

RESCUE EXCAVATIONS ON SITE 3 IN LUDWINOWO, DISTRICT OF  
WŁOCŁAWEK, KUYAVIAN-POMERANIAN PROVINCE  
(THE LINE OF FREEWAY A-1)

Summary

PRELIMINARY INFORMATION (*Ireneusz Marchelak*)

The current study is the result of research, following archaeological rescue excavations on site 3 at Ludwinowo, district of Włocławek, which were conducted prior to the building of A-1 motorway. A long period of excavations was carried out by the Professor Konrad Jażdżewski Foundation of Archaeological Research, co-ordinated by its chairman P. Papiernik PhD. The research took place in close co-operation with the Museum of Archaeology and Ethnography in Łódź, with substantive consultation provided by Prof. Dr hab. Ryszard Grygiel. The excavations were funded by the General Directorate for National Roads and Highways. The Kuyavian segment of the rescue works was completely co-ordinated by the Foundation of Adam Mickiewicz University in Poznań.

The excavations lasted for seven seasons from 2000, 2004 to 2009. They were conducted by the team of archaeologists, including: Paweł Frąsiak MA (2000), Iwona Nowak MA (2004–2008), Michał Kaleta MA (2004), Tomasz Łapa MA (2005) and Aleksandra Lachmayer MA (2008–2009). The works were supervised by Ireneusz Marchelak MA from the Museum of Archaeology and Ethnography in Łódź.

During the rescue excavations, an area of 855.6 ares was explored, which makes site 3 at Ludwinowo one of the largest sites in the Kuyavian sector of motorway A-1. Almost 7.8 thousand archaeological features have been unearthed, with post pits being the most numerous. These are traces of over-ground foundations (mainly houses of the Przeworsk culture). Other building remains have also been unearthed. These include: dugouts, buildings with a well-preserved ground layer and characteristic construction trenches of trapezoidal houses of the Brześć Kujawski group of the Lengyel culture. Moreover, the site consisted of numerous wells, clay pits, utility pits, hearths, furnaces and diverse grave forms, as well as, so called cemetery layers. In total, we have unearthed an assemblage of over 138 thousand pottery fragments, 40 thousand bone fragments, mainly animal, post-consumption ones, but also human and animal bones obtained from graves, 714 flint artefacts, 150 stone objects, 580 metal objects, 31 bone artefacts and c.a. 7 thousand fragments of daub.

Most of the site bears traces of cultural layers, from 1.5–2 m thick in the denudation valley in the south-eastern section of the site and in the endorheic basin in its north-western part. The exploration of those zones posed a major organisational challenge during the excavations. The above mentioned wells from different pre-historic periods and late Middle Ages (over 50 features) also turned out to be very difficult to explore.

Site 3 at Ludwinowo has a multi-cultural and multi-period character. It consists of the following cultural-chronological levels: the Linear Pottery culture, Stroked Pottery culture, Brześć Kujawski group of the Lengyel culture, Funnel Beaker culture, Globular Amphora culture, Corded Ware culture,

Trzciniec culture, Lusatian culture of the Bronze Age and Hallstatt period, Pomeranian culture, Bell Grave culture, Jastorf culture, Przeworsk culture, late Middle Ages and the early Modern Times.

The works culminated in the study of the above mentioned cultural-chronological periods, prepared by Ireneusz Marchelak, Anna Nierychlewska, Iwona Nowak and Piotr Papiernik, which supplement the work of L. Tyszler and M. Mielczarek. The publication also contains the results of multi-faceted and interdisciplinary research of the natural environment and the analysis of artefacts and other related data.

All artefacts and field documentation have been catalogued in the collection of the Museum of Archaeology and Ethnography in Łódź from the funds of the Konrad Jażdżewski Foundation of Archaeological Research.

So far the preliminary results of the research of site 3 at Ludwinowo have been published in two volumes of the Report, issued by the National Institute of Heritage, and devoted to archaeological rescue excavations in the years 2005–2006 and 2007–2008 (I. Marchelak 2011; I. Marchelak, A. Nierychlewska, I. Nowak 2012).

#### LOCATION AND NATURAL CONDITION OF THE SITE (*Piotr Kittel*)

The Ludwinowo site is situated in the eastern part of the Kuyavian (Kujawy) Lakeland in the close vicinity of the border of the Płock Basin. The Płock Basin is a part of the Toruń-Eberswald ice-marginal streamway (pradolina). A distinct morphological edge of the Płock Basin reaches about 10 m in height. Denudational valleys and erosional cuts were developed on the Płock Basin slope. The site area is situated in the recently glaciated area of the Weichselian Cold Stage. In the Kuyavian Lakeland, one horizon of Weichselian basal till has been recorded with a thickness of 2–5 m. The Ludwinowo site was located on the morainic plateau and surficial substratum is a glacial till. The elevation of the morainic upland rises up to 88 m a.s.l. at the site area. The site occupied a local culmination of the morainic plateau and slope of subglacial channel. The small kettle hole is situated in the central part of site area. The multicultural settlement at Ludwinowo site was established in the area characterized by a high geo- and biodiversity, which was very suitable for development of multidirectional prehistoric economy.

#### SETTLEMENT OF THE LINEAR POTTERY CULTURE (*Iwona Nowak*)

The oldest settlement phase from Ludwinowo, site 3 is dated to the Neolithic and it is connected with the penetration of the region by the Linear Pottery culture. The excavations have yielded 21 immovable features of settlement character, 1734 pottery fragments, 64 flint artefacts and 2 stone axes connected with the above mentioned culture. The conducted spatial analysis conducted on the site helped distinguish two pit clusters, which were found in two zones, located at a distance of 80 m away from each other. They pits were marked as “A” and “B” respectively (fig. 5). Cluster A consisted of 15 features, and contained pottery material belonging to the above mentioned culture. Cluster B consisted of 6 features. Cluster A was mainly composed of clay pits, also known as building pits (A. Czekaj-Zastawny 2008, p.38). Apart from clay pits, three features were recorded in cluster A. They occurred in the form of single pits, adjacent to clay features of the Lengyel culture. Only two pits in the cluster occurred on their own, unaccompanied by other features from the above mentioned culture. The cluster in question bears traces of a hypothetical house of the Linear Pottery culture, which was designated on the basis of a single row of the preserved post holes. The holes were located along the cluster, between separate clay pits. The reconstructed building is rectangular, c.a. 6–7 m wide and 13–14 m long, on the line N-S (fig. 9). The pits recorded in cluster B form the concentration of 5 features together with a single pit, located at a distance of c.a. 4 m. Cluster A should be definitely linked with a residential zone of the Linear Pottery culture, whereas cluster B with a utility zone of the site at Ludwinowo. The latter has features of the peripheral part of the settlement.

The pottery vessel fragments from Ludwinowo have been divided into fine and coarse pottery. The former group consists of 761 fragments, whereas the latter of 835 fragments. The main type of vessel in both stylistic groups is a cup in the shape of a spherical sector, either  $\frac{2}{3}$  or  $\frac{1}{2}$  of a sphere. Both categories of pottery included fragments of miniature vessels, with two vessels with a decorated bottom (plate 5: 2;

7: 4). Thin-walled pottery was decorated with engraved lines, with the prevalence of lines around the vessel appearing in various patterns above the lines placed at an angle. Raised ridged bands, present on thick-walled pottery contained different types of knobs (plate 6: 3, 20, 23; 7: 8; 8: 1; 9: 1, 3, 18, 23). Decorative elements, such as note-like holes, mostly round and oval are of classical character (plate 5: 7; 6: 2, 7, 15; 7: 7, 13; 8: 18; 9: 2). The study of the pottery material has revealed that it is possible to put together pottery fragments unearthed at a different depth, but it is impossible to do the same for the fragments of pottery found in separate features. This refers to the pottery found in pits from cluster A, and the relationship between the pottery from cluster A and B. However, the character of the material indicates that it is contemporaneous.

The chronology of the settlement of the Linear Pottery culture has been established on the basis of the stylistic analysis of the pottery material. It was obtained during archaeological excavations at Ludwinowo, site 3 and it represents the note-like phase of the Linear Pottery culture. The artefacts were attributed to this phase on the basis of the vessel decoration, mainly note motif.

The analysis of the above mentioned pottery material from the site at Ludwinowo indicates that it belongs to the classical phase of the culture in question. At the same time, early features, linked with the Zofipol phase of the Lesser Poland decorative style of the Linear Pottery culture, are still present. The excavated material should be dated to the first half of the classical phase of this culture, i.e. about 5200–5100 cal. BC (R. Grygiel 2004, p. 641).

#### SETTLEMENT OF THE STROKED POTTERY CULTURE (*Ireneusz Marchelak*)

A small assemblage of 157 fragments of pottery of the Stroked Pottery culture was unearthed on site 3 at Ludwinowo. It was found in four features, not accompanied by any other cultural elements. It occurred on secondary deposit in feature 6285 of the Brześć Kujawski group of the Lengyel culture (plate 11: 7, 8). Features 1703 (ha III, are 15), 3007 (ha III, are 7) and 4088 (ha IV, are 71) were located in the border zone of the southern part of the excavated area, in the denudation valley (fig. 10). The features have the form of small pits and indicate some kind of economic activity in the vicinity of the zone which at that time must have been watered terrain (plate 10: 1; 11: 1,5). Feature 3911 (ha VI, are 94/95; plate 10: 3) may be interpreted as a foundation trench of a dwelling building or a larger utility pit. However, a close vicinity of the cluster of features of the Brześć Kujawski group of the Lengyel culture and a small amount of pottery on the site (six fragments) may indicate its secondary character. The unearthed artefacts (plate 10: 2, 4; 11: 2–4) point to a late phase of the Stroked Pottery culture – IVb after M. Zápotocka (1970).

#### SETTLEMENT OF THE BRZEŚĆ KUJAWSKI GROUP OF THE LENGYEL CULTURE (*Ireneusz Marchelak*)

Settlement of the Brześć Kujawski group of the Lengyel culture occupied an extensive section of the site, with the range of c.a. 500 m along the line NW-SE and 250 m along the line N-S. Within its boundaries, we can distinguish three main clusters, designated by trapezoidal houses and other utility features (fig. 11). The layout is also confirmed by pottery finds (fig. 12). The excavations have yielded 14,853 fragments of pottery, 465 flint artefacts, 54 stone objects, 17 bone artefacts, an assemblage of 4499 fragments of animal bones and human bones found in ten graves.

The pottery has been divided into nine technological groups: T1-T9; (compilation 2). The most numerous are vessels made of ceramic mass with admixture of white stone temper, mostly medium-grained (group T3–39.7%) and thick-grained (group T4–36.6%), with a small amount of fine-grained temper (group T2–16.4%). We can distinguish vessels with black surfaces, mainly made of ceramic mass with admixture of pink temper, which was more frequently applied in pottery of the late phase of the Brześć Kujawski group of the Lengyel culture (R. Grygiel 2008). The pottery of the Brześć Kujawski group of the Lengyel culture has been classified according to the typology applied by R. Grygiel (1986). The pottery frequently occurring on the site, can be divided into the following form types: I – wide-rimmed vessels; II – wide-rimmed vessels with handles, III – vessels with a cylindrical neck (amphorae and non-numerous jugs); IV – bowls and V – bathtub-shaped vessels (fig. 13–24). There were also special forms of type VII, mainly unearthed as single finds. They include vessels with a side mouth, scoop, small beaker, miniature

vessel, sieve-like vessel, zoomorphic vessel (?) and three spindle whorls (fig. 25). Type VI – clay spoons – has not been found. As regards stylistics, some of the distinguished forms stem from the early phase of the Brześć Kujawski group of the Lengyel culture, e.g. I/1, I/6, I/7, II/1, III/1, III/2, III/8, IV/9, IV/11, IV/16, VII/2, many of which are present in the classical phase. Classical forms include the following variants: I/3c, I/6c, I/8, I/10, I/12, II/3, II/4, II/5, II/7, III/5, III/6, III/13, IV/1, IV/6, IV/10, IV/13. Some of those may have lasted longer, e.g. II/3 (C-14 date from feature 2565). Late phase is connected with variants I/2d, II/8, IV/15, V/2, which is confirmed by C-14 dates, and also with I/11, II/4, II/9, III/3a.

Decoration of pottery is dominated by finger impressions on vessel rims and some parts of bellies. The motif of broad impressions is typical of the late phase of the Brześć Kujawski group of the Lengyel culture (fig. 14:I/5b; 15:I/12). Several vessels have decorations typical of the Góra group of the Lengyel culture, characteristic of the early phase of the Brześć Kujawski group of the Lengyel culture (fig. 19:IV/2b; 26: 3). We could also find a motif of finely-perforated, hanging triangles which occurred in the Rzeszów phase of the Malice culture (plate 12: 12). It is worth noting an extended decoration with the motif of an engraved line with triangular stamp impressions, covering most of the belly (plate 47: 1), which may be linked with the influence of the Rössen culture (R. Grygiel 2008). A characteristic element of the classical phase of the Brześć Kujawski group of the Lengyel culture has the form of raised ridged bands, horizontal or vertical, occasionally arched, frequently crimped (fig. 17:II/4b; 20: IV/1d1; 19:III/13a; 26: 17). They also occurred in the form of short, vertical segments (fig. 18:III/11; 26: 18–21).

