Early Neolithic Sites at Brześć Kujawski, Poland: Preliminary Report on the 1976–1979 Excavations

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Since 1976, excavations have been conducted on two neighboring Early Neolithic sites at Brześć Kujawski, Wloclawek district, Poland. The aim of this research is to improve the understanding of the developmental sequence of Early Neolithic cultures on the Polish lowlands as well as to recover palaeobotanical and archaeozoological materials to study the changes in subsistence patterns over time. There are three components of Early Neolithic settlement at Brześć Kujawski: the Linear Pottery, Early Lengyel, and Late Lengyel cultures, which span the period between 4300 and 3000 radiocarbon years B.C. *Large amounts of animal bones indicate a shift from cattle-centered stockbreeding in the Linear Pottery component to a very diverse pattern of animal exploitation in the Late Lengyel component. Early Neolithic house remains, storage pits, flint industries, and copper artifacts are also discussed.*

Introduction

Since 1976 the authors have been conducting excavations on the complex of Early Neolithic sites at Brześć Kujawski, Wloclawek district, located approximately 150 km. NW of Warsaw in the Kujavy region of Poland. At this writing, four excavation seasons, totalling 12 months, have been completed. This article is a preliminary report of the results obtained so far.

The sites at Brześć Kujawski are well-known to European archaeologists because of the pre-World War II excavations of Professor Konrad Jażdżewski, then on the staff of the State Archaeological Museum in Warsaw.[1] The complete or partial outlines of over 50 trapezoidal-plan longhouses which he uncovered cause Brześć Kujawski to remain as one of the largest Neolithic village sites yet excavated in Europe. The current project represents a continuation of this work, with the goals of elaborating the developmental sequence of Early Neolithic cultures in the Polish lowlands and recovering archaeozoological and palaeoethnobotanical materials which have been hitherto poorly-known on European sites of this period. Brześć Kujawski provides an ideal place for the pursuit of such goals, since, on a single complex of sites 0.5 km. in diameter, rich material from the earliest Linear Pottery Culture settlement of the Polish lowlands through the latest stages of the Lengyel culture is found, spanning the period from ca. 4300 to 3000 radiocarbon years B.C. This long span of occupation in a limited area allows us to control for many ecological variables when explaining cultural change at Brześć Kujawski.

The Environmental Setting

Brześć Kujawski (52°36′N, 18°35′E) is located at the eastern end of the Radziejów Plain, a flat area on the west bank of the Vistula River which forms an interfluve between the Warsaw-Berlin and Toruń-Eberswalde glacial meltwater valleys (see map FIG. 1). In the region of Brześć Kujawski, the plain is covered by a ground moraine comprised primarily of boulder clay deposited during the latter stages of the Weichsel (= Alpine Würm) glaciation.[2] The sites them-

1. K. Jażdżewski, "Cmentarzyska Kultury Ceramiki Wstęgowej i Związane z Nimi Ślady Osadnictwa w Brześciu Kujawskim," *Wiadomości Archeologiczne* 15 (1938) 1–105.

2. B. Nowaczyk, "Sytuacja Geomorfologiczna Osad Kultury Ceramiki Wstęgowej Rytej w Brześciu Kujawskim," *Prace i Materialy Muzeum Archeologicznego i Etnograficznego w Lodzi* 23 (1976) 115–120.

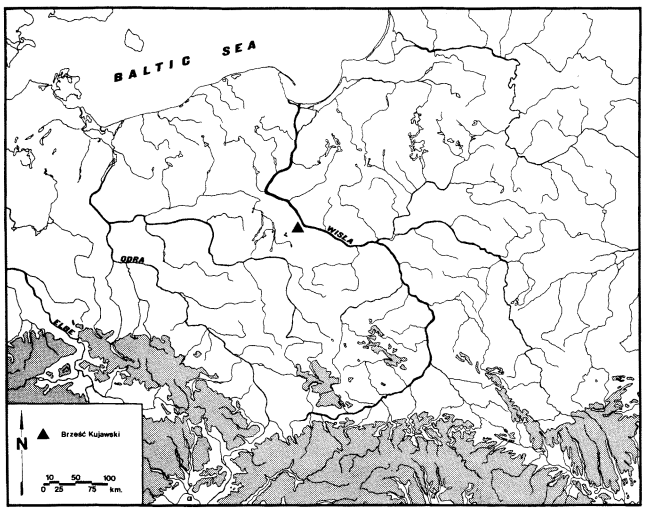


Figure 1. Map of Poland and surrounding areas showing location of Brześć Kujawski. Shaded areas are over 300 m. above sea level.

selves are located on a series of high points in this ground moraine (ca. 85 m. above sea level) which forms a peninsula jutting out into the basin of a large ice-block kettle lake. This lake was formed by the thawing of a huge block of buried ice during the Allerød period,[3] resulting in a 2.5 km. long depression (FIG. 2). This peninsula, although basically composed of morainic clay, is "capped" along its spine by gravels and sands probably deposited during the thawing of the buried ice. It was the digging of sand and gravel that resulted in the discovery of the sites in 1933. The lake is currently dry (except at the western end) as the result of recent land-reclamation programs; until 30 years ago, the peninsula with the sites was surrounded on three sides by water.

Modern land use tends towards keeping as much land as possible in cultivation (including the bottom of the drained

3. Ibid. 118.

Figure 2. Brześć Kujawski and vicinity showing topography in 5 m. contours. Numbers indicate location of sites 3 and 4.

kettle lake), with wheat, rye, barley, sugar beets, potatoes, and chicory as the primary crops.[4] The area of Brześć Kujawski is reputed to have some of the richest agricultural soils in Poland. Before these soils were cleared for cultivation, they were covered by deciduous or mixed deciduous/conifer forest.[5] The actual density of the primeval forest in the Brześć Kujawski area is somewhat problematical, since the area has one of the lowest annual rainfalls in Poland and, in fact, in all of central Europe (under 500 mm./year on the average, with very dry years under 300 mm./year.)[6] Moreover, the topography and soil structure of the flat ground moraine hinders runoff and promotes evaporation and ground infiltration to a deep aquifer. Although the European climate during the Atlantic period, when the Brześć Kujawski sites were first settled during the Early Neolithic, was warmer and moister than today, it would seem that the physiographical and climatological factors contributing to the low rainfall and general dryness of the Brześć Kujawski area today would have been in operation then as well. It is therefore possible that the primeval forest cover of the Brześć Kujawski area was not as dense as that found in surrounding areas of the Polish lowlands.

History of Previous Work at Brześć Kujawski

In the spring of 1933, Dr. Konrad Jażdżewski was conducting surface investigations in eastern Kujavy and excavating a variety of sites ranging in age from Early Neolithic to Early Medieval on behalf of the State Archaeological Museum in Warsaw.[7] Gravel- and sand-digging by the residents of the peninsula described above revealed a number of human skeletons, pottery, animal bones, and other archaeological materials, and Jażdżewski decided to concentrate his work at this location, which he designated as "site 4" (FIG. 3). Between 1933 and 1939, Jażdżewski excavated 438 5 m. by 5 m. units (10,950 m.^{2}) on site 4.[8] At the same time, excavations took place on "site 5", about 100 m. to the west of site 4, where 2750 sq. m. were exposed. It is probable that sites 4 and 5 are really part of the same large settlement, except that the intervening area was unexcavated. In autumn, 1935, traces of Neolithic settlement were discovered about 200 m. to the east of site 4, at the very tip of the peninsula. This was designated as "site 3", and 475 sq. m. were excavated here in 1937. World War II brought a halt to the excavations at Brześć Kujawski, and the shipment of artifacts from the 1939 campaign was destroyed by bombing at the Warsaw train station. Some lots of the materials from previous seasons were mixed and some destroyed during the Warsaw Uprising in 1944.

The 1976 and 1977 Excavations

In 1976 and 1977, excavations took place on site 4, the main focus of Jażdżewski's excavations between 1933 and 1939 (FIGS. 3,4). During these two seasons, a total of four months, 850 sq. m. were excavated to an average depth of 80 cm., although some of the deeper features reached to more than 1.5 m. below the surface. The stratigraphy of site 4 is typical of many open-air sites in temperate Europe in that there is no real depth of layered deposits but rather a complicated palimpsest of pits, postholes, trenches, and graves excavated by the prehistoric (and recent) inhabitants of the site from the 5th millennium B.C. onwards. These features overlap and cut through each other to create a complex horizontal stratigraphy. The vertical stratigraphy, on the other hand, is relatively simple and can be summarized as follows:

1. a 30 cm. thick plow zone which is disturbed every year;
2. a 30 cm. thick (on the average) humic layer not disturbed by modern plowing which consists of a combination of the collected organic debris of six millennia of intermittent occupation of the site and the humus and leaf litter formed on the site when it was not occupied or cultivated;
3. the sterile sand, gravel, or boulder clay (depending on the part of the site) into which the features are dug.

It is generally impossible to discern different strata or anything that might be considered a "living surface" within the humic layer, even though it did contain artifacts from all periods of occupation of the site and even though this deposit was carefully trowelled in case such strata could be perceived. This lack of defined strata in the humic layer is the result of a combination of processes. These include erosion, disturbances associated with construction during later prehistoric and modern occupation of the site, and, especially, several millennia of cultivation on the site at those times when it was not inhabited. The high concentration of fertile organic settlement refuse on the site probably made it very attractive to later cultivators whose activities appear to have thoroughly mixed the contents of

4. A. Dzierzawski, *Wieś i Kolonia Kąkowa Wola w Powiecie Wloclawskim* (Warszawa 1965).

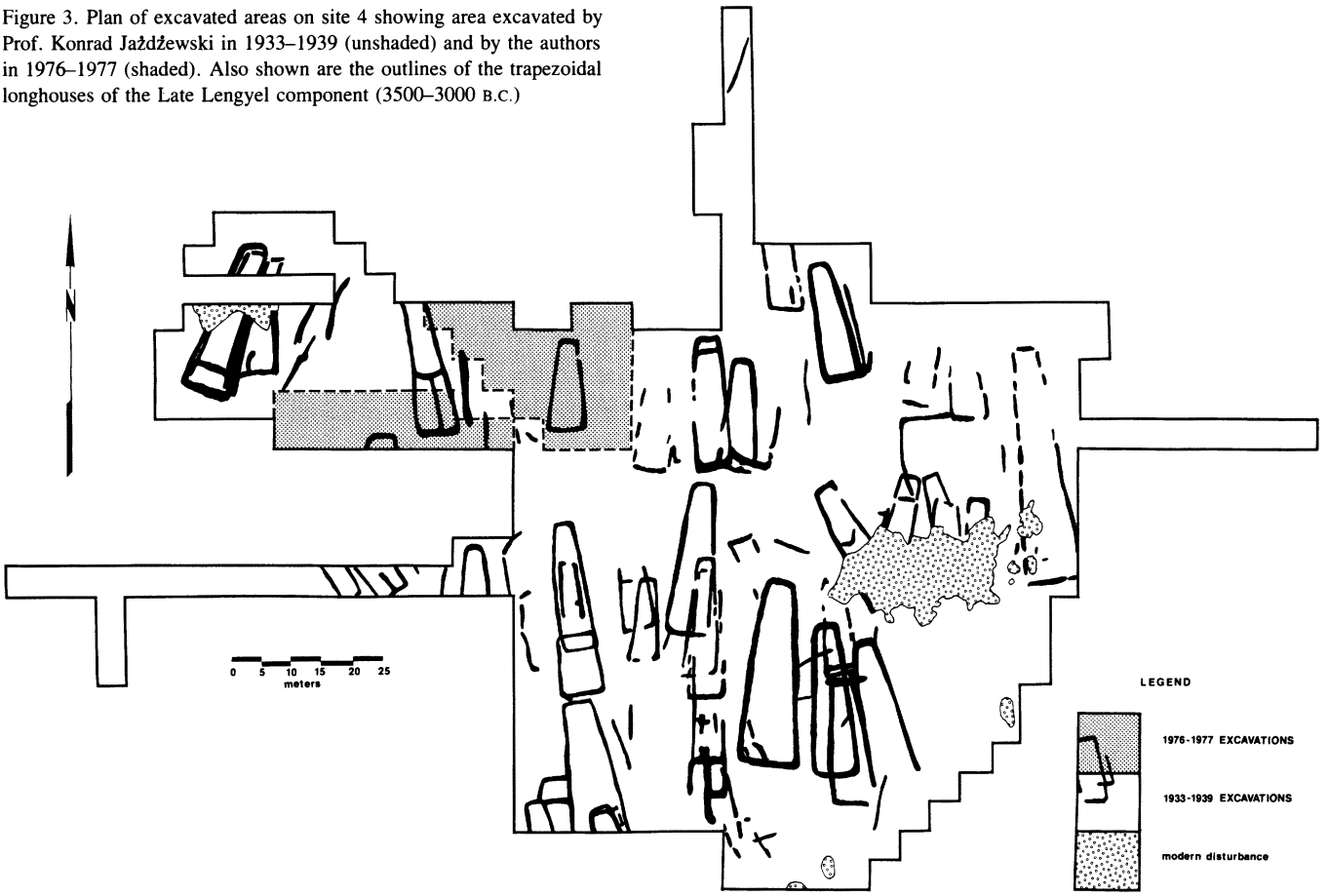
5. F. Szafrański, "Historia Roślinności Okolic Nowin w Pow. Inowroclawskim," *Badania Fizjograficzne nad Polską Zachodnią* 15 (1965) 147–165.

6. R. Glazik, "Stosunki Wodne Pow. Wloclawskiego," *Przegląd Geograficzny* 42 (1970) 661–684.

7. Jażdżewski, op. cit. (in note 1); material from the 1933–39 excavations at Brześć Kujawski was also published by L. Gabalówna, *Ze Studiów nad Grupą Brzesko-kujawską Kultury Lendzielskiej* (Lódź, 1966); R. Grygiel, "Osady Kultury Ceramiki Wstęgowej Rytej w Brześciu Kujawskim kolo Wloclawka," *Prace i Materialy Muzeum Archeologicznego i Etnograficznego w Lodzi* 23 (1976) 5–114.

8. Jażdżewski, op. cit. (in note 1).

Figure 3. Plan of excavated areas on site 4 showing area excavated by Prof. Konrad Jażdżewski in 1933–1939 (unshaded) and by the authors in 1976–1977 (shaded). Also shown are the outlines of the trapezoidal longhouses of the Late Lengyel component (3500–3000 B.C.)



the humic layer. Diagnostic Neolithic potsherds are often found lying on top of Iron Age ones, clearly not in their primary depositional contexts.

As a result, our overriding interest is in the spatial arrangement, the stratigraphic relationships, and contents of the various features which have been dug into the sterile soil underlying the site. This is not to say that the artifactual content of the humic layer was ignored, since although mixing of materials has taken place vertically, there has been very little horizontal displacement of these artifacts. In many cases, concentrations of material in the humic layer presaged features subsequently found below.

In order to be consistent with Jażdżewski's documentation, a 5 m. x 5 m. excavation unit was employed. The plow zone was removed as a single unit by shovel, while the humic layer was trowelled by 10 cm. levels. When the humic layer/sterile soil interface was reached, the surface of the excavation unit was sprayed with water to bring out the color difference between the dark features and the light subsoil. After mapping, the features were sectioned to obtain profiles. Large features were divided into quadrats and opposing sections removed simultaneously in order to obtain both longitudinal and latitudinal profiles. All excavation within features took place by 5 cm. or 10 cm. levels (depending on the density of the cultural material) unless there was visible stratification. About 30% of the fill of each feature was wet-screened using 2 mm. mesh.

The 1978 and 1979 Excavations

In 1978 and 1979, our attention was shifted to site 3, about 200 m. to the east of site 4. This shift was prompted by several considerations. First, site 3, which is separated from site 4 by a slight depression, formed a discrete locus of prehistoric settlement that had been barely touched by previous excavations. In 1937, Jażdżewski had excavated 475 sq. m. there, but the greater part of the site was completely unexcavated. Secondly, site 3 was on unused ground, so we could strip large areas and extend our excavations whenever necessary. In contrast, modern cultivation had hindered our ability to open up wide areas on site 4 without having to pay large sums in damages. Third, the area of site 3 was scheduled to be converted later in 1979 into garden plots for the residents of Brześć Kujawski. The present opportunity, therefore, would be our last to work there, a fact that added a sense of urgency to our

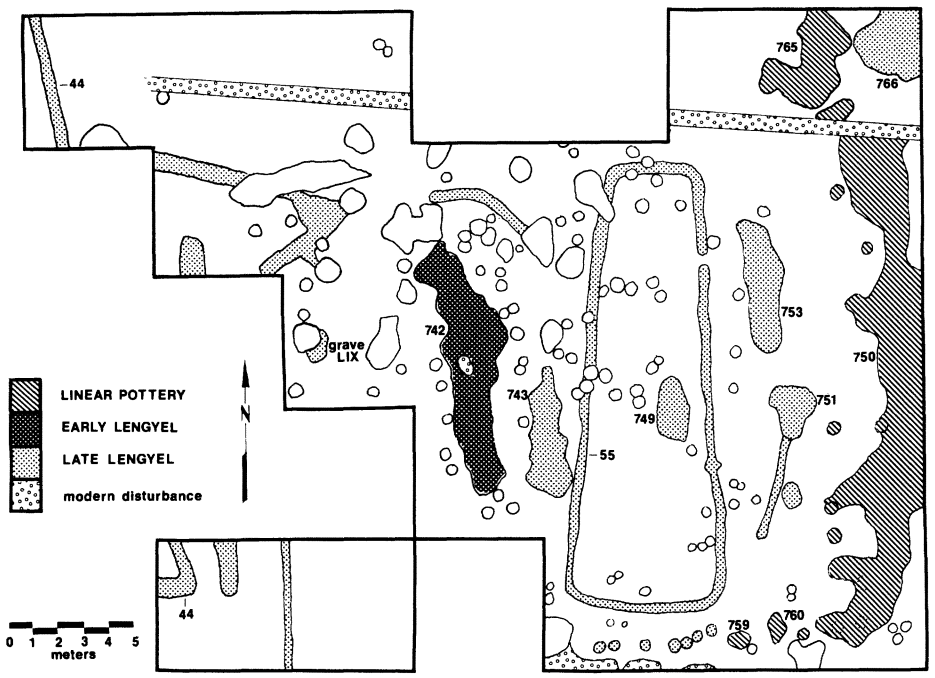


Figure 4. Area of 1977 excavations, showing features from all three Early Neolithic components. Unshaded features are from later prehistoric periods.

work. Finally, we knew from Jażdżewski's trial excavations that there were primarily Early Neolithic materials on site 3 without much of the later occupation (especially Iron Age) found on site 4. In this way, we hoped that we would be able to see stratigraphic relationships between Early Neolithic features better, and thus improve our understanding of the Early Neolithic developmental sequence on both sites.

During the two seasons, totalling 8 months, an area of 1500 sq. m. was exposed to an average depth of 50 cm. Basically the same excavation methodology was used for our excavations on site 3 as was employed on site 4, except that the absence of crop cover allowed us to expand our excavation area and expose a wide surface (FIG. 5). The stratigraphy of site 3 consists simply of a plow zone/humic layer about 25 cm. thick on the average (although ranging up to 40 cm. in spots) and then the sterile boulder clay into which the features are dug. The lack of a well-defined plow zone and humic layer configuration like that of site 4 is partly because the irregular shape of the end of the peninsula probably made it unsuitable for regular cultivation in recent centuries, and partly because of the lack of post-Neolithic settlement on the site.

Chronology

Site 4 shows signs of several episodes of occupation. The most intense is that which occurred during the Early Neolithic (Linear Pottery and Lengyel cultures), with which we are most concerned here. Several other pits contained Late Neolithic (Globular Amphora culture), Early Bronze Age (Trzciniec culture), and Early and Middle Iron Age (late Hallstatt and La Tène periods) material.[9] On site 3, apart from two Middle Iron Age pits and some medieval potsherds in the plow zone, there were only Early Neolithic materials.

Table 1. Radiocarbon dates from Brześć Kujawski

Sample	*Date*	*Associations*
GrN-8867	4590 ± 130 B.P. (2640 B.C.)	Linear Pottery culture (site 4, pit 643)
GrN-9255	6180 ± 35 B.P. (4230 B.C.)	Linear Pottery culture (site 3, pit 769)
GrN-8869	5330 ± 130 B.P. (3380 B.C.)	Late Lengyel culture (site 4, hut 44)
Lod-110	5160 ± 180 B.P. (3210 B.C.)	Late Lengyel culture (site 3, pit 773)
GX-6369	5525 ± 320 B.P. (3575 B.C.)	Late Lengyel culture (site 3, pit 775)
GX-6370	4515 ± 210 B.P. (2565 B.C.)	Late Lengyel culture (site 3, pit 784)

From the beginning of our excavations at Brześć Kujawski in 1976, a major interest has been the radiocarbon dating of Early Neolithic materials. Six dates (TABLE 1, FIG. 6) are currently available for Early Neolithic features at Brześć Kujawski and more are expected in the future. In all cases, the material analyzed was wood charcoal. GX-6369 and GX-6370 consisted of charcoal from wet-screen-