Other artefacts include bone products, such as beads, awl, needle as well as a blade-dagger and a small pendant – the latter two – characteristically decorated (plate 53: 1–9; 77: 7).

The main element of spatial organisation of the settlement of the Brześć Kujawski group of the Lengyel culture is a large homestead on the plan of trapezium. There were ten remains of such constructions at the settlement at Ludwinowo, located in a separate zone of the settlement (fig. 11). Seven of those belonged to the largest cluster of features, covering the area c.a. 200 m wide. We found two, completely preserved trapezoidal houses: house no 1, with measurements 33.5×9×4.2 m (plate 30) and house no 2 measuring 32×9.6×3.8 m (plate 32). House no 6 was also relatively well preserved and characterised by an internal dividing wall (plate 50). Other houses were fragmentarily preserved in the form of segments of construction trenches (houses no 3, 4, 5, 7; plate 31: 1; 14: 1; 18; 57). There were other separate houses in different clusters of the settlement (fig. 11). House no 9 was only partly found within the area of the excavations, but it was as well preserved as houses 1 and 2 (plate 85).

Clay pits are the second most important spatial element of the Brześć Kujawski group of the Lengyel culture (fig. 29). Some were unearthened in the vicinity of the houses and were places where clay was extracted for the building of walls (e.g. next to houses 2 and 6). Interestingly, some houses were void of such features (house 2), or the features may have been very small (house 4). The settlement also consisted of clay pits not connected with houses. Some of them covered a larger area (fig. 29). In the vicinity of the houses and in the free space of the settlement we recorded various utility pits. These included larger features, frequently regular in the cross-section, which would indicate strengthening of walls (braid, stockade ?), e.g. features 653 and 661 (plate 19: 1), 984 (plate 31: 2), 1274 (plate 40: 6), 2565 (plate 24: 5), 4772–4773 (plate 59: 8). Smaller features, regular in the cross-section (rectangular, trapezoidal, sack-shaped) must have been used to store farm products. These are features 508 (plate 48: 1), 1108 (plate 28: 1), 5275 (plate 80: 11). Some deeper pits may have functioned as fridges, e.g. feature 6341 (plate 68: 5).

The settlement also consisted of features which may be interpreted as the remains of furnaces or hearths, e.g. features 978, 2109 (plate 33: 1, 13) and 6269 (plate 63: 4). Besides, there were six wells with no casing. Two of those (features 1080, 1086; plate 27: 3, 11) were almost centrally located on a free square between houses 1, 4, 5, 6 and 7 (fig. 29), and provided water for them.

At the settlement of the Brześć Kujawski group of the Lengyel culture we also unearthened ten graves (fig. 11; table 1; see anthropological analysis by W. Lorkiewicz). The first zone consisted of three burials with not very well-preserved skeletons, but with a clear layout of bodies put on one side with bent up legs and the head facing south. Two of them were placed in an intentionally dug pit (grave I – feature 2190; grave II – feature 4740; plate 27: 2; 60: 2). The third one underwent secondary deposition in the utility pit (grave III – feature 5510; plate 56: 3). Grave II has yielded C-14 date, 4331–4221 cal. BC (51.8%), 4211–

4151 cal. BC (21.8%), 4134–4055 cal. BC (21.8%, which indicates late phase of the Brześć Kujawski group of the Lengyel culture. The next three graves had been unearthed within the second cluster of features, linked with house 8. It is worth noting that the graves are located at a regular distance from each other on the line N-S (fig. 11). Grave V (feature 6342; plate 68: 11–12) has yielded C-14 date cal. 4450–4341 BC which indicates classical phase of the Brześć Kujawski group of the Lengyel culture, whereas grave IV (feature 6313; plate 67: 5–6) – date cal. 4252–4037 BC, which points to a late phase. This settlement zone also contained two burials, fragmentarily preserved and like grave III, deposited in extraction pits (feature 6284; cluster of features 6289–6291, 6558, 6582, 6604; plate 62: 1; 64: 1). The other two graves were found in the third cluster of features. One burial was deposited in the pit niche (grave X – feature 6807; plate 83: 1).

It has been confirmed that wheat and probably rye were grown at the settlement of the Brześć Kujawski group of the Lengyel culture. However, poorly preserved macro-remains of vegetation samples obtained from the utility pits prevented us from gathering more data (see analysis by A. Mueller-Bieniek, K. Wasylikowa; K. Cywa). Archeozoological analysis turned out to be a far richer source of information (see study by K. Stefaniak, T. Piskorska, B. Pokryszko). The study confirmed the domination of pig remains (24.9%) over cattle remains (16.68%), unlike other sites of the Brześć Kujawski group of the Lengyel culture in the nearby region (P. Bogucki 2008). However, when we attempt the evaluation of the minimal number of individuals, the proportions are reversed. The analysis also confirms the presence of cattle remains in twice as many features as those containing pig remains. Besides, the breeding of sheep (9.12%), goat (7.57%) and horse (2.01%) has been attested at the site. There were also not numerous remains of dog (2.1%) and domestic goose. Hunting has been evidently confirmed, due to a large amount of red deer remains. Other animals, such as bear, roe deer, fox, boar, black grouse and ruff were also hunted. There was also a small number of bones and carapaces of a pond tortoise.

Seven C-14 dates have been obtained for the settlement of the Brześć Kujawski group of the Lengyel culture, which allow absolute dating (fig. 30). Apart from the dates obtained from the graves, there are also dates from utility pits and extraction pits. The oldest pit from feature 2109 (plate 33: 9) cal. 4790 BC (95.4%) 4504 BC marks the beginning of the settlement in the classical phase. Dates from features 2129, 2565 and 3837 (plate 34; 24–26; 37–38) coinciding with cal. 4350–3990 BC, confirm its existence in the late phase.

On the basis of the above dating and the analysis of pottery, it can be assumed that the beginning of the settlement at Ludwinowo occurred in the early phase of the Brześć Kujawski group of the Lengyel culture and can be linked with houses 3 and 6, as well as the pits found in their vicinity (e.g. features 2109, 984, 3960, 4602, 4701). The next stage of its development coincides with the classical phase of the Brześć Kujawski group of the Lengyel culture and is linked with houses 1, 2 and 4, located in rows along the line N-S. The continuation of this layout occurs in the late phase and is connected with house 5, which is confirmed by dating from feature 2565 and its vicinity. Dates from the late phase of the Brześć Kujawski group of the Lengyel culture, obtained from pits 2129 and 2837, i.e. the utility zone of houses 1 and 2 may indicate that they functioned for a longer period of time, also in that period. House 5 has close chronology to house 7, which is attested by the pottery from some pits of utility character (e.g. features 4772, 6029), as well as dating of the nearby grave II.

During classical phase, a third settlement zone connected with house 10 was also functioning. In this case, however, we only deal with scarce material of diagnostic character (e.g. features 5233, 6799, 6801, 6806).

Classical phase may be also linked with the second settlement zone connected with house 8, although many of its pottery assemblages are characterised by the stylistic elements of the early phase. This may indicate the early part of that period. Pottery material which would allow such dating was only found in several clay pit clusters, including two extraction pits (plate 71–73; 78–80) and separate pits unearthed on a larger area (e.g. features 5915, 4976, 4949, 4959, 4879, 6338, 6273). It is also confirmed by a date from grave V. On the other hand, a date from grave IV and artefacts from feature 6269 and 6284, linked with grave VII indicate a late phase of the Brześć Kujawski group of the Lengyel culture, which is connected with a further stage of the zone's development and a larger number of remains found beyond the area of the excavations.

SETTLEMENT OF THE FUNNEL BEAKER CULTURE (*Piotr Papiernik*)

During rescue excavations on site 3 at Ludwinowo diverse remains of the Funnel Beaker culture settlement have been unearthed. The archaeological sources include: (inter alia) 34 recessed features, 3589 pottery fragments, over a dozen flint and stone artefacts and over 1400 fragments of animal bones. The material has been found in various parts of the trench, mainly in its central and southern section. For the sake of analysis, the Funnel Beaker culture artefacts have been catalogued into six sub-assemblages, which correspond with the layout in which they were recorded on the explored area (cf. fig. 31).

On the basis of the analysed material, it can be assumed that the Funnel Beaker culture settlement on site 3 at Ludwinowo appeared relatively early. The materials with stylistic features of the Pikutkowo phase are well-documented (cf. 91: 2–4; 92; 93: 5; 96: 3, 4), including direct analogies to settlement on site 6 at Pikutkowo (cf. E. Niesiołowska 1967 and plate 93: 5; 96: 4). It is likely that zone F (plate 107: 11, 12) and are 42 and 52, ha VI (plate 104: 2, 3, 6) contain even older pottery, with the features of the Sarnowo phase.

During the Wiórek phase, the settlement of the Funnel Beaker culture was the most intensive on the slope and at the bottom of the glacial valley form. A number of specialised features were set up there, including several wells and two large clay pits (fig. 33). The unearthed material does not seem to be connected with permanent settlement, but with a long-lasting economic exploitation of the site. This is confirmed by a complete lack of house remains and an exceptional content of movable artefacts. It has been observed that there is an excessive number of amphorae in vessel assemblages and cattle remains in osteological material. This indicates consumption of only some parts of animal carcass. Moreover, the Wiórek phase is void of larger series of flint and stone artefacts. The above assumptions show that the explored site provided economic support for the settlement or settlements, which were located beyond the excavated area, because the remaining sections of the trench (zones: B, C, D) contained very small amounts of pottery, and only a few recessed features which may be linked with the Wiórek phase.

During the functioning of the Radziejów group, the settlement spread over the southern section of the site. In hectares I–III, three clusters of materials have been observed (fig. 35). They are characterised by late chronology and clear traces of the Baden culture (cf. plate 86: 4; 87: 2–16; 88: 1–7; 100: 1, 2, 6–8, 10, 12–18; 21, 23). Zone A contained a well (plate 86: 1), from which a geological cross-section was obtained for paleobotanical research. The cross-section contained preserved traces of plant sporomorphs, whose quality and quantity allowed palinological analysis (cf. D. Nalepka, current volume). Due to an exceptional character of the find, it has been decided that wider research of the explored layers is needed. Geochemical and sedimentological analyses have been carried out (cf. R. Borówka, D. Okupny, A. Fortuniak, J. Tomkowiak, current volume), as well as the analyses of the micromorphology of sediment (cf. A. Budek, current volume) and radiocarbon dating with AMS method. On the basis of palinological analysis conducted by D. Nalepka (current volume), it may be assumed that the site was intensively used as a farming area for a long period of time. It was a place of growing crops (barley and wheat) and breeding animals, mainly cattle. Radiocarbon dating (AMS) indicates that the feature began to be filled between 3350 and 2950 BC. The above dating is confirmed by the latest chronological findings for the Radziejów group, and more broadly for the Baden culture in Poland (cf. A. Przybył 2006; A. Zastawny 2008; 2015).

The three clusters of material of the Radziejów group mentioned above are quite similar. Each of them contains a small amount of pottery, represented by several, or over a dozen vessels, which are similarly decorated. Each cluster covered a similar area of up to 10 ares. In two cases, a single feature was found in the centre of the cluster. Zone A consisted of the above mentioned well, whereas zone C contained a clay pit, which may have been used again for a different purpose. Thus, it seems likely that the Radziejów group of the Funnel Beaker culture did not have a stable character.

The settlement of the Radziejów group is connected with one other problem, i.e. the chronological relationship between the Funnel Beaker culture and the Globular Amphora culture. In the case of Ludwinowo, a series of dates from sepulchral features unearthed in ha III (cf. I. Nowak, current volume) indicate that the area of the site was occupied by the Globular Amphora culture between the 4<sup>th</sup> and 3<sup>rd</sup>

millennium BC or in the 1<sup>st</sup> century of the 3<sup>rd</sup> millennium BC. This period also marks the end of the Funnel Beaker culture settlement on the site.

To sum up, we need to emphasise that the Funnel Beaker culture material sources from site 3 at Ludwinowo are of great value, due to the fact that these are first, numerous materials of the Radziejów group, unearthed in the vicinity of the Vistula valley. Moreover, comprehensive specialist analyses from many fields of natural science, significantly broaden the scope of settlement research, connected with the 4<sup>th</sup> millennium BC.