9. These materials were very sparse and will be treated in the future in a separate publication.

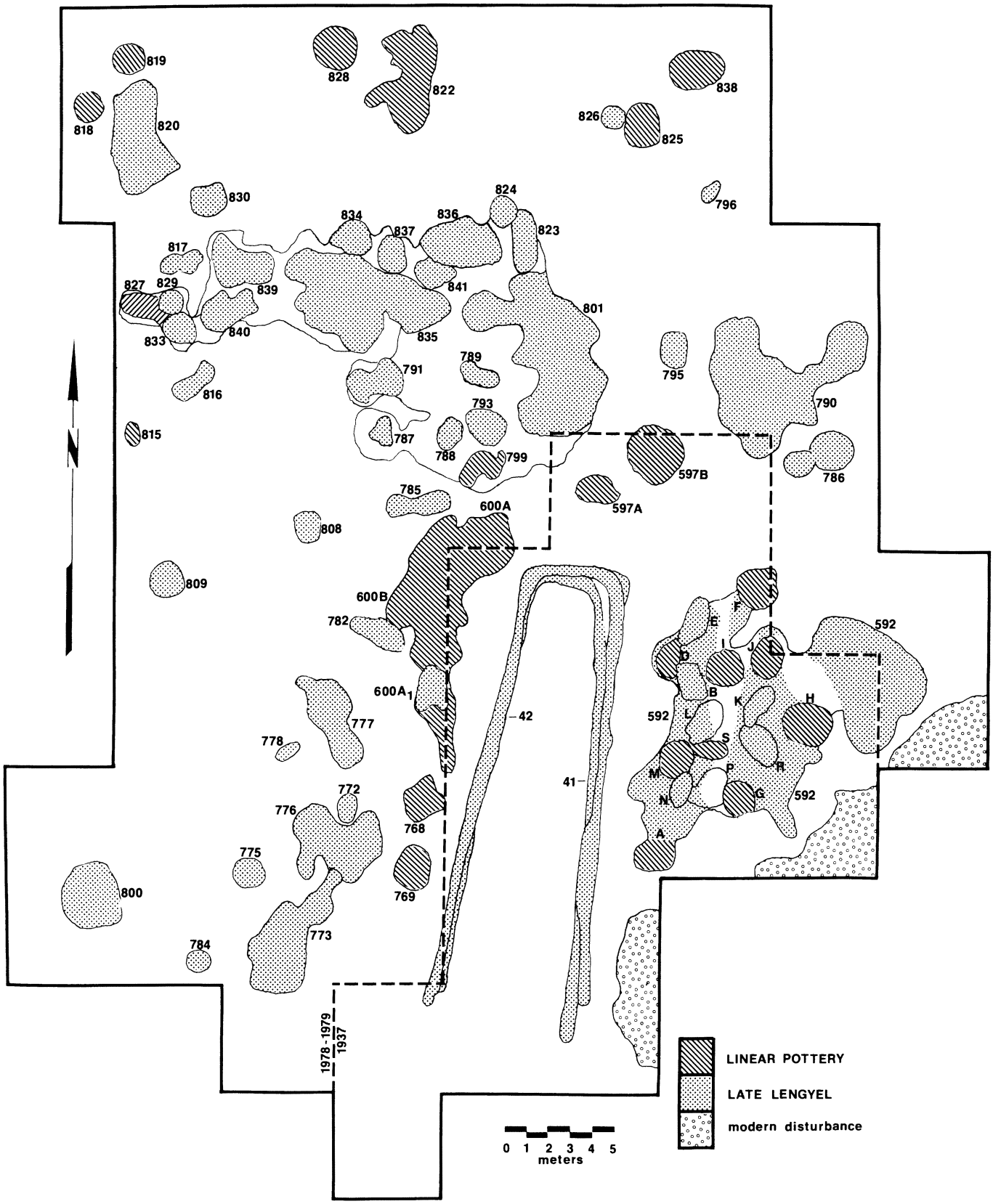


Figure 5. Plan of excavated areas on site 3 showing areas excavated in 1937 by Jażdżewski and in 1978–1979 by the authors. There are two longhouses in the area excavated by Jażdżewski, stratified one on top of the other. Note the lack of an Early Lengyel component.

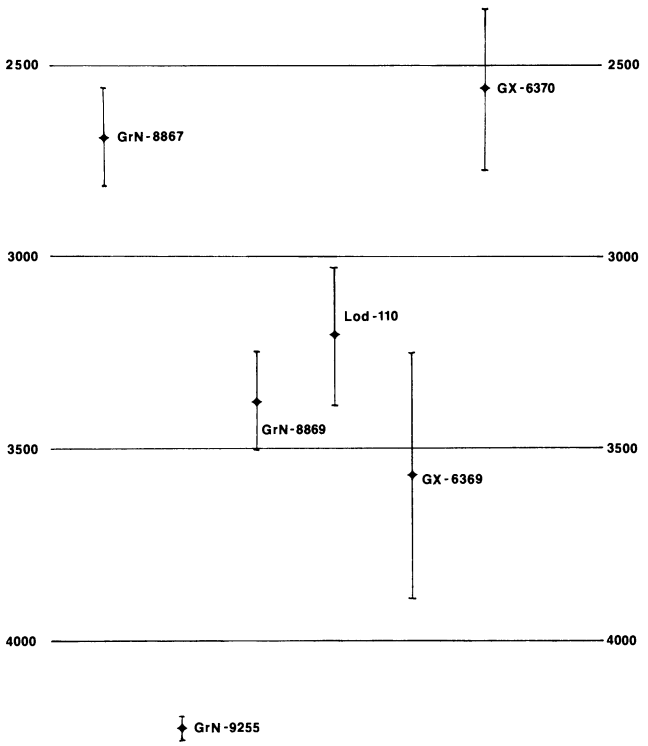


Figure 6. Chart of radiocarbon dates (unrecalibrated) from the 1976–1979 excavations at Brześć Kujawski.

ing residue.[10] All dates are given according to the 5570 ± 30 half-life, unrecalibrated.

GrN-8867 and GrN-9255 date materials of the Linear Pottery culture (see below). In comparison to many other Linear Pottery dates from across Europe, GrN-8867 is much too young. We believe that this circumstance is attributable to sample quality, that is, the small charcoal pieces in the sample may have been contaminated by small pieces of later date carried downward in the soil profile. GrN-9255, which consisted of large pieces of charcoal from the bottom of a pit, fits very well with the many other Linear Pottery dates from central Europe. In particular, it compares very well with the only other Linear Pottery date from the Polish lowlands, that from Strzelce (GrN-5087), 4310 ± 70 B.C.[11]

The remainder of the dates are associated with materials that belong on typological grounds (see below) to the late stage of the Lengyel culture. Of these, GX-6370 is somewhat later than the rest, while GX-6369 is slightly earlier, but they generally are in agreement with other dates known for late Lengyel materials.[12] It is therefore possible to place the late stage of the Lengyel culture firmly in the second half of the 4th millennium B.C., probably continuing somewhat into the first half of the 3rd millennium B.C.

No radiocarbon dates are yet available for materials of the early stage of the Lengyel culture, which are more sparsely represented on site 4 than Linear Pottery and late Lengyel materials, and are not found at all on site 3, but it is possible to conclude that they fit into the span between ca. 4000 B.C. and ca. 3500 B.C.

Architectural evidence

The major identifiable traces of structures on both sites 3 and 4 are those of the trapezoidal longhouses dating to the late stage of the Lengyel culture (FIGS. 3,4,5). These appear against the subsoil as long black discolorations with relatively parallel edges (FIGS. 7,8) which are the traces of bedding trenches into which upright posts were placed. Such bedding trenches range 20–50 cm. in width and from a few centimeters to over a meter in depth below the humic layer/sterile soil interface. The depositional processes associated with the filling of these bedding trenches vary. In some places, there are distinct darker discolorations visible in the longitudinal profiles which appear to be the traces of decomposed posts. Elsewhere, no such posts appear at all and instead the trench is filled with potsherds, flint tools and debitage, and animal bones, suggesting that the posts of a house fallen into disrepair were pulled out and the resultant trench filled with refuse.

During the 1976 and 1977 seasons on site 4, one complete longhouse and the parts of two others were exposed (FIGS. 3,4,7,8). One of the fragmentary longhouses was really the completion of one partially excavated by Jażdżewski (hut 44), while the other partial longhouse was a completely new structure (hut 54). Unfortunately, the outline of this structure had been partially destroyed by gravel digging during World War II, in the area of the southern border of the 1976 excavations. Where the bedding trenches of this structure were preserved, they contained a large amount of faunal material, and this appears to be one of the cases where the original posts were pulled out before the trench was filled.

The one complete longhouse, excavated during the 1977 season (hut 55; see FIGS. 7,8), was 18 m. long, 6 m. wide at the southern end and 3 m. wide at the northern, more or less average dimensions when compared to other late Len-

10. See T.W. Jacobsen, "New Radiocarbon Dates from Franchthi Cave: a Preliminary Note Regarding Collection of Samples by Means of Flotation," *JFA* 1 (1974) 303–304, for a discussion of the use of water-separation residue for radiocarbon dating. Jacobsen concludes that, barring contamination from other sources, there should be no difference in dates between trench-collected and water-separated samples.

11. J. Bakker, J. Vogel, and T. Wiślański, "TRB and Other C14 Dates from Poland," *Helenium* 9 (1969) 3–37, 209–238.

12. A late date comparable to GX-6370 is available for Late Lengyel materials at Zlotniki in southern Poland at 2760 ± 200 B.C. (M-1847).

Figure 7. Pattern of pits, postholes, and bedding trench of house 55 in excavation units 592 and 597 on site 4 (facing north).

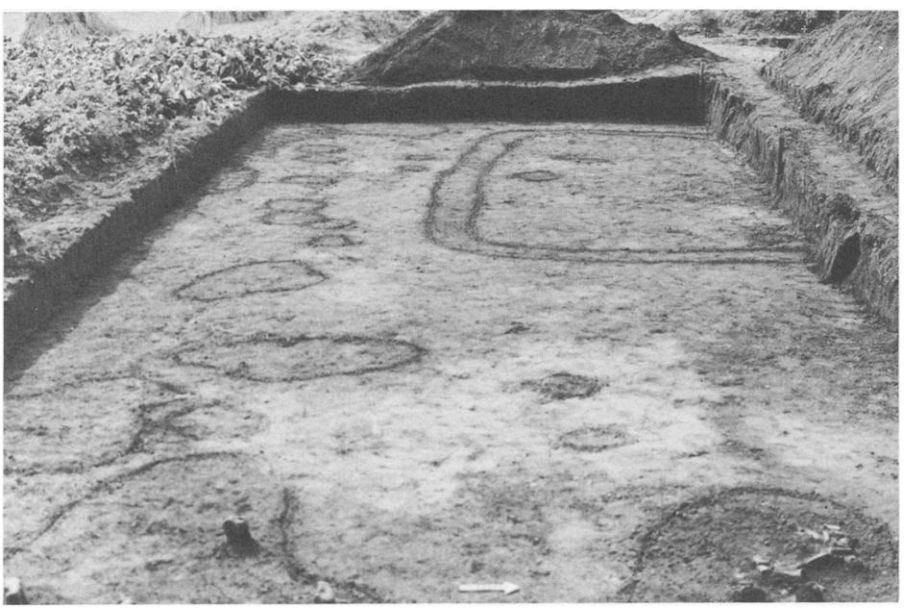


Figure 8. Views of units 594, 595, and 596 (facing west) showing southern terminus of house 55.

gyel longhouses on site 4 and other sites.[13] It is characterized by relatively narrow (20–30 cm.) and shallow (30–40 cm.) bedding trenches in which the traces of posts could be perceived and which contained a paucity of faunal material and artifacts. Whereas the other Brześć Kujawski longhouses form clusters where a house site has been built upon several times, the site of this longhouse appears to have been utilized only once.