#### REMAINS OF THE GLOBULAR AMPHORA CULTURE (*Iwona Nowak*)

The Globular Amphora culture at Ludwinowo is represented by an assemblage of artefacts obtained from settlement pits and a small sepulchral zone which contains two skeletal human graves and three animal burials. The assemblages of the Globular Amphora culture have been distinguished on the basis of the pottery material. The features are mostly pits of undetermined function (18 features), utility pits (8 features) and post holes (6 features). Two wells were also unearthed in the northern section of the central part of the site. Quantitative analysis of the pottery obtained from the cultural layer indicated that the major part of the material is located in the northern and north-eastern section of the central part of the explored area (fig 39). The region which contained the largest amount of pottery in the cultural layer was almost completely void of the features of the Globular Amphora culture. Other single vessel fragments were scattered on the remaining part of the site, occupied by the “amphora” settlement. Pottery material unearthed in features of the Globular Amphora culture have only been fragmentarily preserved (plate 115). The major part consists of belly sherds, as well as fragments of mouths, bottoms or bottom areas. Only 15 decorated artefacts have been found, which come from culturally “pure” features and also those, located on secondary deposit. The clay pit assemblage of the Funnel Beaker culture has yielded a cluster of pottery attributed to the culture in question. The number of the preserved fragments allowed a partial reconstruction of the form (plate 115: 17). Another vessel, whose form we managed to reconstruct, was a small bowl found in feature 3651 (plate 115: 19). On the basis of the preserved fragments in feature 3592, it was possible to reconstruct the vessel form and the layout of its decoration (plate 115: 14). Ludwinowo vessels were decorated with the following elements: vertical and horizontal, rectangular pillars, impressed on the vessel surface, raised ridged bands, motif of a bird’s feather and cord imprints. The motifs of the cord ornament have the form of straight, horizontal lines made with a double, right – twist cord (plate 115: 11, 13, 16). The preserved material is characterised by a simple decoration pattern, which consists of horizontal cord impressions, without any other decorative elements. Traces of the settlement of the Globular Amphora culture on site 3 at Ludwinowo were unearthed in the north-eastern part of the central zone of the explored area. Apart from the sepulchral part, the remains of the above mentioned culture indicate that the settlement was scattered (fig. 38). A small number of features which do not belong to a larger cluster, a lack of traces of dwelling constructions, and a small amount of pottery let us assume that it was probably a campsite of the Globular Amphora culture community. In places like these, only single features and artefact clusters are preserved. A large area on which artefacts from this culture could be found may mean that the communities of the Globular Amphora culture may have re-inhabited the site several times. Decoration in the form of filled triangles, vertical bands at the base of a handle, decoration with impressed pillars, or brushing vessel surfaces indicate that the Globular Amphora culture communities took over the motifs of the Baden culture, Funnel Beaker culture or the Pit-Comb Ware culture. The assemblage which was stylistically analysed, does not reveal any chronological diversity. The results of technological-decoration analysis and the presented analogies from the literature on the subject, indicate that vessel fragments from site 3 at Ludwinowo may be linked with the classical horizon of the development of the Kuyavian communities of the Globular Amphora culture, i.e. phases IIb-IIIa of the culture in question (M. Szymt 1996, pp. 74–75, 78). The lack of ornate decorations, mainly the cord motif, allows the dating of the assemblage to the initial phase of IIIa of the culture in question, i.e. 3250/3100–2900/2700 BC.

## Sepulchral Zone of the Globular Amphora culture

### HUMAN GRAVES OF THE COMMUNITIES OF THE GLOBULAR AMPHORA CULTURE

Grave features of the Globular Amphora culture were located on a gentle slope of a low hill (fig. 40) in the south-eastern section of the central part of the site. Apart from an animal grave 1857, all features formed a compact cluster, spread over an area with a 15 m radius.

#### Grave 1558 HA III, ARE 65

On the basis of anthropological analysis of the preserved remains, we have distinguished bones of one individual, probably at the age of *adultus* (20–40). It was not possible to determine the sex of the individual. Archaeological analysis indicates that it was a male person, buried on his right side. At the lower part of the skeleton (plate 114), there were three vessels, placed along a straight line, one next to the other. The pottery is represented by the following forms: amphora, type IIA1 (T. Wiślański 1996, p. 28), egg-shaped amphora, type IA2 (T. Wiślański 1996, p. 26), bowl, type IVA1 (T. Wiślański 1996, p.30). Moreover, a flat axe made of striped flint was placed at the head of the buried individual (plate 116: 2).

#### Grave 1585 HA III, ARE 75

5–8 m north of grave 1558, another skeletal burial of the Globular Amphora culture was unearthed. The feature was positioned on the line E-W, slightly leaning to the east. At the bottom of the grave pit there were remains of two individuals: a man, at the age of 20–30 and a woman, between 17–25 years old (see, appendix, volume 1). The skeleton of a woman was bent up, placed on the left side, along the line E-W, with the head towards the west. Most of the bones in the skeleton of the man were relocated. The bone material in the grave pit may indicate that the individual was placed along the line N-S. The fill of the feature contained pottery fragments from three different vessels (plate 114) and one, almost completely preserved bowl (plate 117: 3): vessel no 1 – bowl of type IV C (T. Wiślański 1996, p.31), vessel no 2 – amphora with a globular belly, probably type IA1 (T. Wiślański 1996, p.25), vessel no 3 – probably amphora, vessel no 4 – probably amphora, type IA1 (T. Wiślański 1996, p. 25). During the grave exploration, one bone point was also unearthed. It was broken on one side (plate 117: 2). Its original position was impossible to determine. In the eastern section of the grave, on its boundary, a butted axe (with squared cross-section) made of erratic stone (plate 117: 4) was unearthed.

Three burials of the community of the Globular Amphora culture were unearthed on the site. They were deposited in two grave pits. The graves unearthed at Ludwinowo, site 3, represent flat recessed features, possibly with a cairn (?), covered with a stone paving. To sum up, the stylistic-technological analysis of the preserved vessel fragments, analogies from the literature on the subject, and the obtained C-14 dates let us date the grave clusters 1558 and 1585 from Ludwinowo to a broad horizon of the classical phase of the Globular Amphora culture. On the basis of the preserved pottery fragments from grave 1585, it can be concluded that the presented grave cluster is older than grave cluster 1558, within the classical phase of the Globular Amphora culture. It has also been confirmed by the obtained C-14 dates (plate 114).

### ANIMAL BURIALS OF THE GLOBULAR AMPHORA CULTURE

#### ANIMAL GRAVE 1594 HA III are 75

During the preliminary exploration of the feature, we have come across a grave pit, which was positioned, with its longer axis, from north-east to south-west. Further research, and above all the position of particular bones in the grave indicated that cattle bones were placed along the line N-S (plate 109). After the analysis of the layout of particular bones in the grave, it can be assumed that it is a burial of one animal *bos taurus* (see appendix v. I). All bone fragments, whose age were possible to be determined, point to the age of the animal between 2–3.5 years old. The bone material from particular zones of the trench reveal its anatomical layout. Thus, it can be assumed that the animal was placed on the right, with its head in the southern part of the grave, and the back side in the northern one. There is a lot of evidence to suggest that the head and the neck of the cow from the grave at Ludwinowo were severed (lack of the head or its fragments and cervical vertebrae in the bone material). Due to the fact that pit 1594 does not border on any other feature in the southern part, and thus it is not disturbed by any features, we can rule out the possibility that this part of the skeleton was destroyed. The procedure of an intentional severing an animal's head or quartering animals was not unique in the Globular Amphora culture.

## ANIMAL GRAVE 1857 HA V ARE 99

At the depth of 27–30cm underground, there was a fragment of a cattle skeleton (plate 110: 1). The distribution of the preserved bones reveals their anatomical layout (see appendix v. I). The animal was buried on the right side, with bent up limbs, and its head towards S-W.

## ANIMAL GRAVE 2555 HA III ARE 87

The animals in this grave were positioned on the right side, with bent up limbs, one after the other, at a very close distance (plate 110:2). The anatomical layout of bones is well visible. Archaeozoological analysis of bones (see appendix v. I) indicated that the pair of cattle are individuals between 7 and 10 years old, from 115 cm to 124 cm at the withers. Placing animals one after the other is very rare in the Globular Amphora culture. Most frequently, the animals were placed on the side, with their heads towards each other, and with bent up legs (L. Gabałówna 1958, p. 86). Feature 2555 has yielded date  $4310 \pm 40$  BP, after calibration 3010–2887 BC (probability 68.2%), which coincides with the dates obtained from human grave 1558 (burial of a man  $4100 \pm 35$  BP, 2849–2578 BC), and particularly with the dates of human grave 1585 (burial of a man  $4440 \pm 40$  BP, 3322–3018 BC; burial of a man  $4320 \pm 40$  BP, 3010–2892; burial of a woman  $4370 \pm 35$  BP, 3017–2922 BC).

Animals at Ludwinowo were buried in flat graves. Although all three animal burials were discovered in different spatial layouts, we cannot rule out the possibility that they belong to the Globular Amphora culture.

The results of the analysis of vessel pottery from graves 1558, 1585 and the obtained results of C-14 dating let us assume that the Ludwinowo cemetery comes from the classical amphora period, to be more precise from phase IIb/ the beginning of phase IIIa of the Globular Amphora culture.

The same dating should be applied to the settlement material.

TRACES OF THE SETTLEMENT OF THE CORDED WARE CULTURE (*Piotr Papiernik*)

Site 3 at Ludwinowo has yielded not numerous material which should be linked with the pottery of the Corded Ware culture. Only six fragments of pottery have been unearthed in various parts of the trench (fig. 41, plate 118). The sherds have been included in the above mentioned culture on the basis of decoration elements, above all the motifs of impressed cord on the upper part of the vessels (cf. J. Machnik 1979, J. Czebreszuk 1996). The distinguished vessel fragments attest a short-lived presence of the community of the Corded Ware culture on the site, at the end of the Younger Palaeolithic.

FLINT ARTEFACTS (*Piotr Papiernik*)

Rescue excavations at site 3 at Ludwinowo have yielded 714 flint artefacts, divided into several analytical groups depending on the context where they were unearthed. First of all, chronologically coherent assemblages will be described, which can be attributed to given cultural units. Two groups of materials have been distinguished, which are described as Linear Pottery culture (62 artefacts), and the Brześć Kujawski group of the Lengyel culture (454 artefacts). Other assemblages have been unearthed in the features of the Funnel Beaker culture (9 artefacts) and the Globular Amphora culture (8 artefacts). The assemblages are rather small, and their homogenous character is difficult to assess. Therefore, they can only be described in very general terms. Other artefacts have been obtained from the explored layers (110 artefacts), or from the features, linked with the Iron Age (the Lusatian culture – 2 artefacts, Pomeranian culture – 5 artefacts and the Przeworsk culture – 33 artefacts) or with the late Middle Ages (21 artefacts). Some artefacts are culturally undetermined (9 artefacts). The small assemblages do not provide relevant information.

It is worth emphasising that all Neolithic features have been excavated with the use of the geodetic technique to demarcate layers (10 or more rarely 20 cm thick) and separate cataloguing of artefacts. This method allowed us to broaden the scope of artefact analysis by adding observations referring to the deposition of flint artefacts, which is essential for the assessment of homogeneity and dynamics of the formation of different assemblages.

Regardless of the place of discovery, the applied method of analysis for all artefacts was the one that had been previously worked out for the Danubian cultures from the region of Brześć Kujawski and Osłonki (P. Papiernik 2008). The method mainly involved reconstructing the dynamics of flint processing through the record and multi-faceted analysis of measurable and descriptive features, with less emphasis on typological-technological division.

Features of the Linear Pottery culture have yielded 62 flint artefacts. The materials are mainly connected with the clusters of clay pits (no 4539, 4540, 4541, 4644, 4708, 5575) recorded in south-western part of hectare V (cf. fig. 43), where 55 artefacts have been obtained. These forms were probably part of one assemblage, connected with a house of the Linear Pottery culture. Its chronology is correlated with the classical phase of the Linear Pottery culture in Kuyavia (after R. Grygiel 2004). The remaining 7 forms have been unearthed in feature 1799 in the central section of the trench. All the artefacts have undergone functional analysis (cf. M. Winiarska-Kabacińska, current volume).

Artefacts from Ludwinowo significantly enrich our knowledge about flint processing from phase II of the Linear Pottery culture in Kuyavia. They document similarities in flint processing of the Linear Pottery culture, which can be observed in the methods of exploitation of single-platform cores and the stylistics of tools (cf. B. Balcer 1983, J. Kabaciński 2010, op. cit). At the same time, the artefacts provide significant data for the functional analysis of flint tools and the rules of raw material supply, in which the chocolate flint played a big role. The import of ready-made raw materials from the Świeciechów flint is of great interest. It was observed on sites, located in the close vicinity of the Vistula valley (e.g. Brześć Kujawski, site 4 – R. Grygiel 2004, Kruszyn, site 10 – P. Papiernik 2016a).

Most of the flint artefacts unearthed at Ludwinowo are connected with the well-explored settlement of the Brześć Kujawski group of the Lengyel culture. However, due to the multicultural character of the settlement, only 454 forms have been included in a more detailed analysis. These are artefacts excavated in features, containing only assemblages from the Brześć Kujawski group of the Lengyel culture, which point to their cultural homogeneity. The artefacts were unearthed in different parts of the settlement, in features connected with the whole period of its development (fig. 44). Comprehensive analysis of all data (c.f. study by I. Marchelak, current volume) allowed us to place particular assemblages within three phases of the development of the Brześć Kujawski group of the Lengyel culture (after R. Grygiel 2008). The first group includes material from the initial period of the culture in question, which has clear links with the Stroke Pottery culture. The second group contains flint assemblages from the classical phase, mainly its older part. The third, smallest one, consists of material from the features characterised by late stylistic traits of vessels. The above groups do not contain artefacts unearthed in features with scarce pottery material, whose more precise chronology was not possible to be determined. The oldest assemblages are of utmost importance, as they considerably broaden our knowledge about flint processing from the early phases of the Brześć Kujawski group of the Lengyel culture.

The discussed materials include 16 artefacts, unearthed in three graves (feature 2190, 5510 and 6313). However, a detailed location of the forms in separate features is not known. Thus, it is impossible to figure out which artefacts should be treated as grave goods, and which of them should be treated as a random element resulting from backfilling grave pits. Morphological analysis indicates that a truncated piece with traces of polishing (harvesting) (feature 2190 – plate 123: 4) and fluted blade (feature 5510 – plate 127: 7) may have been intentional grave goods. Feature 6313, connected with the late phase (dated with C-14: 5300±40 BP) contained 13 flint artefacts, mainly post-production waste, but also refitting of splintered piece and blade made of the chocolate flint (plate 132: 4, faint patina) and two, quite irregular truncated pieces (plate 132: 2, 3), made of the Baltic flint. In this case, interpreting the forms, or the whole assemblage as grave goods would be unjustified.

The whole structure of the Brześć Kujawski group of the Lengyel culture is dominated by local erratic stones, classified as the Baltic flint. Indicators of its percentage in chronologically arranged groups range from 59% to 84% (fig. 45). It can be observed that the importance of the local flint is on the increase, until it completely prevails in the youngest assemblages. Chocolate flint had the largest percentage (over 40%) in the oldest assemblages, but it was hardly present in the late ones (fig. 45). In the initial and classical phases of the Brześć Kujawski group of the Lengyel culture, a vast majority of retouched tools

was made of this raw material, which increases its significance for the supply system of the community of this culture.

The assemblage of the Brześć Kujawski group of the Lengyel culture treated as a whole, or as separate chronological groups of assemblages is dominated by the traces of core processing, which attests a primary role of this activity in tool making. Moreover, it has been observed that the semi-product is dominated by blades, with a small number of flakes and not numerous traces of splintered pieces exploitation. However, a lack of cores and compact assemblages, confirmed by the complete dynamic analysis and refitting do not allow a more detailed description of different aspects of flint processing on the site. However, on the basis of the analysis of artefacts coming from flint processing, tools and some splintered pieces, it is possible to attempt a general description of core processing.

Chocolate flint played a major role in the production of tools. On the basis of the analysis of all typologically distinguished categories, it can be concluded that the raw material was processed on the site, in the early and classical phases of the Brześć Kujawski group of the Lengyel culture. A small number of flake forms, particularly with no traces of any preparation on the dorsal surface and technological forms connected with initial core preparation, as well as a lack of unprocessed butts of striking platform, implies that chocolate flint was imported in a processed form. The presence of technological artefacts connected with correcting cores, mainly rejuvenation of butts and core platforms lets us assume that initial cores and pre-cores were imported. These artefacts were used as single-platform cores, but in their highly exploited form, also as specimens with changed orientation, and as cores for flakes. However, the group of technological forms is so scarce in comparison with the number of blades, with negative scars and a small number of blades with natural (without negative scars) dorsal surface that it seems fair to say that ready-made blades were imported. It can be assumed that chocolate flint was transported to the site throughout the whole time of the settlement's functioning. However, its significance was greatest in the early phase and in the older part of the classical phase of the Brześć Kujawski group of the Lengyel culture. This was the time when the standard processed blade was created, in the form of artefacts up to 75–80 mm long, rarely over 20 mm wide, and between 3 and 8 mm thick. The above observations regarding the intensive import of chocolate flint and its influence on flint industry in the times of the early Brześć Kujawski group of the Lengyel culture have already been mentioned in other studies (cf. Papiernik 2008, J. Kabaciński 2010, L. Domańska 1995, J. Małecka-Kukawka 1992, 2001). The value of the new data from Ludwinowo is connected with a great scale of import, particularly in the early phase, and the confirmed local production of blades (cf. J. Kabaciński 2010).

The second type of raw material used by the communities of the Brześć Kujawski group of the Lengyel culture is Baltic flint (table 4). Its percentage in the overall structure of the discussed artefacts is the greatest, regardless of the chronological phase. A series of artefacts, including flakes with no negative scars, primary blades with traces of core preparation and other technological forms connected with core rejuvenation confirm the process of preparing and exploiting cores on the site. The processing of the Baltic flint also aimed at obtaining regular blades from single-platform cores, using the method of serial, though meticulous, production.

The prevailing group of morphological tools in the assemblage of the Brześć Kujawski group of the Lengyel culture are truncated pieces (table 4). These are metrically (fig. 50) and stylistically (cf. plate 122: 1, 3; 123: 3, 4; 124: 1; 126: 1, 2; 127: 4; 128: 2; 129: 1, 3–5, 8; 131: 1, 3; 132: 1–3, 5) diversified forms. It is worth noting truncated pieces with so called harvesting polishing situated obliquely to the main axe of the semi-product, typical of the Danubian cultures. The forms were made from standard blade semi-product, and were used as sickle inserts, with a characteristic serrated blade (cf. P. Papiernik 2008). Other morphological tools are less numerous. These include end-scrapers, retouched blades, and perforators – the latter are quite rare in the assemblages of the Brześć Kujawski group of the Lengyel culture.

Over 20% of forms in the discussed assemblage have been classified as technological group of splintered pieces. The technology was more frequently used for Baltic flint processing (c.a. 35% artefacts made with the use of the raw material). It has been established that cores, lump of raw material, larger flakes and even morphological tools were used for further exploitation. The technology was used for a short time and involved a single splintered piece. Mostly several (rarely over a dozen) flakes were knapped from the splintered piece. (plate 121, 5; 124: 3; 126: 3, 5; 132: 7). Only very rarely were splin-

tered pieces used as semi-product for the production of morphological tools. A small number of artefacts wore traces of usage retouch. A similar description of splintered pieces would apply to chocolate flint, but with two reservations. The group in question is very small (c.a. 5% of artefacts in the overall structure of the raw material) and the technology of the splintered piece processing was used only for artefacts from the group of artefacts connected with core processing (mostly cores and flakes), less intensively than in the case of the Baltic flint.

Artefacts unearthed in three features (3869, 4602, 4770) were analysed by M. Winiarska-Kabacińska from the point of view of their functional use. 90 artefacts underwent analysis, out of which 29 forms had traces of wear. Supplementing the observations of the author, it should be noted that chocolate flint definitely prevails (27 functional tools) and thus confirms the exceptional role of this type of raw material in the assemblage of the Brześć Kujawski group of the Lengyel culture at Ludwinowo.

Assemblages of the Funnel Beaker culture and Globular Amphora culture have also provided interesting information, regarding the import of ready-made products from the southern raw material. In the case of the Funnel Beaker culture, it is interesting to note the import of macrolithic products (axes and blades) made of Jurassic flint, during the settlement of the Radziejów group of the Funnel Beaker culture. As regards the Globular Amphora culture, apart from striped flint, there was also an interesting discovery of an axe made of local erratic stone (plate 136: 2), with clear traces of using the method of celt (e.g. axe) processing. The axe should be treated as an imitation of imported products made of striped flint and also as a rare example of the production of polished tools in the Globular Amphora culture in the Middle European Plain.

To sum up, the flint assemblage unearthed on site 3 at Ludwinowo is of great value for the study of various aspects of flint industry among Kuyavian Neolithic communities. Ludwinowo materials seem to be an important asset in a broader discussion about the role of the communities, inhabiting the area adjacent to the Vistula valley, in the distribution of the raw material and ready-made products made of southern raw material, mainly chocolate flint. It appears that in the case of Band Pottery cultures, the import was a broader and more complex organisational process than it has been assumed so far (cf. J. Kabaciński 2010).

#### SETTLEMENT REMAINS OF THE TRZCINIEC CULTURE (*Ireneusz Marchelak*)

The main feature of the Trzciniec culture is a single grave, marked as feature 452, unearthed in the southern section of the site (fig. 54). It was recorded in the form of an elongated, irregular zone, with measurements 2.6×0.55–0.65 m, oriented along N-S line (plate 139: 1). The grave encompassed two larger and one smaller hollow, which contained human remains – not burned, weakly and strongly burned, which points to a bi-ritual character of the grave. In the grave zone and in its vicinity, there were remains of a damaged stone, grave construction. They contained remains of at least six people of varied age and sex (see analysis by A. Zielińska). The analysed feature is an example of a collective grave, which is the most typical form of the Trzciniec culture, dominated by inhumation, but also characterised by bi-ritual burials. In case of this type of graves, bodies were buried at some intervals. The presence of partly burned bones can be interpreted as the burials that involved burning the dead together with grave constructions (e.g. wooden coffins, burial platforms and houses of the dead), as opposed to a typical cremation, leading to a complete or considerable destruction of bone tissue (P. Makarowicz 2010).

The grave includes a small pottery assemblage of settlement character (137 fragments), which belongs to the same chronological context. The pottery was scattered over a large area of the site (fig. 54). It was mainly found in the cultural layer, and on secondary deposit in features 735, 1035, 1099, 5225, 6106, and only in one feature (4371) with no admixture of other cultural elements. Fragments of vessels include pots – typical of the Trzciniec culture, S-shaped, not well-indented, with the belly in the high position, decorated with the raised ridged band around the rim (plate 138: 8; 139: 6, 10). The micro-morphological analysis revealed the prevalence of widened rims: bevelled (plate 138: 10, 13; 139: 3, 6, 13) straight (plate 138: 8, 14, 20; 138: 5; 139: 10) and faceted. There were very few traces of not-widened rims, straight (plate 138: 17) and rounded (plate 139: 7). There were very few examples of a horizontal, multi-

ple engraved line (plate 138: 21; 139: 2,9). The unearthed artefacts mostly point to classical horizon of the Trzciniec culture, with great emphasis on horizon HT3 (c.a. 1750–1650/1600 B.C.; P. Makarowicz 1998).

#### SETTLEMENT REMAINS OF THE LUSATIAN CULTURE (*Ireneusz Marchelak*)

Settlement remains of the Lusatian culture on site 3 at Ludwinowo are very scarce, both in terms of space (fig. 55) and the amount of material (fig. 56). They were mainly unearthed on the border line of the excavated area, which may indicate that these were auxiliary features belonging to larger spatial structures, connected to settlement of more permanent character.

The remains of the Bronze Age are represented by two extraction pits, partly recorded in the explored area. These are: feature 3424 with niches (ha IV, are 95; plate 140: 1) and feature 3425 (ha IV, are 95). The unearthed artefacts include a fragment of a vase with a collar (plate 140: 2), characteristic of the so called knob style and the bottom of a pot, decorated with engraved lines, typical of the Urad style in the western part of Greater Poland (plate 140: 3). Those elements allow us to date the assemblage to the beginning of the 4<sup>th</sup> period of the Bronze Age. Non-numerous fragments of pottery unearthed on the secondary deposit in features of the Przeworsk culture: 616 (ha III, are 42, 52) and 759 (ha III, are 62; plate 140: 7–8) and in the cultural layer (plate 140: 9) belong to the same chronological level. Hallstatt influences on the zone are attested by scarce vessel fragments, decorated with, so called pseudo-corded ware motif, and unearthed on the secondary deposit in features of the Przeworsk culture, 1389 (plate 141: 1) and 4654 (plate 141: 3) and in the cultural layer (plate 141: 2).