No trapezoidal longhouses were found during the excavations on site 3 in 1978 and 1979, although two were located by Jażdżewski during his excavations on this site in 1937 (FIG. 5). These structures (huts 41 and 42) are superimposed, indicating the conscious effort to reuse the same house location. Since virtually the entire area of Early Neolithic settlement on site 3 was excavated, it can be said

13. Other trapezoidal longhouses in the Polish lowlands are described in K. Jażdżewski, op. cit. (in note 1); F. Maciejewski, "Budowla Trapezowata Kultury Nadcisańskiej z Biskupina," *Sprawozdania Archeologiczne* 2 (1956) 26–33; J. Bednarczyk and A. Kośko, "Badania Archeologiczne na Stanowisku 2 w Dobieszewicach, Pow. Mogilno," *Sprawozdania Archeologiczne* 27 (1975) 197–226; L. Czerniak, "Osada Kultury Lendzielskiej w Kościelcu Kujawskim, Gm. Pakość, Stan. 16," *Pomerania Antiqua* 8 (1979) 73–109.

with certainty that these are the only trapezoidal structures on site 3.

Numerous postholes on site 4 (but almost none on site 3) indicate that structures were erected during other periods on the site, although a major problem exists in associating postholes with specific chronological units. By virtue of the stratigraphic relationship of some postholes with datable features, it is possible to state that there were probably post structures on the site during the Linear Pottery and early Lengyel (i.e. pre-longhouse) periods as well, although it is uncertain what form these structures took[14] or whether they were of more than a temporary nature.

Pits

The most common features on sites 3 and 4 are pits of various sizes and shapes. As with the bedding trenches, the processes involved in the prehistoric excavation and filling of these features are quite varied. Some pits are obviously deliberate excavations for specific purposes. In this category are the large, deep, irregular pits found on site 3 which are borrow pits for clay (for example pits 773, 776, and 777 in FIG. 5). Such borrow pits are also found on site 4 where the clay is relatively close to the surface (e.g. pit 765 in FIG. 4). These clay pits are characterized by their irregular profiles, elongated plans, and relatively great depth (pit 765, for instance, extends almost 2 m. below the present surface). After the clay was extracted, these pits were filled up with refuse.[15] To judge from the volume of these pits, the demand for clay, probably for plastering houses, was very great. Other pits, in many cases shallow and covering a wide area, appear to be simply undulations in the original surface of the site which then filled with trash in the course of the prehistoric occupation. Good examples of these are pit 750 on site 4 and pits 600 A and 600 B on site 3. These features are all elongated like many of the clay pits, but are extremely shallow, often only 10–20 cm. below the humic layer/sterile soil interface. It should be noted that the clay borrow pits are characteristically filled with late Lengyel materials (which is not surprising in light of the clay demand necessitated by longhouse construction) and the shallow, wide trash deposits are characteristic of the Linear Pottery culture.[16]

Several of the pits excavated on site 3 in 1978 are notable (namely pits 775 and 784 in FIG. 5) in that they appear to have been used for the live storage of lacustrine resources such as fish, molluscs, and turtles. These features date to the late stage of the Lengyel culture, contemporary with the period of longhouse construction. They are of different dimensions, but all are wider at the bottom than at the top[17] in their profiles. One of these features (FIG. 9) had very interesting stratigraphy, which led to the assessment of the function of these pits by the authors. On the very bottom of this pit (5) were many laminae of water-deposited sand, which contrasted markedly with the clay into which the pit was dug and which indicate that standing turbid water had been present in the pit and renewed at intervals. Across the top of these sand layers (7) was a layer of freshwater mollusc valves *(Unio* sp.) lying one mollusc thick across the entire interior of the pit. This layer of shells is of both such uniform thickness and such density (the valves appeared to be deposited while still articulated) that it does not seem to be consumption refuse but rather stored, uneaten shellfish.[18] Lying directly on this layer of shells was a human skeleton (FIG. 10), which was in such a position and without any grave goods so as to preclude the possibility that the mollusc valves were part of the burial rite.[19] The interment of this individual ended the use of this pit for storage, and the rest of the feature is filled with refuse, including many fish bones, pieces of mollusc shell, and turtle carapace. A smaller feature, pit 784, did not have the distinctive stratigraphy of pit 775, but nonetheless had the same bell-shaped profile and a dense concentration of fish and turtle bones.

Burials

In the course of four seasons at Brześć Kujawski, 12 human burials have been found, which can be added to the

14. Soudský hypothesized that the traces of Linear Pottery longhouses could be found at Brześć Kujawski in B. Soudský, "Etude de la Maison Neolithique," *Slovenska Archeologia* 17 (1969) 5–96. We seriously doubt that the postholes found on site 4 are the remains of anything like the large longhouses found at many large Linear Pottery sites on the central European loess uplands, since the regularly-spaced patterns of postholes of constant depth are just not found at Brześć Kujawski.

15. The density of this refuse in Late Lengyel pits varies in direct proportion to the proximity of the pit to a contemporary longhouse.

16. Further discussion of the differences between Linear Pottery and Lengyel settlement remains can be found in P. Bogucki, "Tactical and Strategic Settlements in the Early Neolithic of Lowland Poland," *Journal of Anthropological Research* 35 (1979) 238–246.

17. These features are reminiscent of the Mesoamerican bell-shaped pits described in M. Winter, "The Archaeological Household Cluster in the Valley of Oaxaca," *The Early Mesoamerican Village*, K. Flannery, ed. (New York, San Francisco, and London 1976) 25–31.

18. For other cases of Early Neolithic shellfish storage, see L. Smoczynska, "Kultura Ceramiki Wstęgowej w Wielkopolsce," *Fontes Archaeologici* (Poznań) 3 (1952) 1–84; A. Kulczycka-Leciejewiczowa, "Nowa Huta-Pleszów: Osada Neolityczna Kultury Ceramiki Wstęgowej Rytej i Lendzielskiej," *Materialy Archeologiczne Nowej Huty* (Kraków) 2 (1969) 7–124.

19. Moreover, shellfish are not known from any other Lengyel burials except in the form of ornaments made from shell.

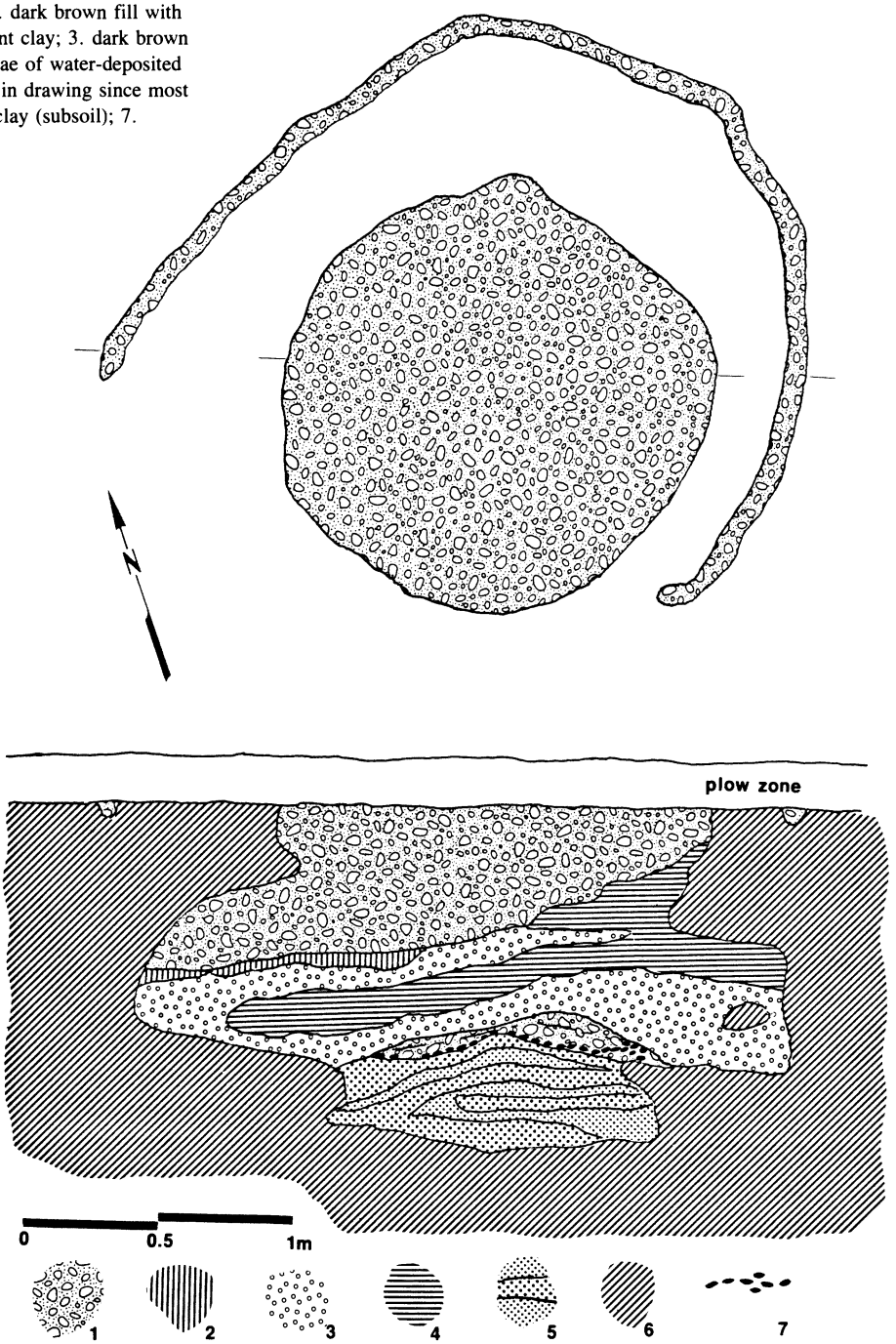


Figure 9. Plan and section of pit 775. Legend: 1. dark brown fill with potsherds, flint, and animal bones; 2. lightly burnt clay; 3. dark brown fill; 4. light brown fill mixed with clay; 5. laminae of water-deposited sand (only major units of this deposit are shown in drawing since most of these laminae are very fine layers); 6. sterile clay (subsoil); 7. mollusc valves (*Unio* sp.).