Settlement remains of the Lusatian culture from the Hallstatt period (possibly from the late period of the Bronze Age) have been found in the opposite part of the site. These are remains of a large over-ground building on a rectangular plan, possibly of log construction (cluster of features 7567, 7568, 7575), with estimated measurements 7×13 m (plate 142). It comprises a pit (feature 7640) most certainly of storage character (plate 143: 1). The unearthed pottery includes a blackened amphora, bi-conical and gently shaped (plate 143: 7) and a pot, whose form can be described as egg or barrel-shaped (plate 143: 6). The wooden beam from feature 7640 (plate 143: 1) has yielded a C-14 date, calibrated between 850–720 BC (60.5%) and 700–530 BC (34.9%), which points to the late Bronze Age (HB2-HB3) and the Hallstatt period, mainly its older part (HC). The date confirms the stylistics of the unearthed vessels. Other finds include a bone pendant (plate 141: 10) and an assemblage of seventeen stone tool forms: grinders, pestles and a whetstone, unearthed in the homestead and its vicinity. They were certainly connected with economic activity performed at the settlement and its surrounding area (plate 141: 8–9; 143: 2–3; 144: 3–4, 8, 10; 145: 4–8). The vicinity of the feature consists of other pits of diversified morphology, which are of auxiliary, economic character (plate 144: 6, 9, 11).

#### SEPULCHRAL ZONE FROM THE LATE HALLSTATT PERIOD (*Ireneusz Marchelak*)

In the southern part of the site we found four grave features of diversified character, with the range of 40 m (fig. 57): features 294, 430, 432, 504.

Feature 294 is characterised by a stone construction laid out at the bottom of a bathtub-shaped grave pit (plate 146). The back of the stones had traces of weakly preserved remains of a skeleton of a young individual of undetermined sex, and the age of c.a. 13–15 years, *infans II* (see analysis by A. Zielińska). Grave goods included two three-leaved, bronze arrowheads of the Scythian type, placed at leg-room (plate 146: 2–4). It is an example of many such finds on the area of Poland (Z. Bukowski 1978; J. Fogel 1979; M. Gedl 2014). This type of weapon is mainly connected with, so called second wave of Scythian incursions, which occurred between the middle of the 6<sup>th</sup> century (possibly the end of the 6<sup>th</sup> c.) and the beginning of the 5<sup>th</sup> century BC. Their visible effects mainly include destroyed defence settlements, such as Strzegom, Polanowice, Wicina, Kamieniec (Z. Bukowski 1978). Skeletal burials may be connected with features unearthed in the south-eastern part of the Greater Poland Lakeland (e.g. Brześć Kujawski, Lachmirowice, Radojewice). They are considered to be the influence of the Upper-Silesian-Lesser Poland group of the Lusatian culture in the late Bronze Age (K. Szamałek 1995; M. Gedl 2005). Some graves were rectangular, surrounded by a stone cairn (K. Szamałek 1995; U. Narożna-Szamałek 1997). However,

their chronology (V EB-HC) differs from the grave at Ludwinowo. Thus, the grave should be treated as a foreign element in the local environment. It may be considered as one of the finds of eastern provenience, e.g. Scythian (e.g. the finds of nail earrings) in the close vicinity of the site at Ludwinowo (Brześć Kujawski, site 3; Gustorzyn, site 1; Kolonia Dębice; R. Grygiel 1995). They are linked with the migration of population from south-east, e.g. the Wysocko Wyzne group. This, in turn, could be connected with the wave of Scythian incursions, following the events in the Black Sea region at the end of the 6<sup>th</sup> century BC (Persian incursion of the Scythians in the years c.a. 514–512 BC; R. Grygiel 1995; Z. Bukowski 1978). These new cultural elements on the area of eastern Kuyavia may have contributed to the process of transformation from the local late Lusatian culture to the early Bell-grave culture (R. Grygiel 1995). The bones from feature 294 have yielded C-14 date – 821–753 cal. BC (87.7%), 686–667 cal. BC (6.3%) and 611–597 cal. BC (1.5%), which indicates that they are chronologically different from the cultural content of the grave.

In the vicinity of the grave there were two small, pit, cremation burials – features 430 and 432 with very few grave goods (e.g. fragments of iron razor; plate 147: 1–6). One grave contained the remains of an individual of undetermined sex and age (430), whereas the other one (432) – the remains of a male individual, at the age of *adultus/maturus* (see analysis by A. Zielińska).

30 m east of features 430 and 432, there was a feature 504 (plate 147: 7–9) in the form of a miniature vessel placed in a larger bowl. These were urns, containing the remains of a child at the age 4–6 (see analysis by W. Lorkiewicz). The stylistics of vessels does not differ from the local tradition. However, the technique of bowl making, like in the case of the vessel from feature 430, seems to differ from the “Lusatian workshop”. This can be also observed in the assemblages from the above mentioned features, characterised by eastern elements. Feature 504 has yielded C-14 date – 753–410 cal. BC, with the range 597–410 cal. BC (57.8%), which coincides with the chronology of feature 294. It seems that the unearthened graves are related in terms of space and chronology. Auxiliary character of the zone where they are located, the technique of pottery making and, above all, the goods found in grave 294 let us assume that it was a burial place of people, whose origin was not connected with the local tradition. However, the diverse character of burials, including cremations, may indicate assimilation processes. This also refers to vessel forms, whose different character has been determined by the technique of pottery making.

#### SETTLEMENT OF THE POMERANIAN CULTURE AND BELL-GRAVE CULTURE (*Ireneusz Marchelak*)

The features attributed to the Pomeranian culture and Bell-grave culture at Ludwinowo are represented by a collective grave (feature 438), unearthened in the southern part of the central section of the site, and by two zones containing features of settlement character (fig. 58). A smaller zone, marked as settlement A, was located east and south-east of the grave in its close vicinity. A larger settlement B has been designated 300 m north and north-west of the grave (fig. 58). Pottery was found far beyond the boundaries of the above mentioned zones, which reflects the complex and dynamic character of post-deposition processes on the site, particularly in the younger chronological periods (fig. 59).

The assemblage which consists of 4,871 vessel fragments is connected with the above mentioned cultural level. 1781 fragments have been obtained from feature 438, i.e. the collective grave, whereas 3090 fragments are of settlement character. The pottery has undergone technological analysis. As a result, six technological-raw material groups have been distinguished (compilation 10). In groups TI-TIII white stone temper was applied in the admixture, whereas in groups TIV-TVI pink temper was used. The above mentioned groups have been correlated with the type of vessel surface used. The “blackening” process was also marked.

The pottery of the Pomeranian culture and the Bell-grave culture consists of the following forms: A/ pots/bells; B/vase-like vessels; C/ bowls; D/ mugs/jugs; E/ lids; F/plates (fig. 60–64). Pots and bells have only been found in settlements. Due to their fragmentation, the forms are only partly discernible and give basis for micro-morphological analysis (fig. 60). Most of the vessels belonging to other categories come from the collective grave, except for the bowls which more frequently occur in settlements (fig. 62–63). Vessel decoration can be divided into three main categories (fig. 65): engraved decoration (OR), impressed decoration (OO) and moulded decoration (OP), which have been recorded on 72 fragments

of pottery (1.5% of the whole pottery assemblage). Moulded elements, such as: handles, knobs and vertical raised ridged bands (OP.1, OP.8, OP.9, OP.10) prevailed in the area of the grave. They were accompanied by a complex motif, most certainly made by the impressions of a breastplate (OO.2). The most common motifs of settlement pottery included finger impressions on vessel brims (OO.3) and diverse raised ridged bands around a vessel (OP.3-OP.7).

The main cultural element is the collective grave – feature 438 (plate 148). It was located along the line east-west and consisted of a pit, irregular in shape (measurements: 320×125×205cm). It was originally surrounded by a stone construction, which is now heavily damaged due to deep ploughing, and appears in the form of several clusters of stones. In the southern part there is a discernible rectangular annex, c.a. 1 m wide, which could have originally served as an entrance to the barrow. The proper grave pit, designated by the presence of urns, had the shape of irregular trapezium, with the following measurements: 80×220×40×115×140 cm (walls W, N, E, S, SE – respectively). The grave is characterised by a row pattern of burials of irregular character with some rows displaced (plate 148). The grave contained 29 urns, thanks to which it can be counted among one of over several dozen other multi-urn barrows of the Pomeranian culture (containing at least 15 urns). At the same time it is one of the largest barrows in the area of the lower Vistula river and the south of the Noteć river (containing over 25 urns), (B. Muzolf, W. Lorkiewicz 2005, p. 197, fig. 6). The vessels used as urns were mostly vases (24), jugs (3), bowls (2) with other accessories. The additional vessels include a bowl on feet (plate 150: 1), which must certainly supported an urn (plate 149: 7–8). Twelve urns contained small objects – elements of earrings: mainly bronze circles and glass beads, cobalt in colour, as well as a decorative coil of “salta leone” type and bronze links. One burial contained a bone pin (plate 152: 2). Most urns, especially larger vase specimens, were either generally damaged, or only in their upper part. Interestingly, three lids (no 37, 38 and 42) were found in the position which might suggest that they had slipped down before the upper section of the grave was destroyed. It must indicate that the grave was covered with a wooden ceiling, whose natural destruction together with the penetration of earth within the grave chamber may have caused the relocation of some elements. All urns contain the remains of 36 people in total. Seven urns contain double burials (table 11, fig. 66: see analysis by A. Zielińska).

The pottery assemblage of the grave is characterised by “pure” forms and cultural context accompanied by noticeable stylistic eclecticism resulting from adaptation processes. The former include typical Pomeranian elements, such as face urns (hypothetically reconstructed), (plate 153: 8–10, 10a) and the custom of using urn lids (plate 149: 7–8; 150: 2,5; 151: 2–3; 153: 8–10). On the other hand, the Bell-grave culture is linked with the presence of moulded elements on the vases of post-Hallstatt type (fig. 61; type B.1), as well as on the Pomeranian ones with spherical belly (fig. 62, types B.10, B.11). Moreover, the effect of adaptation processes can be seen in the form of some jugs (fig. 64, type D.1) and decoration of knobs on the bowl brim (fig. 62, type C.1/3), which are not typical of the Pomeranian culture and were incorporated when its influence extended and got into contact with Lusatian tradition.

The above described grave is included in the group of multi-urn, “mixed-character” features, with the presence of pebble constructions. They are recorded on the area of central Poland, Mazovia and the Lublin region, where Pomeranian forms of vessels are accompanied by Bell-grave culture specimens and the forms directly linked with the Lusatian culture. The above mentioned collective graves attest the relocation of the population of the Pomeranian culture from the eastern part of Greater Poland, through central Poland, towards east and south-east. On the way it incorporated elements of the local Lusatian culture. The chronology of this stage, which resulted in the formation of the Pomeranian-Bell-grave culture assemblages, coincides with the broad time framework, between HD3 – LtB1 (M. Andrzejowska 2005, p. 130–135, fig. 2, 4, 5). Feature 438 from Ludwinowo is also dated to the same period. Taking into account weak recognition of Kuyavia in the early phase of the Pomeranian culture (M. Kaczmarek 2005, p. 167, fig. 8–9) most burials must have occurred in La Tene period (LtA ?).

In the settlement area A, located closer to the grave, small, uncharacteristic pits have been recorded, which may be linked with agricultural-breeding activity (plate 156: 8, 11; 157: 1, 7–8, 10; 158: 1). In zone B, situated further from the grave, there is a cluster of features (B1) with two larger clay pit clusters (plate 162: 1; 165: 1) and several pits connected with more complex economic activity (plate 166: 3; 67: 1, 8). A small cluster (B2), located 150 m away, contained a bath tub-shaped feature, which may be inter-

preted as the remains of a partly buried building (plate 160: 1). The character of the unearthed features indicates that zone B2 might have been of dwelling character, whereas zone B1 could have provided economic support, evidently of different type than in the case of settlement A. It was most certainly connected with processing-production activity or the extraction of clay. The meagre amount of strongly fragmented pottery, unearthed in both zones, is clearly linked with the Bell-grave culture. The presence of pots/bells fragments (fig. 60) prevails, and it is mainly accompanied by bowls (fig. 62, 63) and to a lesser extent by vase-shaped vessels (fig. 61, 62). The forms characteristic of the older level of the Bell-grave cemeteries, phase I (e.g. egg-shaped pots A.2, bells with no band A.5/6, profiled bowls C.1, S-profiled bowls C.2, bowls with indentation C.3) co-occur with younger elements, connected with phase II and III (e.g. completely roughened pots A.1, A.4, pots/bells with a smooth neck and a band A.5/1–5, vase B.13, bowl C.9, egg-shaped mugs D.6, pot with handles A.7). These observations allow the dating of both zones to the early La Tene period. The lack of visible, chronological differences between them enables us to treat them as one functionally diversified settlement complex. It is interesting to observe that both of the above mentioned clay pits contained single forms, connected with the Pomeranian culture: jug of type D.6 (plate 162: 6) and pot A.6 (plate 165: 3), which reflects the process of cultural interference, also visible in the case of the collective grave. It seems that both, in the case of the collective grave and the settlement, we deal with the early stage of the development of the Pomeranian-Bell-grave complex. Taking this into consideration, the above mentioned zones should be treated as an explored fragment of the settlement, whose bigger part is located beyond the excavated area and which was closely connected with the grave. The Pomeranian forms unearthed in the clay pits may indirectly indicate the presence of a permanent building and imply a possibility that representatives of both communities may have co-existed on the same area. This would confirm earlier observations on settlement processes made by R. Grygiel which referred to Smętowo peninsula at Brześć Kujawski in the early La Tene period (R. Grygiel 1995, pp. 356–358, fig. 43).