38 excavated by Jażdżewski between 1933 and 1939.[20] Of these, five are on site 4 and seven are on site 3 (TABLE 2), and all date to the late stage of the Lengyel culture. The five burials on site 4 all have the flexed position and orientation of the head towards the south or SSE which are typical of most Lengyel culture burials (FIG. 11). Only one of the 1976–77 burials on site 4 had any grave goods.[21] Burial LIX had several perforated pieces of mollusc shell around the neck and six tubular beads made from the pol-

20. Jażdżewski, op. cit. (in note 1); Gabalówna, op. cit. (in note 7).

21. Several of the graves excavated by Jażdżewski were quite richly furnished, however; see Jażdżewski, op. cit. (in note 1) 6–29.

ished diaphyses of mammal bones around the waist.

There were noticeable differences between the burials found on site 3 and those on site 4. Whereas those excavated on site 4 show a marked uniformity of burial rite with their flexed position and the southerly orientation of the head, those on site 3 are interred in a variety of positions, both flexed and extended. The individual buried in the storage pit described above (burial LX) appears to have been simply laid in the pit with little attention paid to the orientation of the body. Three of the burials are in one pit (burials LXIV, LXV, and LXVI in pit 801) with two extended and one strongly flexed. The differences between the site 4 burials of the 1976–77 seasons and the site 3 burials appear to result from a change in the burial rite which took place between Late Lengyel phase II and Late Lengyel phase III (see *Ceramics* below).

Early Neolithic Material Culture

The Early Neolithic at Brześć Kujawski can be divided into three components.

1. Linear Pottery culture (ca. 4300–4000 B.C.)
2. Early Lengyel culture (ca. 4000–3600 B.C.)
3. Late Lengyel culture (ca. 3600–3000 B.C.)

The Late Lengyel culture in the Polish lowlands is also known as the "Brześć Kujawski group" of the Lengyel culture, since Brześć Kujawski was where Jażdżewski first recognized the focus of Late Lengyel ceramics peculiar to the Polish lowlands. In each of the three broad temporal divisions noted above, it is possible to discern finer subdivisions based on the stratigraphic relationships of pits and trapezoidal huts on sites 3 and 4, as well as on stylistic parallels with Early Neolithic materials in southern Poland and Germany

Ceramics

The ceramics of the Linear Pottery component at Brześć Kujawski belong to two basic technological classes.

1. *Fine ware*. Well-wedged clay with sherd or fine sand temper, fired to a gray or reddish-gray color, with wall thicknesses of 4–8 mm.

2. *Coarse ware*. Fiber-tempered paste, sometimes with the inclusion of small stones or crushed flint, fired to a brown or reddish-brown color, with wall thicknesses of 8–15 mm.

The paste, temper, and color of these two classes of Linear Pottery ceramics are virtually identical to those found across Europe and Slovakia to eastern France. At Brześć Kujawski, there are four basic Linear Pottery vessel forms (FIG. 12). Virtually 90% of all vessels belong to group I, 3/4-spherical bowls, which is the "classic" vessel form associated with middle and late phases of the Linear Pottery culture in central Europe. Some vessels belonging to group IV, shallow

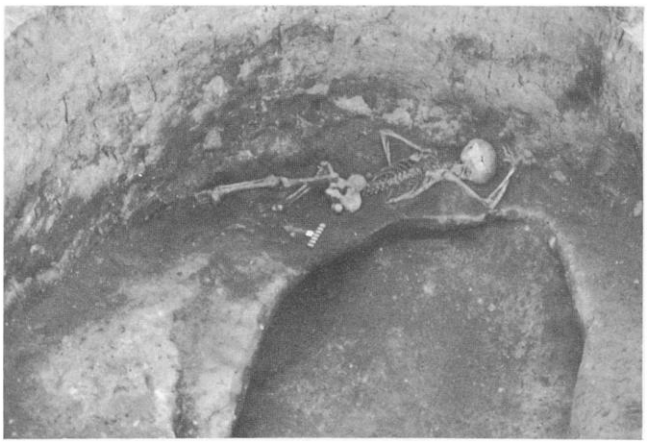


Figure 10. Burial LX in pit 775 on site 3.

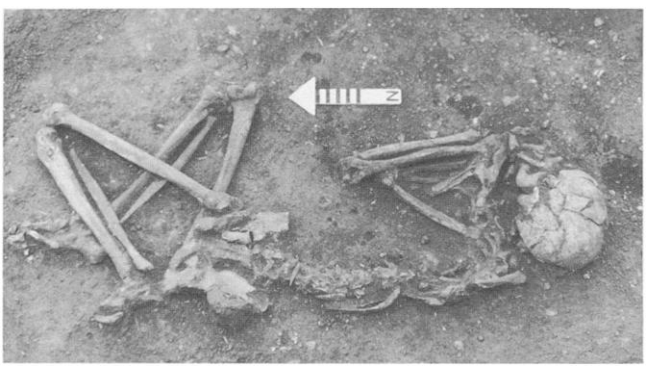


Figure 11. Burial LVIII on site 4. This burial was quite shallow and the rib cage and parts of the pelvis and feet were destroyed by modern plowing.

Table 2. Summary data on inhumations excavated at Brześć Kujawski 3 and 4. burials LV-LIX were excavated in 1976 and 1977 on site 4; burials LX-LXXI were excavated in 1978 and 1979 on site 3. Missing Roman numerals were assigned to stray pieces of human bone or teeth found in the course of excavation but which could not be definitely associated with an inhumation. A = adult; * = not preserved.

Burial number	*Age*	*Sex*	*Position of skeleton*	*Orientation of head*
LV	A	M	contracted	SE
LVI	1 yr.	?	contracted	S
LVII	A	F	contracted	SSE
LVIII	A	M	contracted	SSE
LIX	ca.15 yrs.	M?	contracted	S
LX	ca.15 yrs.	M?	extended	E
LXIII	A	M	contracted	N
LXIV	A	*	extended	N
LXV	A	M	extended	W
LXVI	A	M	contracted	W
LXX	A	F	contracted	N
LXXI	A	F	contracted	SW

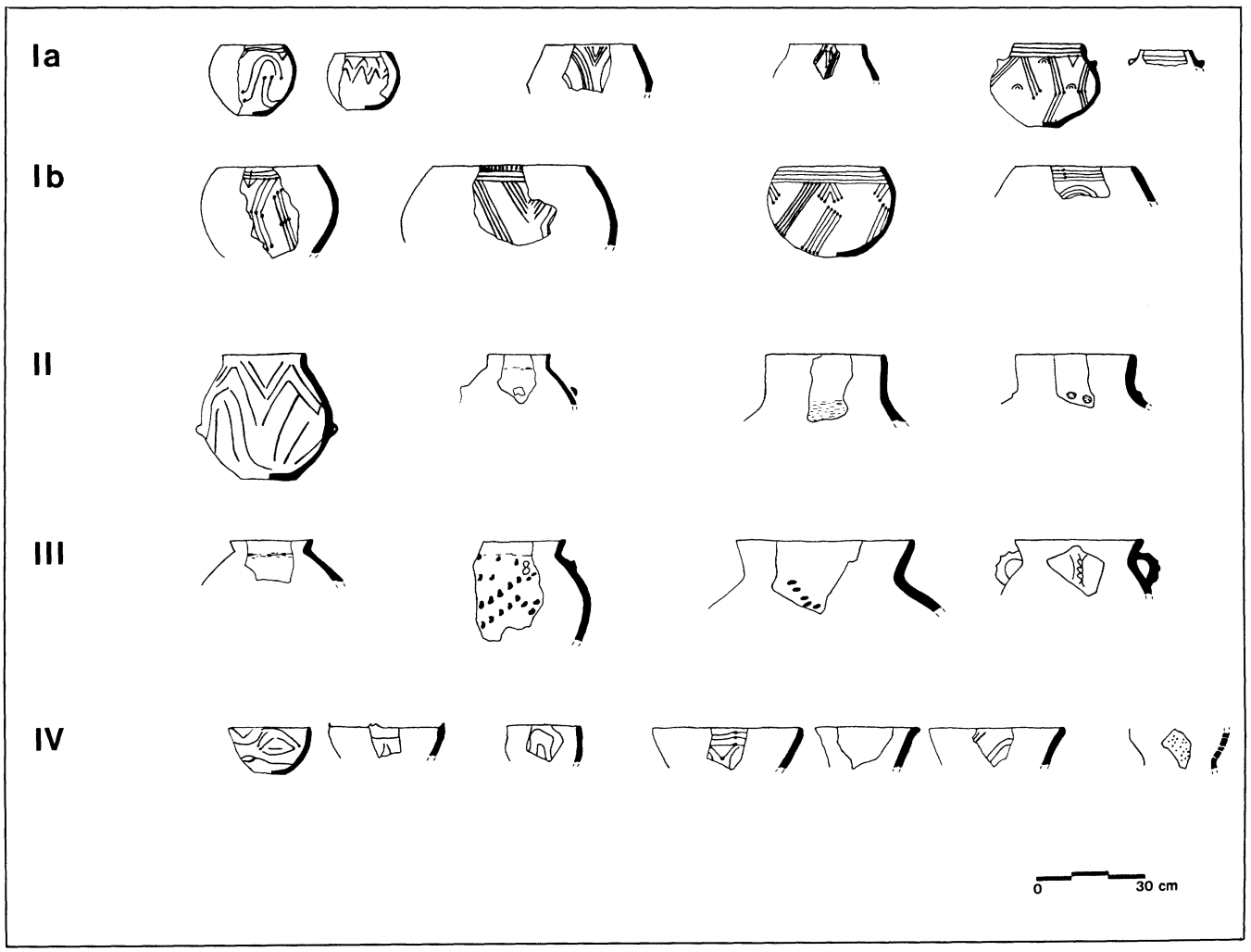


Figure 12. Linear Pottery ceramic vessel forms and decoration.

bowls, are perforated over the entire body of the vessel. Such "colander" sherds are found in very small numbers at virtually every Linear Pottery site in the Polish lowlands.[22]

Both the fine and coarse Linear Pottery ceramics have their own characteristic decoration. The fine ware is decorated by incised lines (from which the Linear Pottery culture takes its name), which are relieved by circular or oval punctates at their terminal points, where one line crosses another, or at intervals along their length (the so-called "music note" motif). The coarse ware, if it is decorated at all, usually has rows of fingernail impressions. Such fingernail impressions never occur as decoration on fine ware and *vice-versa*. Within these classes of decoration, a wide variety of motifs prevail, only a few of which appear in Figure 12. The more curvilinear incised motifs (FIG. 12: Ia, II) are characteristic of the middle phase of Linear Pottery in southern Poland and Germany, while the more angular motifs (FIG. 12: Ib) are characteristic of the late phase in these areas. While it was not possible to demonstrate this same chronological sequence stratigraphically at Brześć Kujawski because of the dispersed nature of the Linear Pottery features, we can discern that the Linear Pottery material on site 3 fits with the motifs of the middle phase, while that on site 4 corresponds to the late phase. We take this to indicate that the Linear Pottery settlement of sites 3 and 4 did not take place simultaneously, although the exact duration of each of these occupations is uncertain.