#### SETTLEMENT TRACES OF THE JASTORF CULTURE (*Ireneusz Marchelak*)

One small separate pit – feature 7759 (ha XVI, are 92; fig. 67; table 168: 1) was found along the north-western border of the excavations. It contained fragments of a sack-shaped pot with a tape-like handle, made of ceramic mass, tempered with a large amount of sand (plate 168: 2). A small grinder/pestle has also been unearthed (plate 168: 3).

The stylistics of the vessel bears some resemblance to some forms of the Jastorf culture. Artefacts from grave 86 from Stare Babice, site I (T. Dąbrowska 2008, fig. 5: 4) reveal close analogies to the above mentioned culture. Upper parts of the vessels found on the sites in Poznań – Nowe Miasto, no 278 (H. Machajewski, R. Pietrzak 2008) and no 284 (T. Kasprowicz 2008) have a similar shape. The Jastorf culture forms include the micro-morphology of the vessel rim and the tape-like handle – element characteristic of the older pre-Roman period (H. Machajewski, R. Pietrzak 2008). The discovery from Ludwinowo is part of a wider context of finds attributed to the Jastorf culture from the Greater Poland-Kuyavian Lowland (H. Majewski, R. Pietrzak 2004), including the closest region of Brześć Kujawski (M. Grygiel 2004).

#### SETTLEMENT OF THE PRZEWORSK CULTURE (*Ireneusz Marchelak*)

The Przeworsk culture features unearthed on site 3 at Ludwinowo mostly include the remains of an extensive settlement covering the area of c.a. 350×250 m, i.e. almost 3 ha (fig. 68). During the excavations its northern and eastern section was explored. The settlement clearly extends beyond the south-western edge of motorway A-1. At a distance of 270 m north-west of the compact settlement and c.a. 170 m away from peripheral features, we have found the remains of the Przeworsk culture cemetery (so called cemetery layers I, II), which are contemporaneous with the settlement. Both the cemetery and the settlement form a complex which encompasses an area of over 500 m.

The Przeworsk culture settlement consisted of an assemblage of 22,676 fragments of pottery, 34 metal artefacts, 14 stone artefacts, 11 bone products and an assemblage of 8,274 animal remains. Cemetery layers yielded 32,650 fragments of pottery.

The pottery found on the site has been divided into three main technological groups: I – pottery moulded by hand, II – pottery thrown on the wheel – smooth (so called “grey” pottery), III – pottery thrown on the wheel – rough. Vessels thrown on the wheel constitute only 0.6% of the whole assemblage from the settlement (compilation 11). In terms of typology, the Przeworsk culture pottery has been divided into the following categories of forms: A/ vases, cups, bowls; B/ pots; C/mugs, ladles; D/jugs; E/ amphorae; F/miniature vessels; G/sieve-like vessels; H/other forms; I/spindle whorls; J/ loom weights; K/ lunar plates; L/ zoomorphic forms (fig. 70–85). The assemblage of moulded pottery found at the settlement consists 10.5% decorated fragments. They have been divided into 2 groups of motifs: O.I.A (*abbreviation refers to the type of vessel decoration*), which occur mainly on thin-walled vases, cups and bowls (fig. 87–89) and O.I.B (*abbreviation refers to the type of vessel decoration*), present on larger vessels, mainly pots (fig. 90–92).

Some forms of moulded pottery link with the stylistics of the early Roman period. They mostly include angular form of vessels of types A1, A4, A5, as well as types A2, A7, A8, A18, A22, A25–28, A50, B10/3, C3, E. Some forms from this group are also characteristic of the younger Roman period, i.e. vessels A10, A21, A25, A27, A28, B4, B5, B6, B7, B8, B9, B11, B12, B16, B21, B23, B33, B34, B37, B38, B41, B46, B48, B49, B50, C2, C7. A very rare form is represented by a two-level vessel A9. Vessels of type A6, A11, A15, A16, A24, A37, A38, A48, A49, B1, B2, B3, B10/1–2, B13, B14, B15, B18, B19, B20, B22, B25, B26, B27, B29, B30, B31, B35, B36, B40, B42, B43, B45, B47, C1 are connected with the younger Roman period. These forms also include some forms which are found in late assemblages of the Przeworsk culture (A12, A14, A20, B44, B51, B52, B53). Other pottery material includes three loom weights (J), a lunar plate of sacral-magic significance (K) and a fragment of a zoomorphic vessel (L; fig. 85).

Smooth pottery thrown on the wheel (group II) includes the following forms: A/ vases, cups, bowls; B/pots; D/jugs; H/other forms (fig. 93, 94). Rough pottery (group III) can be divided into category A and B (fig. 94). Most vessels from this group have been fragmentarily preserved. We can establish a more precise chronology on the basis of types II. A5, II.A6a, IIA7 (phases C1b–C2), types II.A3, IIA13 (phases C1b–C3), types II.A1, IID1 (phases C2–D) and type II.D2 (phase D). Non-numerous fragments of pottery from group II were decorated (fig. 96). It is worth noting a stamp decoration filled with a checked pattern, which is found on cemeteries in the area of the lower Weser river. This decoration is rarely found in assemblages from the early Migration period.

Out of five fibulae unearthed at the settlement, chronologically older specimens are represented by bronze artefacts of type A.V.127–128 (fig. 97: 3) and A.VI.162B with a trapezoidal foot (fig. 97: 1) from phases B2c–B2/C1. A bronze fibula A.VI.162 with a faceted arch (fig. 97: 4) is dated to phase C1a. An iron fibula of type A.VI.158, variant *Szczedrzyk-Zadowice* (fig. 97: 2) is dated to phases C1b–C2. A partly preserved bronze fibula from group A.VI or A.VII (fig. 97: 6) has also been unearthed. Cemetery layers yielded a bronze fibula A.V.96 dated to phase B2/C1 (fig. 97: 12) and a fibula A.VI.162A dated to phase C1b (fig. 97: 10). Garment artefacts are represented by a silver S-shaped buckle of type D, typical of the *Wielbark* culture, occurring in phases B2–C1 (fig. 97: 5). Other bronze artefacts include belt fittings (fig. 97: 9, 11, 13, 14), tweezers (fig. 97: 7), needle (fig. 97: 8) and a door bolt (fig. 98: 11). Iron artefacts are represented by: a fire striker (fig. 98: 2), little knives (fig. 99), awl (fig. 98: 3), arrowhead (fig. 98: 4) and a rare find of adze (fig. 98: 8). Two silver denars from the times of Trajan (table 263: 2) and Faustina II (table 196: 13) have also been unearthed on the site. The cemetery layers have yielded one gold plate, possibly coming from a capsule-shaped pendant (fig. 97: 15).

Bone artefacts include horn, one-layer, one-piece combs of type ThAII, characteristic of the younger Roman period (fig. 100: 1, 4). Cemetery layers have also yielded numerous small sherds of three-layer combs dated to phase C1a onwards (table 320: 8–23). Both, the settlement and the cemetery layers have yielded fragments of decorated bone pins (fig. 100: 3; table 320: 5; 321: 16). Very rare finds include dice – one in the shape of a bead (table 320: 1; 321: 15) and a bone arrowhead (fig. 100: 10). Frequent finds include awls (fig. 100: 5–7) and bone skates (fig. 100: 11).

Glass artefacts are mostly found in cemetery layers, where we can record a fragment of a jug handle (table 321: 17) and eight beads (table 319: 9, 10, 13–15; 321: 20, 22, 23). One bead was also found at the settlement (fig. 100: 8)

Beads made of other material have also been unearthed on the site. They include four amber beads (table 272: 7; 319: 11, 12, 16), most certainly coming from one of very many amber workshops found in Kuyavia. Rare finds on the area of the Przeworsk culture are represented by three stone beads, made of chalcedonite (table 319: 18, 19; 321: 19). Typical stone artefacts found at the settlement include finds of erratic stones with traces of wear (table 195: 8; 248: 11; 175: 9; 238: 4), whetstones (table 185: 11; 201: 17) and a quern stone (table 229: 8).

The Przeworsk culture settlement from Ludwinowo is characterised by numerous and diverse forms of immovable features, which reflect a complex process of its development. They include the remains of overground buildings, recessed buildings, utility pits, wells, clay pits and a lime kiln. Within the boundaries of the settlement we could find 300 various pits, the gaps between which were filled with numerous post pits (occasionally 60–70 per one are; plate 299, 304). The observed regular layouts indicate traces of diversified overground buildings. However, it should be pointed out that it is very difficult to designate their foundations. It is caused by the fact that the construction remains from different phases of the building development overlap with traces of other chronological periods (mainly the Brześć Kujawski group of the Lengyel culture and the Middle Ages), as well as a contemporary, dense irrigation system (fig. 103). Additionally, we can observe flattening of the original level of land in later periods, e.g. as a result of slope processes or as a result of intensive farming. It must have led to the destruction of the traces of some posts, evidently recessed at a different depth. This may often result in an incomplete layout of posts. Thus, some of the reconstructions should be treated as hypothetical. In total, seventy-three post buildings of diverse character have been designated, with 1200 identified post pits (table 12).

A distinct element of the Przeworsk culture building development is the complex of ten large, post longhouses, whose area does not exceed 100 square metres – buildings 1, 2, 3, 5A, 6, 7A, 8A, 9, 10, 11 (fig. 102; plate 298, 299; 2; 302; 303; 304; 305: 1, 2; 306: 4; 307: 1; table 12). This type of construction was the basic form of house for people and livestock on the area of Free Germania (*Germania Libera*) between the pre-Roman and Roman period and the Migration period. This has been confirmed by well-preserved sites in north-western part of Central Europe, particularly in Lower Saxony, settlements from Feddersen Wierde and Flögeln-Eekhöltjen (W. Haarnagel 1979; W. H. Zimmermann 1992; A. Michałowski 2011). All the longhouses unearthed at Ludwinowo are characterised by two-nave construction with the inner row of posts supporting the roof structure, which runs along the longitudinal axis of the building. This type of building development was used on the whole area of *Germania Magna* (e.g. southern Holland, Westphalia), particularly in its eastern part (the Elbe river circle). On the other hand, the southern coast on the North Sea and Jutland was characterised by three-nave construction (J. Brabandt 1993). A growing number of discoveries from the Przeworsk culture (particularly the settlement at Konarzewo, site 5; J. Schuster 2012) indicates that the two-nave longhouse was also popular here (A. Michałowski 2011). The largest houses from Ludwinowo were diversified in terms of construction. The main buildings were built on the plan of a rectangle, with an occasional arcade, usually attached from the south (no 1, 2, 5A, 7A and 11; plate 298: 1, 2; 303; 303: 2; 307: 1). We can also find houses with an apse-shaped gable (no 3A, 8A, 9 and 10; table 299: 2; 305: 1, 2; 306: 4). Alongside the largest buildings there were six similar, slightly smaller constructions, covering the area of 71–86 square metres (nr 3B, 8C, 8D, 12A, 41, 48; plate 300: 1; 305: 3; 306: 1; 308: 1; 307: 2; 312: 1). A two-nave longhouse structure was also used for smaller constructions, including eight buildings, covering the area of 40–54 square metres – no 3C, 3D, 3E, 7B, 8B, 17A, 28, 29 (plate 300: 2; 301: 1,2; 303: 2; 306: 3; 309: 1, 9; 310: 1).

The settlement also consisted of small buildings on an elongated plan, covering the area of between 24–32 square metres (no 5B, 14, 15, 20A, 24, 27, 30, 33, 37, 49, 54) and the smallest constructions, covering the area of between 14–18 square metres (no 8E, 20B and 42). This size of structure can be interpreted as, so called auxiliary buildings, which occurred in the vicinity of larger buildings and most probably provided them with support of economic-workshop character (J. Brabandt 1992; W. H. Zimmermann 1992; A. Michałowski 2011).

The smallest layouts of post pits (usually between 4–6) have been unearthed on the site. They cover an area of 4–13 square metres each (one larger example of 19 square metres), and can be interpreted as the remains of granaries, in the form of either covered or open platform on posts. This type of construction served as a place for storing supplies of food, especially grain, insensitive to frost (A. Michałowski 2011). Twenty-six granaries have been distinguished on the site (table 12).

Apart from overground buildings only preserved in the form of layouts of post pits, there are also non-numerous examples of overground post foundations, which can be seen in the layout of a utility layer. These included two smaller buildings, covering an area of 22 square metres (feature 4163; plate 279: 1) and 9 square metres respectively (feature 1035; plate 268: 1). A different variant is represented by a building, most probably of storage character, with an additional recessed section, covering the area of 38 square metres (feature 457; plate 213–214).

Post buildings at the Przeworsk culture settlement were accompanied by numerous forms of recessed pits. The largest ones, which cover the area of over 5 square metres, frequently with a flat bottom and vertical walls are interpreted as earth lodges (so called dugouts). Most probably, they played a role of storage, but the workshop function cannot be ruled out (A. Michałowski 2011). These include features without post remains (plate 169: 1; 176: 1; 183: 1; 187: 1; 191: 6; 210: 1; 219: 1; 231: 1; 244: 1; 247: 1; 252: 1, 8; 267: 1; 283: 1). There was only one earth lodge characterised by post construction (feature 1405; plate 270: 1), although this type of structure is quite common at the Przeworsk culture settlements (A. Michałowski 2011). Other numerous pits, covering a rather smaller area, include features recessed over 1 m into the ground, rectangular or sack-like in the cross-section. They can certainly be linked with a storage function (plate 170: 12; 179: 1; 217: 1; 230: 1; 286: 1). The deepest ones, nearly 2 m dug into the ground, most certainly had a “fridge” function (plate 209: 5; 210: 1; 278: 1).

An essential element of a settlement was a well. Thirty wells have been unearthed on the site. They are all characterised by a lack of a casing construction, which means that they were bored directly in clay (plate 169: 7; 173: 9; 184: 8; 202: 6; 204: 1; 208: 6; 210: 1; 212: 9; 224: 5; 224: 4; 225: 1; 226: 1,7; 228: 1; 229: 7; 236: 1,4; 241: 6; 250: 1; 251: 1; 254: 1; 278: 1; 282: 1; 286: 6). Wells were primarily linked with a zone occupied by large, post longhouses. It is worth noting a cluster of ten wells, located at the settlement, close to a northern section of the main square. They provided direct support for several large houses (probably buildings no 4, 5A, 7B, 8A–8D, 9, 10, 56, 57). In other cases, single wells could be found next to separate buildings.

Clay pits form yet another category of features. The largest ones have been unearthed in the vicinity of large houses and were certainly connected with their foundation (feature 411; plate 194; feature 551; plate 206; feature 601; plate 202). However, several smaller features may have been linked with the economic activity of the community, such as pottery (e.g. cluster of features 688–690, 1125, 1126, 1210; cluster of features 2721, 2728, 2876, 2879; plate 200: 1; 180: 12).

It is worth noting the remains of a lime kiln among the unearthed features, with a very well-preserved stone cairn (feature 6050; plate 285: 4).

The whole settlement is organised around an empty square, c.a. 85×70 m large in the older phase of the building development and c.a. 65×55 m in its younger phase (fig. 35).

This type of spatial organisation resembles similar layouts of settlements of comparable size, from Germany and Denmark areas (e.g. Fedderson Wierde, Flogeln-Eekholtjen, Hodde, Bärhorst; J. Brabandt 1992; W. H. Zimmermann 1992; A. Michałowski 2011). The settlement was mainly occupied by a dwelling zone, which bordered with the main square from the north and north-west. It is visible that the dwelling zone goes along W-E axis, a direction according to which some of the buildings were also oriented (1, 3A–3E, 4, 5A, 7A, 8B and 8E, 11). Some were built perpendicularly to the above line, along N-S axis (2, 6, 8D, 9, 10, 12A). There are also some houses whose position is diagonal in relation to the layout mentioned above. This attests different phases of building development on the site. Interestingly, the latter buildings are smaller structures, like features 12A, 41 and 48, which are situated beyond the main dwelling zone of the settlement. This may confirm a chronological difference mentioned earlier, but it may also reflect functional diversity of the settlement. The spatial division of the settlement is reflected in the location of the zone, south of the main square. It consists of small buildings with pits and dugouts, which may have been the main economic infrastructure of the settlement.

Artefacts unearthed on the site include complete dog skeletons found in seven features. Some of them, unearthed next to buildings (features 457, 4163; plate 214) may be treated as foundation deposits containing offerings and may be linked with the magical-sacral role of the Przeworsk culture (T. Makiewicz 1987). Other specimens found in the backfilling layers of the utility pits (features 74, 3060, 1134; plate 187: 1; 190: 1) and the well (features 1006, 4654) should be treated as an effect of their utilisation.

Different traces of economic activity of the settlement dwellers have been recorded. Vegetation macro-remains indicate growing crops, such as barley, rye, common wheat, millet and oat, as well as pea and probably flax. Numerous finds of animal remains confirm breeding cattle, pig, horse, sheep and poultry (hen, domestic goose). Hunting activities are confirmed by the finds of wild animal remains (red deer, wolf, roe deer, wildcat, hare, black grouse, eagle-owl). Other activities of economic character include calcinations of limestone, carpentry, spinning, weaving and leather processing.

The unearthed pottery materials and other dating artefacts clearly indicate their link with the younger Roman period. There is a visible decline of stylistic forms typical of the early Roman period. Fibulae A.V. 127-128 and A.VI.162B point to an older part of the younger Roman period (phase C1a), or possibly the beginning of the early Roman period, thus indicating that the settlement comes from an older chronological phase. The settlement comprises two large dwelling buildings, situated on the northern line of the main zone of the settlement (no 1, 2, 5A, 7A, 11). All of them had a rectangular construction with an arcade. The buildings were accompanied by smaller utility features (8B, 8D, 37). Most probably buildings no 6 and 8a (construction without arcade) and possibly building 12A, which are typical of the younger construction phase were also built during this chronological phase. They can be linked with a specialised economic function and a nearby lime kiln. Fibula A.VI.158 and the pottery thrown on the wheel indicate the flourishing of the younger Roman period (phase C1b) and the subsequent phase of the development of the settlement. A small amount of "grey" pottery in most assemblages points to the initial stage of its dissemination. This implies that some zones cannot be dated beyond phase C1b (c.a. 260 years B.C.). The distribution of "grey" pottery points to its presence mostly at northern boundaries of the main square. This phase of the settlement is connected with the buildings with an apse-shaped gable (no 9, 10, 3A, 3B, 43).

A bigger amount of "grey" pottery in features at the boundaries of the excavations, confirmed by C-14 dating, most probably indicates an even younger phase of the settlement development, which extends westwards. It can certainly be linked with phase C2 (2<sup>nd</sup> part of the 3<sup>rd</sup> century) and C3 (4<sup>th</sup> century A.D.) Some C-14 dates which indicate the 5<sup>th</sup> century A.D. seem too late with reference to the pottery artefacts (features 4389, 4654). However, it cannot be ruled out that the settlement was still functioning in that period, and buildings 4, 5B, 7B may be connected with that phase (fig. 105).

The remains of the Przeworsk culture cemetery were unearthed north-west of the settlement. They occurred in the form of two zones of the cultural layer, marked as features 7666 and 7580 (fig. 104). They were initially interpreted as the remains of so called layer cemetery. However, each level yielded fragments of late medieval pottery, which indicates a secondary character of the layers, formed as a result of ploughing the surface of the cemetery, which functioned at a distance from the find (so called agricultural diamictons, analysis by P. Kittel, current volume). Artefacts obtained from these layers and numerous vessel fragments of terra sigillata type dated to 160–170 – 233/244 (analysis by L. Tyszler, current volume) confirm contemporaneous character of the cemetery and settlement and their mutual links as part of one settlement complex.

#### SETTLEMENT FROM THE LATE MIDDLE AGES AND MODERN TIMES (*Anna Nierychlewska*)

Site 3 at Ludwinowo has yielded 118 immovable features, most of which are dated to the late Middle Ages. Only 13 features can be linked with the Modern Times.

The large assemblage consists of 53770 movable artefacts. These include: 51007 fragments of pottery vessels, 244 furnace tile sherds, 380 metal objects, 7 stone objects, 7 "other" artefacts, a coin, 2119 animal bone sherds, 6 lumps of iron slag and daub lumps. Other artefacts have been found in the cultural layer and in the bottom layer of humus.

The most numerous late medieval features have been divided into several categories, depending on their function. Thus, we have: a dwelling house, utility buildings with a recessed section, overground buildings, recessed buildings – cellars, wells, storage pits (single ones and clusters), garbage pits, post pits, hearths/bonfires and clay pits (fig. 107). Not numerous modern features include: single and double pits and post pits.

Features unearthed on the site can be chronologically divided into four periods, distinguished on the basis of the percentage of a technological group of vessel pottery in an assemblage from a given feature:

- The oldest period from the end of the 14<sup>th</sup> and the 1<sup>st</sup> half of the 15<sup>th</sup> century
- Period dated to the 15<sup>th</sup> century and the beginning of the 16<sup>th</sup> century
- Period connected with the 15<sup>th</sup> century and the first half of the 16<sup>th</sup> century
- The youngest, modern period, dated to the 2<sup>nd</sup> half of the 16<sup>th</sup> century and the 17<sup>th</sup> century

Not numerous features from the oldest horizon have been mainly found in the north-eastern and eastern part of the site (ha I and III). Only one pit has been unearthed in its western part. The features included: a well (no 182), trough or a cold store (no 3075), 5 large storage pits, covering an area from 1.8 to 4.5 square metres (no 183, 2454, 207, 3331, 5431), 8 smaller pits (no 269, 249, 246, 239, 132, 2588, 56A, 2522) and one post pit (no 1825).

The largest number of features belongs to the second period. Their first larger cluster is located in the southern and eastern part of the site (mainly III ha). Feature 1627 is situated closest to the southern border of the trench, and is interpreted as a dwelling house, covering an area of 39 square metres. 10 metres away eastwards, there was a cellar (no 434), also quite big, covering an area of 27 square metres. Other utility buildings were situated further – 35–60 m away from the house, towards east and north-east. They included buildings with a recessed part/ cellar (no 398), with a recessed part and a storage pit (no 319, 2667), with an entrance annexe (no 2511), and also buildings with no additional elements (no 490). Areas of the recorded recessed parts of the buildings ranged from 10.7 to 18.7 square metres. Overground sections could have been even bigger.

In the vicinity of the utility buildings there were numerous pits and pit clusters. A large cluster consisting of 7 pits was found c.a. 10 m away from the house northwards (no 1634, 1693, 1636, 451, 496, 458). Other storage pits and their clusters have been located in the vicinity of the utility buildings (no 373, 323, 1595, 389, 2809 and 2878, 476 and 1515, 258 and 258A, 266 and 267, 2564 and 2846) and a well (no 2692). Next to a cluster of utility buildings we found a garbage pit (no 459), a hearth (no 427 and 428), and a bonfire (no 415 and 416). Two smaller garbage pits (no 3117, 3385) and storage pits (no 3236, 3691, 243, 3332) have been recorded in the north-eastern and eastern part of the site (ha I and II). In the vicinity of utility buildings no 319 and 490, as well as pit no 373, there were numerous post pits, which are most probably traces of fences, e.g. for cattle, horses, goats and sheep. In the north-eastern section of the site, away from dwelling and utility buildings, we unearthed wells (no 353, 354, 356, 61), located close to each other. One of them had a preserved casing, made with a log technique of construction.

A smaller cluster of features from the second period has been recorded in the north-western part of the site, in ha XIII and XIV. The features were clearly scattered along the belt, which was 150 m long and 60 m wide. A few smaller features were located in a cluster c.a. 50 m towards north-west. The complex was located c.a. 240 m from the first cluster. It consisted of two utility buildings: one partly recessed with an entrance annexe (no 5100), covering an area of 10.6 square metres, and the other one – overground (no 5117), covering an area of 7.5 square metres. Besides, there were 2 wells (no 6680 and 5112) with partly preserved casings, storage pits and their complexes (no 6859, 5113, 5095, 5154, 5086, 6698, 5129 and 5132, 5120 and 6752, 5110 and 5111, 4811 and 6795), covering an area from 10.4 to 3.1 square metres and several smaller pits (no 5231, 6656 and 6751).

Features from the third period have been mainly found in the western part of the site (ha XVI and XX). It was possible to distinguish two utility buildings – one partly recessed (no 7572), covering an area of 10.8 square metres, and an overground building, with no cairn, covering an area of 8.8 square metres. Other features included: a well with no cairn (no 7444) and storage pits (single and in complexes – no 6938, 6997, 7292, 4843 and 4852). Very few features were unearthed in the southern part of the site. They

encompassed a complex of clay pits (cluster no 38), storage pits (no 3442, 1693) and “other” pits (no 1666 and 1667).

Features from the Modern Times have been grouped in the south-eastern section of the site (ha I), and they are not very numerous. We have distinguished several small pits (no 3163, 3171, 3147, 3825, 4953) and 7 post pits. They attest not intensive use of the site in the Modern Times.