Early Lengyel ceramic technology shows far greater variety than does Linear Pottery. The ceramic material cannot be divided into "coarse ware" and "fine ware", but rather forms a continuum from coarse to fine. The very fine Linear

22. L. Gabalówna, "Ślady Osadnictwa Kultur z Cyklu Wstęgowych w Radziejowie Kujawskim," *Prace i Materialy Muzeum Archeologicznego i Etnograficznego w Lodzi* 9 (1963) 25–91; T. Wiślański, "Kultura Ceramiki Wstęgowej Rytej na Ziemi Pyrzyckiej," *Studia Archaeologica Pomeranica*, F. Lachowicz, ed. (Koszalin 1974) 53–77.

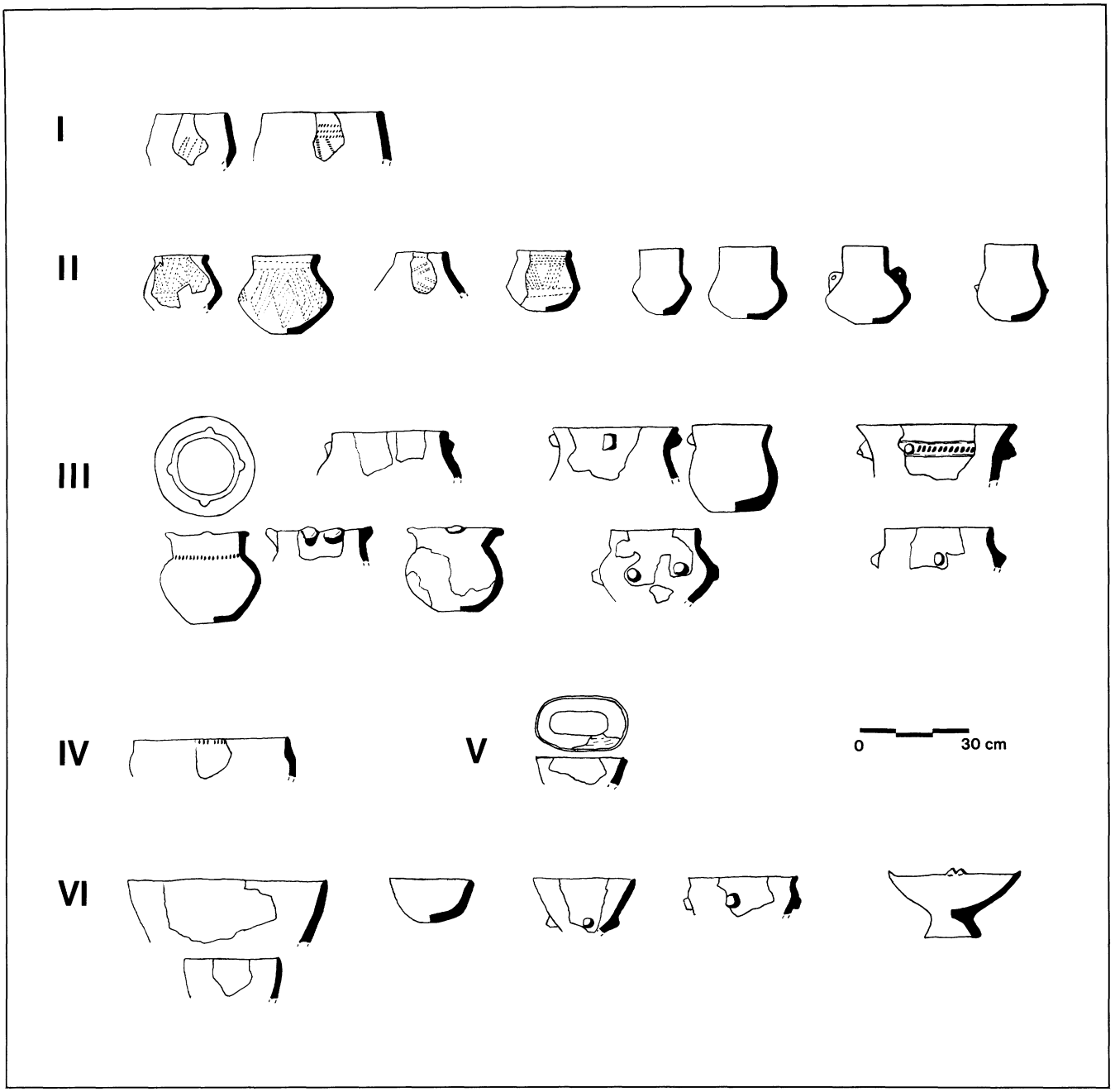


Figure 13. Early Lengyel ceramic vessel forms and decoration.

Pottery gray ware is no longer found, and there is an increase in the use of plant fiber and the first appearance of micaceous stone as tempering materials. There is also a greater variety of vessel forms in the Early Lengyel component than in the Linear Pottery material (FIG. 13). No single form predominates, although groups I (biconical vessels), II (narrow-mouthed jugs), and III (wide-mouthed jugs) are most common. The typical Linear Pottery 3/4-spherical bowl form is no longer found.

Surface decoration on Early Lengyel vessels is much less common than on Linear Pottery ceramics. Stroked ornamentation, especially prevalent at this time in assemblages in SW and western Poland and East Germany, is relatively rare at Brześć Kujawski (FIG. 13: I,II). When stroked ornamentation is found, the rows of strokes are in angular or rhomboid patterns, much like the angular incised lines on the late Linear Pottery material. Incised decoration, in the form of bands of short vertical incised lines, is also found,

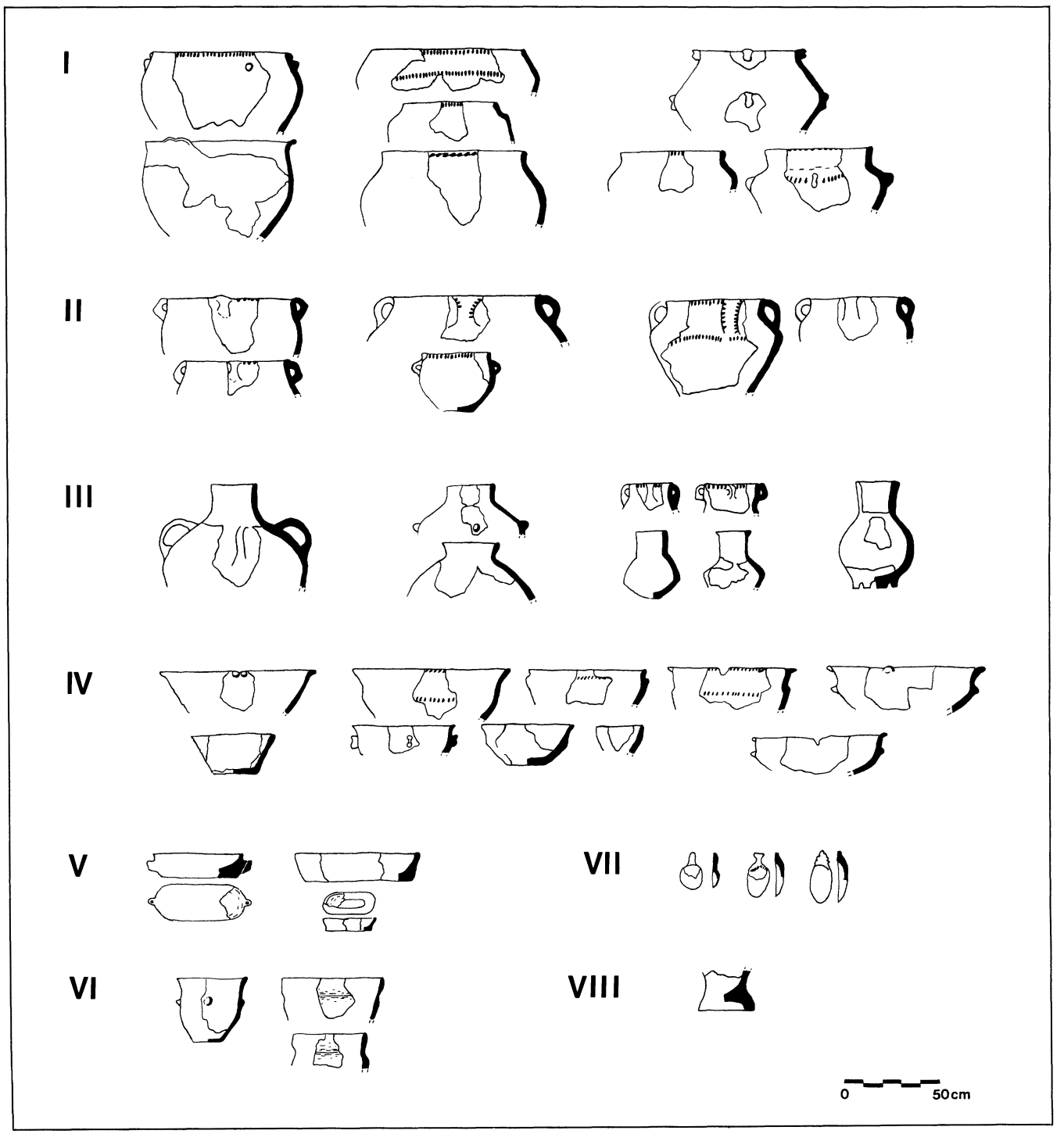


Figure 14. Late Lengyel ceramic vessel forms and decoration.

usually on the rim, neck, or waist of the vessel. Appliques, in the form of conical bosses and various types of lugs, make their first appearance.

It is difficult to make any statements about chronological divisions within the Early Lengyel component because of the relatively small amount of these materials at Brześć Kujawski in comparison to those of the Linear Pottery and Late Lengyel components. As a general rule, in Early Len-

gyel assemblages in the Polish lowlands the amount of stroked ornamentation declines through time. Based on the rarity of such decoration in the Brześć Kujawski Early Lengyel materials, they should be assigned to a relatively late phase of Early Lengyel. It should be noted that Early Lengyel materials do not appear at all on site 3 and in only a limited area of site 4. No Early Lengyel features were found by Jażdżewski in the 1930s, and an important result of the 1976–77 excavations was the discovery that there in fact was an Early Lengyel component at Brześć Kujawski.

The Late Lengyel ceramic materials show many continuities from those found in Early Lengyel contexts. Mica temper predominates and shell temper makes its first appearance. The variety of Late Lengyel vessel forms is even greater than that of Early Lengyel. Eight groups of forms, with numerous variants in each, can be distinguished (FIG. 14). The most common forms are group I, a flat-bottomed beaker usually with an inward-turned rim; group II, wide-mouthed, handled globular pots; and group III, globular flasks with cylindrical necks. Hollow-pedestalled bowls, group VIII, which are common in Late Lengyel assemblages in southern Poland, Czechoslovakia, and Hungary, are very rare at Brześć Kujawski.

Late Lengyel surface decoration is even more reduced than that found on Early Lengyel ware. If it occurs, it takes the form of short vertical incised lines or fingernail impressions on or directly below the rim or on the neck of the vessel. Plastic decoration includes conical bosses, knobs, and, most frequently, large, thick handles.

The rich stratigraphic overlapping of Late Lengyel features permits us to divide the Late Lengyel component into three phases.[23] Diagnostic of phase I are many bands of incised lines (FIG. 14: I,II) and a high percentage of shallow bowls (group IV) among the vessel forms. A high percentage of globular flasks (group II) and wide-mouthed, handled globular pots (group III) is characteristic of materials from Late Lengyel phase II contexts. Phase III sees a disappearance of all incised ornament except for indentations along the very edge of the rim (FIG. 14: II,III) and a predominance of flat-bottomed beakers (group I).

Flint Industry

A very rich Early Neolithic flint industry is found at Brześć Kujawski. It is still being studied, but it is possible to make several preliminary observations.

First, the raw material deserves mention. The Linear Pottery flint assemblage has a very high percentage of the Upper Astartian "chocolate" flint which comes from a very tightly delimited area in the Holy Cross mountains, about 200 km. south of Brześć Kujawski.[24] A typical Linear Pottery flint assemblage comes from pit 643 on site 4, where the distribution of raw material (based on counts of pieces) is as follows.

"chocolate" flint	61.0%
Baltic erratic flint	35.7%
Rugian flint	1.3%
Jurassic flint	0.8%
Świeciechów flint	0.8%

The latter two varieties of flint come from outcrops in southern Poland, while Baltic erratic flint and Rugian flint come from the Polish lowlands and NE Germany.[25]

Pit 734, one of the few Early Lengyel features, yielded a large amount of flint of which 56.8% was "chocolate" flint, while 43.2% was Baltic erratic flint.

In the Late Lengyel component, however, local resources, in the form of Baltic erratic flint, were more extensively utilized. In some contexts, there is 100% Baltic erratic flint, while in other features, the percentage hovers around 90%.[26]

The differing qualities of the "chocolate" and Baltic erratic flint played a great role in the nature of the reduction of raw material into finished tools. In Linear Pottery features, the "chocolate" flint occurs in the form of large, single-platform blade cores, blade blanks, and the blade tools which have been struck from them. These blades are generally 1–2 cm. wide and 5–7 cm. long, with a length/width ratio of about 1:3–3.5. These blades were struck from cores on the site itself, since the cores that have been found were usually not exhausted and since many of the blade blanks in certain features (e.g., pit 769 on site 3) can be seen to have been struck from the same core (and sometimes can be fitted back together). Some of these blades still have strips of cortex adhering to their edges, so apparently the "chocolate" flint was reaching Brześć Kujawski in core, pre-core, or even nodule form. A large amount of debitage in Linear Pottery trash pits, including many very small flakes, indicates a good deal of stone-tool manufacture on the site. The most common tools are "end scrapers" made on blades, as is the case at most other Linear Pottery sites.[27] The functional implications of the name of this tool type should be regarded with caution, since the "scraper" re-

23. These phases, however, are not necessarily of equal duration.

24. R. Schild, "Flint Mining and Trade in Polish Prehistory as Seen from the Perspective of the Chocolate Flint of Central Poland. A Second Approach," *Acta Archaeologica Carpathica* 16 (1976) 147–177.

25. These flint varieties were identified with the help of Mgr. Ewa Niesiolowska and Dr. Krzysztof Cyrek, Muzeum Archeologiczne i Etnograficzne, Lódź. Similar percentages of flint raw material are known from most other Linear Pottery sites in the Polish lowlands.

26. A similar concentration on local flint resources is seen at Kościelec Kujawski; see L. Czerniak, op. cit. (in note 13) 82.

27. See, for example, S. Milisauskas, *Archaeological Investigations on the Linear Culture Village of Olszanica* (Wroclaw-Warszawa-Kraków-Gdańsk 1976) 38–40.

touch might simply be the result of attempts to remove the bulb of percussion or otherwise straighten the blade. Some of these "scrapers" have visible sickle gloss along the edges. Other retouched tools include "borers", notched pieces, and (very rarely) burins. The ratio of tools to cores, debitage, and blade blanks was very low, which is not surprising considering that most of the material is from trash-disposal contexts.

With the greater use of local flint in the Lengyel assemblages, there is a change in the overall appearance of the flintwork. The Baltic erratic flint only occurs scattered across the Polish lowlands in the form of small pebbles. Moreover, in the course of its deposition, it underwent a great deal of shock and hence had very poor flaking qualities.[28] As a result, the Lengyel flint industry, especially the Late Lengyel one, is based on irregular flakes struck from small cores. It is very difficult to discuss tool types based on the morphology of the retouched pieces, since virtually every piece has a different shape.[29]

Antler and Bone Industry

The use of antler for the manufacture of axes becomes especially common during the later phases of the Lengyel culture at Brześć Kujawski. Some scraps of worked antler are found in Linear Pottery features, but only in the Late Lengyel component does antler manufacturing scrap become common (FIG. 15). We have not found any finished antler tools at Brześć Kujawski during the 1976–79 excavations (although Jażdżewski did find some in Late Lengyel burials in the 1930s.) This is probably because they were highly curated as well as used for off-site activities, such as timber cutting. The antler scrap which we have found consists mostly of severed tines and bases, removed from the beam which ultimately became the axe.

The bone industry at Brześć Kujawski is characterized by essentially one tool, the bone awl made from a cervid metapodial. Both very sharp and blunt versions of this tool have been found. Another use of modified bone was for the manufacture of tubular beads, such as those found in burial LIX.

Ground-stone Industry

At least 20 ground-stone tools have been found in the course of the 1976–79 excavations (the number is uncertain because of the possibility that some fragmentary specimens may be parts of the same tool). Although some of these have been found out of context in the plow zone or humic layer, at least 15 have been found in datable contexts. All five of the basic types defined by Brandt[30] have been found at Brześć Kujawski. Long, narrow "chisels" with square cross-sections are most common in Linear Pottery contexts, while flat, trapezoidal axes are very common in Lengyel deposits. Shaft-hole axes are also found. These provide an indication that ground-stone tools were manufactured on the site itself, since we have found a "plug" that would have been a by-product of drilling the hole with a tubular drill in a Late Lengyel context.

Copper Artifacts

The appearance of copper artifacts in Late Lengyel contexts at Brześć Kujawski represents one of the earliest occurrences of copper in temperate Europe north of the Danube.[31] These artifacts are almost exclusively ornaments, sometimes bars of hammered copper (and never tools). During the 1933–39 excavations, copper artifacts were found primarily in burials, but the two found in 1976–79 come from trash deposits. One of these was a strip of hammered copper; the other was a "spectacle spiral"[32] made from copper ribbon. All of the Brześć Kujawski copper artifacts were made by cold hammering, rather than casting, and provide evidence of long-range contacts of the inhabitants of the Polish lowlands, for there is no source of copper closer than 300 km. away.

28. We are grateful to Christopher Edens, Harvard University, for the suggestion that this could have taken place.

29. This does not represent a "degeneration" of the flint industry, as is often claimed, but simply a change in the flint procurement system.

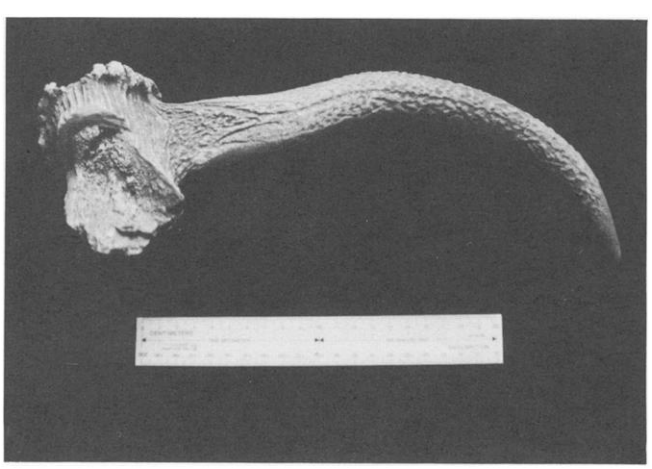


Figure 15. Antler scrap from Late Lengyel pit 782 on site 3. Note the cut-and-snap technique of separating the base and brow tine from the rest of the beam.

30. K.H. Brandt, *Studien über steinerne Äxte und Beile der jüngeren Steinzeit und der Steinkupferzeit Nordwestdeutschlands* (Hildesheim 1967).

31. P. Ottaway, "Earliest Copper Ornaments in Northern Europe," *Proc PS* 39 (1973) 294–331. Ottaway lists Brześć Kujawski as probably the earliest site with copper in this area.

32. The name given by Ottaway, op. cit. (in note 31) to this type of binocular pendant.

Table 3. Fauna found at Brześć Kujawski, 1976–1979.

	Period						
Taxon	*1*	*2*	*3*	*4*	*5*	*6*	*7*
cattle *(Bos taurus)*	70(10)	414(8)	12(2)	5(1)	32(6)	188(12)	721(39)
sheep/goat *(Ovis aries/Capra hircus)*	11(4)	86(4)	13(2)	14(3)	57(7)	146(11)	238(31)
pig *(Sus scrofa)*	1(1)	14(2)	10(2)	12(3)	56(8)	117(14)	213(30)
dog *(Canis familiaris)*	1(1)	1(1)	—	1(1)	2(1)	2(1)	7 (5)
red deer *(Cervus elaphus)*	11(2)	10(2)	6(1)	23(2)	75(5)	67(7)	192(19)
roe deer *(Capreolus capreolus)*	21(2)	5(1)	—	5(1)	39(5)	33(4)	103(13)
wild horse *(Equus caballus)*	2(1)	—	—	—	—	2(1)	
beaver *(Castor fiber)*	2(2)	1(1)	—	7(2)	14(5)	106(9)	130(19)
otter *(Lutra lutra)*	—	—	—	—	1(1)	1(1)	2(2)
bear *(Ursus arctos)*	—	—	—	—	1(1)	—	1(1)
hare *(Lepus europaeus)*	—	3(1)	—	—	—	—	3(1)
wild cat *(Felis sylvestris)*	—	—	—	—	—	1(1)	1(1)
weasel *(Mustela nivalis)*	—	—	—	—	—	1(1)	1(1)
pond tortoise *(Emys orbicularis)*	11	—	2	4	13	133	163
TOTALS	130(23)	534(20)	46(7)	71(13)	290(39)	797(61)	1868(163)

Periods: 1 = early Linear Pottery culture; 2 = late Linear Pottery culture; 3 = Early Lengyel culture, phase III; 4 = Late Lengyel culture, phase I; 5 = Late Lengyel culture, phase II; 6 = Late Lengyel culture, phase III; 7 = Total Early Neolithic

Faunal Remains

In contrast to most sites of this period in central Europe, Brześć Kujawski has very well preserved animal bones. Over the course of the 1976–79 excavations, 13,705 fragments (56,426 g.) of animal bone were recovered. Out of this amount, mammal and reptile bones numbered 8046 (55,878 g.), bird bones 174 (177 g.), and fish bones 5485 (371 g.). The substantial number of fish and bird bones was a direct result of the extensive use made of water-separation recovery techniques.

Table 3 gives the numbers of identified fragments and Minimum Numbers of Individuals (MNI)[33] for each of the mammal and reptile species in six well-defined phases of occupation at Brześć Kujawski, and Figure 16 graphically presents the changes through time in the relative abundance of five major taxa, as expressed by the MNI. From Table 3 and Figure 16, it can be seen that domestic cattle formed the major part of the Linear Pottery faunal assemblage, with sheep/goat a distant second and pigs, red deer, and roe deer very sparsely represented. By 3600 B.C., cattle has fallen off markedly and pig has increased in importance. In the Late Lengyel faunal assemblages, pig becomes the most abundant species, followed closely by sheep/goat. Also noteworthy is the greater role played by red deer and roe deer, especially in Late Lengyel phase II, where all five of the major taxa cluster between 15% and 25% of their total MNI, with no single species enjoying such a degree of abundance as that of cattle in the Linear Pottery component.

Beaver has been excluded from the curves (FIG. 16) because, although the bones of this taxon become especially numerous in Late Lengyel III contexts, the primary reason behind the hunting of beaver was not subsistence but acquisition of its pelt. We are able to make this statement on the basis of the concentration of beaver remains in pit 820 on Brześć Kujawski 3 (FIG. 18). Virtually all the bones of five beavers were found in this deposit, bearing none of the usual signs of butchering for meat or marrow-fracturing. Moreover, no third phalanges were found in this deposit. These bones usually stay in the pelts removed from such small fur-bearing animals. We believe this deposit to be the product of a session of pelt removal from the carcasses of five beavers, rather than the remains of meat-procurement activity.

Another striking aspect of the Late Lengyel faunal assemblage (especially in phase III) is the marked increase in the occurrence of bones of birds, fish, and turtles over that found in previous periods. The birds are primarily aquatic fowl, such as mallards, geese, and ducks, but the bones of capercaillie, marsh hawk, and eagle have also been

33. See D. Grayson, "On the Quantification of Vertebrate Archaeofaunas," *Advances in Archaeological Method and Theory* 2, M. Schiffer, ed. (New York, San Francisco, and London 1979) 200–237, for a thorough discussion of the problems connected with the use of Minimum Number of Individuals. The same patterns of relative species abundance, however, occur if fragment counts or "diagnostic zones" (e.g. J. Watson, "The Estimation of Relative Frequencies of Mammalian Species: Khirokitia 1972," *Journal of Archaeological Science* 6 [1979] 127–137) are used.

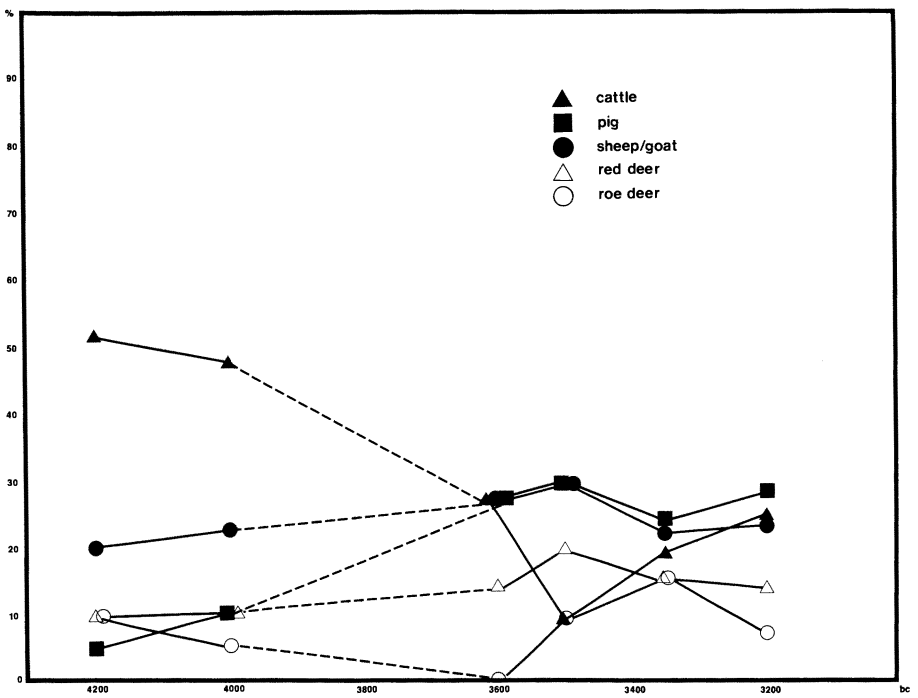


Figure 16. Changes of minimum numbers of individuals of five most common mammal species (expressed as a percentage of total MNI for these five species) throughout Early Neolithic at Brześć Kujawski.

identified.[34] The fish bones have yet to be identified, but preliminary examination indicates that many of them are small- and medium-sized members of the Cyprinidae family, such as carp and roach. Freshwater shellfish remains are also common in Late Lengyel contexts. Although the pond tortoise *(Emys orbicularis* L.) does not occur in the Polish lowlands today, the warmer, moister climate of the Atlantic period provided very favorable conditions, especially in a lakeside environment such as that of the Brześć Kujawski sites (FIG. 17).

Plant Remains

The Brześć Kujawski plant remains are currently being studied. One observation which can be made at this time, based on the examination of the material as it was being wet-screened and floated, is that carbonized grain is virtually absent from Linear Pottery contexts at Brześć Kujawski, whereas it occurs in relative profusion in Late Lengyel features.[35] This circumstance cannot be explained by different conditions of preservation, since all the materials are from the same sites. Some cultural factor, therefore, must account for this difference, such as a change in disposal practices or the simple fact that there was not very much grain being used on the site in Linear Pottery times. We favor the latter explanation at this time.

Discussion

The recent excavations at Brześć Kujawski have provided much new data on the development of Early Neolithic cultures on the Polish lowlands between 4300 and 3000 B.C. We have been able to perceive some very marked differences between the Linear Pottery component and the Late Lengyel component. The Early Lengyel materials at Brześć Kujawski are still too sparse to allow us to say conclusively whether they are closer to the Linear Pottery pattern or to the Late Lengyel one. The Linear Pottery ceramics are characterized by a relative paucity of vessel forms and a wide variety of patterns of incised lines and fingernail impressions as surface decoration. The Late Lengyel ceramics, on the other hand, feature a plethora of vessel forms but a very limited repertoire of surface decoration. The Linear Pottery flint industry gets a great percentage of its raw material from distant sources, such as the "chocolate" flint from the Holy Cross mountains, while the Late Lengyel flint industry is based primarily on the use of local Baltic erratic flint. The first real traces of architecture are found only in the Late Lengyel period. Postholes associated with the Linear Pottery component do not indicate any sort of long-term structures, at least not like the large longhouses that characterize Linear Pottery sites on the loess uplands of central Europe.

These differences in architecture and material culture carry through into the subsistence remains. The faunal as-

34. P. Bogucki, "Neolithic Bird Remains from Brześć Kujawski, Poland," *Ossa* (in press).

35. It must be emphasized that this is a field observation made by the authors, not a definitive statement based on the expert study of these botanical materials.

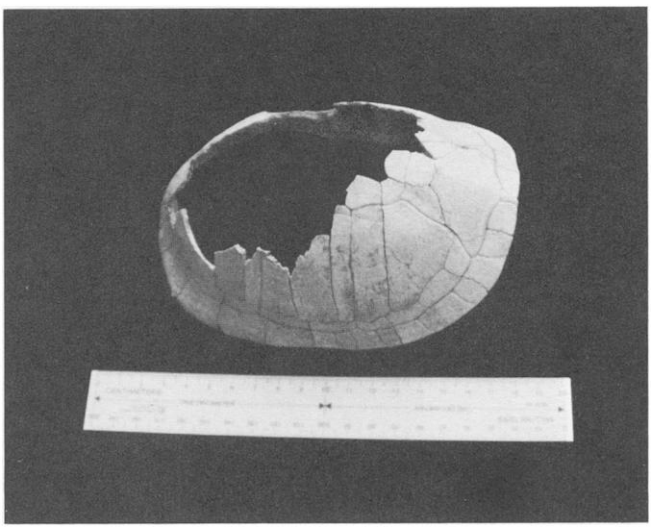


Figure 17. Carapace of pond tortoise (*Emys orbicularis* L.) found in Late Lengyel pit 773 on site 3.

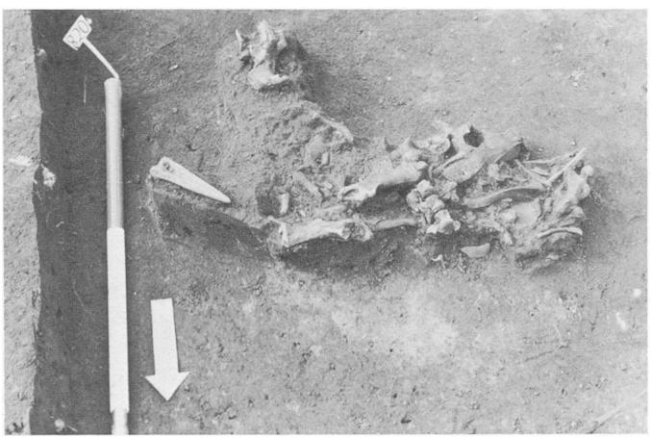


Figure 18. Concentration of disarticulated bones of five beavers in pit 820 (Late Lengyel) on site 3. Units of scale are 20 cm. More bones of these animals were found further to the left beyond the profile shown here. Note the blunt tool made from a red deer metapodial.

semblage shows a shift from domesticated cattle as the primary exploited species in the Linear Pottery component to a broad variety of exploited mammal species, along with an increased use of fish, shellfish, birds, and turtles, in the Late Lengyel component. Carbonized grain is scarce in Linear Pottery features but is regularly found in Late Lengyel deposits.

The Brześć Kujawski excavations have shown that the establishment of the Neolithic cultures on the Polish lowlands was *not* a "package deal" in which most aspects of culture, especially economy, stayed the same after the initial Linear Pottery settlement of the area. Rather, the establishment of a food-producing economy in this area was a complex process, which took quite a long time to develop into the large village sites such as the one found at Brześć Kujawski at the close of the 4th millennium B.C.[36]

Our future research in this area will entail the excavation of several small sites around Brześć Kujawski in order to better understand the hierarchy of Early Neolithic (especially Late Lengyel) site sizes. We also wish to determine whether or not the Linear Pottery settlements at Brześć Kujawski were seasonally occupied. Finally, we would like to find and excavate one or more Early Lengyel sites in the Brześć Kujawski area, since this is the period during which the changes described above were taking place.

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36. Another large Late Lengyel village site has recently been excavated at Krusza Zamkowa, near Inowroclaw; see L. Czerniak, *Rozwój Spoleczenstw Kultury Późnej Ceramiki Wstęgowej na Kujawach* (Poznań 1980).

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