Features connected with the late Middle Ages can be interpreted as part of larger village homesteads. They clearly extend beyond the area of the motorway excavations, towards south and west. Therefore some other dwelling buildings should be sought after in that part. Due to fragmentary exploration of the site, it is neither easy to determine the primary plan of the homesteads in relation to each other, nor their extent. Late medieval features have been located along the belt ES-WS, 500 m long and 80 m wide. The first homestead, consisting of a dwelling house, cellar, 5 utility buildings and several wells, was located in the south-eastern part of the site. The other two homesteads, only fragmentarily explored, found in the south-western part of the site, were located c.a. 240 m away from the first complex. The distance was most probably caused by the presence of a pond between both complexes, and by marshy terrain, not suitable for building development. Scarce features found between the complexes were located close to arable fields or grazing pastures for animals. These were most probably shelters, places for storing food, depositing wastes, or obtaining water.

The most numerous movable material in the rich assemblage came from the late Middle Ages. It included: 50127 fragments of vessel pottery, 145 metal objects, 2119 sherds of animal bones, 6 flint tools, 4 “other” objects and 6 lumps of iron slag. The material was obtained from the fills of features, situated in the southern, south-eastern and western part of the site and the cultural layer, mostly accumulated in ha I, II and III.

A large part of late medieval pottery was fired in reduction atmosphere. They belong to technological groups B and C (34200 fragments, which constitute 68.2% of the whole material – compilation 15B, fig. 108), characteristic of well-developed phases of the late medieval period. In both groups, vessels made of *ferruginous clay*, (subgroups Bz and Cz) dominated over products made of lighter, cream clays (subgroups Bk and Ck). There was a large percentage of vessels fired in advanced oxidation atmosphere (technological group D – 11228 sherds; 22.4%), which occur in larger quantities on sites from the final period of the late Middle Ages and the early period of the Modern Times. In this group, vessels made of *ferruginous clays* (subgroup Dc, 17.73%) dominate over products made of cream and white clays (subgroup Db, 4.67%). There was a small percentage of vessel fragments fired in not advanced oxidation atmosphere, classified as technological groups A/D and A/B (2639 fragments; 5.27% in total). They were found in biggest quantities on sites dated to the turn of the early and late Middle Ages and the beginnings of the late medieval period. Enamelled vessels were not very numerous (technological group E – 0.4%). The same refers to the angoba decoration found on vessels and painted vessels (technological group F – 0.3%). The pottery was mainly made with the use of the tape-slide technique, and then completely thrown on the pottery wheel. Only in technological groups D, E and F were some vessels thrown on the wheel.

The type of vessels did not differ much from forms recorded in other late medieval assemblages of pottery. Vessel fragments included sherds of: pots (types A.I – A.IX), little pots (types A1.I – A.1.IV), jugs (types B.I – B.IV), small jugs (B1.I – B1.IV), bowls (types C.I – C.II), little bowls (types C1.I – C1.IV), vessels with a handle (type D), frying pans and tripods (type E), mugs (types F.I – F.II), lids (types G.I – G. II), miniature vessels (type H.1) and vessels used for draining (type H.2), (fig. 109–110).

145 metal objects connected with the late Middle Ages and found in the fills of the features included: 8 bronze objects (5 fragments of fittings, a thimble, a pin and a lump of bronze), 136 iron objects and one iron artefact, incrustated with silver. The chronology of other 225 artefacts, mainly iron, found in the cultural layer and at the bottom of humus is undetermined.

The most numerous iron objects include house related elements: fittings, hooks and little hooks, nails, hobnails, bolts, a bolt key, keys, staples, a hasp (including 51 late medieval objects). There are also tools: knives, axes, hatchet, sickle, fire strikers, chisel, cooper chisel, wedge, needle, hammer and puncher (including 40 late medieval objects), garment parts and accessories: buckles, a shoe heel plate, pin, and fragment of an undetermined ornament (including 7 late medieval objects), military artefacts and horse

riding gear: 7 completely or fragmentarily preserved spurs with a star bit, 8 arrowheads and 4 horseshoes. All of the artefacts, except for one horseshoe may be linked with late medieval period. The last category consisted of semi-finished products and other objects (including 8 late medieval ones).

Stone artefacts included 6 whetstones and a fragment of a quern. Other objects included: 2 biconical clay spindle whorls, a ceramic disc, fragment of a leather object, 7 lumps of iron slag and a coin – halfgrosz of Aleksander I Jagiellon.

Assemblage of artefacts from the Modern Times included 880 fragments of pottery vessels and 11 metal objects. The material was mainly obtained from the cultural layer and a small number of features.

The group of most numerous artefacts included products fired in oxidation atmosphere, technological group D (750 fragments – 85.23% of the whole structure – compilation 15E, fig. 120), with a visible domination of ferruginous clays (487 sherds – 55.34% of the total structure) over products made of light clays, so called cream or white, caolinite (263 fragments – 29.89% of the total structure). Similar proportional representation was characteristic of vessels from technological group E (enamelled) and group F (made with the angoba decoration and painted). The first group included 48 fragments (5.48% of the total structure), whereas the second – 47 sherds (4.34%). There were only 14 fragments of vessels fired in reduction atmosphere (technological group B), which constitutes 1.6% of the total structure. All vessels were thrown on the wheel.

Metal objects included: a bronze button and iron objects, such as: 4 nails, 2 hooks, a hobnail, a handle, fitting, key and a needle.

A small assemblage dates back to the Modern Times. It consists of 244 fragments, including an assemblage of furnace tiles, mainly pot-like stove tiles, (234 sherds). Only ten pot-like stove tiles have been found.

The chronology of late medieval assemblage of vessels can be linked with the end of the 14<sup>th</sup> century, beginning of the 15<sup>th</sup> c. and the first half of the 16<sup>th</sup> c. (i.e. period II and III of the development of late medieval pottery, after J. Kruppe, 1981, p.49 and the following pages), considering a large number of vessels fired in the reduction atmosphere and advanced oxidation atmosphere, and a small number of artefacts fired in not advanced oxidation or reduction atmosphere, enamelled, painted and made with the angoba decoration technique. The range of vessels also points to well-developed phases of the late Middle Ages – a large number of jugs, small jugs, bowls, little bowls, frying pans, pots with a handle and mugs, which are present among the materials from the 14<sup>th</sup> century, but they were popularised in the 15<sup>th</sup> c. Another indicator of the well-developed phases of the late Middle Ages is the type and decoration of vessels. There is a large number of pots with a sharp profile and a mouth rim either straight or turned outwards, profiled (type A.II), or unprofiled, rounded or thickened, frequently with a distinguished lid groove (types A.III, A.IV), and pots with a distinguished neck (type A.V). It was popular to decorate vessels by means of polishing and smoothing surfaces, as well as decorating them with a coultter and a stamp. There were also not numerous sherds of the so called Hussite pottery, which occur in the earliest assemblages, chronologically connected with the second quarter of the 15<sup>th</sup> century. Unlike the 14<sup>th</sup> c. materials, assemblages from Ludwinowo did not consist of vessels with a cylindrical neck. There were few S-shaped pots, with a weakly profiled mouth rim, commonly occurring in assemblages of early medieval vessels and vessels from the beginning of the late Middle Ages, which disappeared in the 2<sup>nd</sup> half of the 14<sup>th</sup> c. Vessel bottoms (except one) were not signed with a potter's mark. However, they were still present on the 14<sup>th</sup> c. vessels. In the 15<sup>th</sup> c. they are sporadically used. Pottery material corresponds with metal artefacts, such as spurs with a star bit, which can be dated to the 2<sup>nd</sup> half of the 14<sup>th</sup> c and the 15<sup>th</sup> c., or a half-grosz of Aleksander I Jagiellon, found in the cultural layer. The chronology coincides with the dates obtained from dendrological analyses of timber samples from features. Half logs from the well no 5112 (XIV/87) have yielded C-14 dates ranging from 1356 to 1358. Well no 356 (III/29) has provided the date of chopping down the trees. It ranges from 1362 to 1389. The youngest sequence, between 1400–1445 was obtained from radiocarbon analysis of rough-hewn wood planks, from well no 6880 (XVI/36) (M. Krąpiec, E. Szychowska-Krąpiec, current volume).

The chronology of the assemblage of vessels from the Modern Times may be linked with the 2<sup>nd</sup> half of the 16<sup>th</sup> c. and the 17<sup>th</sup> c. (corresponding to period II of the Modern Times pottery production, after M. Gajewska, 1989–1990, p.166). We cannot rule out the possibility that some vessel fragments,

found in the cultural layer, could have come from the 18<sup>th</sup> or even the beginning of the 19<sup>th</sup> c. A small assemblage of furnace tiles can also be dated to the 17<sup>th</sup> c.

The above analysis of movable artefacts obtained from the site indicates that the inhabitation of the area began in the 2<sup>nd</sup> half of the 14<sup>th</sup> c, it flourished in the 15<sup>th</sup> c. and decreased in the 16<sup>th</sup> c. In the Modern Times there were no traces of a permanent settlement. The area was only temporarily used as arable land or pastures.

The village of Ludwinowo was set up rather late, most probably at the beginning of the 19<sup>th</sup> c. The village is first mentioned in the sources from that period. In 1827, Dębice property encompassed villages and manor houses Dębice, Poddębice and the village of Ludwinów/Ludwinowo (SGKP, 1881, volume 2, p. 14).

It can be assumed that the area on which Ludwinów/Ludwinowo was set up in the 19<sup>th</sup> century used to be part of Dębice and Poddębice property in the late Middle Ages. The house and the utility buildings could have been built by a member of a large Godziemba family from Dębice and Poddębice. The homestead can be linked with a cluster of features in the south-eastern part of the site, consisting of: a dwelling house, cellar, five utility buildings, and several wells. It was a large homestead, unlike typical peasant ones which consisted of three buildings only (house, stable, barn) (J. Burszta, T. Wrólewski, 1964, p.59). The area where the three features were situated, has yielded most numerous pottery material and metal objects (e.g. spurs, hatchet, buckles, horseshoes, numerous knives and fittings) which indicate the wealth of the owner. The place also consisted of animal remains, both of livestock and domesticated animals (dog, cat) (K. Stefaniak, T. Piskorska, B. Pokryszko, current volume; fig. 19–22). After Dębice and Poddębice were taken over by the family of Godziemba from Dąbie, the residence was abandoned in the 16<sup>th</sup> century.

It is also likely that the area was part of royal lands, to be more precise a nearby manor house at Kruszyn, which belonged to royal lands of the Brześć district (LWWiK 1628–1632, p. 70). However, with no map of the ownership structure of the vicinity of Kruszyn and Dębice, particularly of private property, it is impossible to determine which of the above mentioned hypotheses is true.

#### CONCLUSION (*Ireneusz Marchalak*)

The excavations on site 3 at Ludwinowo were carried out by the Professor Konrad Jażdżewski Foundation of Archaeological Research, in co-operation with the Museum of Archaeology and Ethnography in Łódź. As a result, an extensive area with diversified cultural features, was explored. It is dated to a broad chronological period of over 6.5 thousand years. Thus, the results of the presented excavations attest the rich history of Kuyavia (A. Cofta-Broniewska, A. Kośko 2002).

The oldest source materials should be linked with the settlement of the Danubian cultures, above all, the Brześć Kujawski group of the Lengyel culture. Remains of an extensive settlement have been unearthed, consisting of three zones of features connected with trapezoidal houses. The development of the settlement has been observed, from its early to the late phase, which is confirmed not only by the diversity of pottery material, but also by C-14 dates, from 4800 to 4000 cal BC. The Brześć Kujawski group of the Lengyel culture was replaced by the community of the Funnel Beaker culture on the area of the site. The unearthed materials indicate a long-lasting economic activity. The sediment of the well from the Radziejów group underwent palynological analysis, which had never been done before in the history of the Polish research on the Neolithic. It allowed us to describe the vicinity of the site, and distinguish elements of the Neolithic economy at the end of the 4<sup>th</sup> millennium BC.

Remains of the settlement of the Globular Amphora culture is connected with the youngest part of the Neolithic. Apart from the remains of economic character, scattered over a large area, a sepulchral zone has also been recorded. It contained two human, skeletal graves and three cattle burials. On the basis of C-14 dating, they should be linked with the classical horizon of the above mentioned culture.

The settlement of the Neolithic communities is connected with an interesting assemblage of flint artefacts. The majority of materials belong to the Danubian cultures, above all the Brześć Kujawski group of the Lengyel culture. This phase of inhabitation is linked to a large import of forms made of chocolate

flint, which confirms the influence of the Lengyel-Polgar groups on the development of flint industry of the Brześć Kujawski group of the Lengyel culture.

As regards the Bronze Age, we should first of all, enumerate a collective grave of bi-ritual character from the Trzciniec culture. The burial contained the remains of at least six individuals, in the form of partly charred or cremated skeletons. The next sepulchral zone, this time connected with the late Hallstatt period, has been unearthed in the southern section of the site. It consisted of a grave with a stone construction, containing arrowheads of the Scythian type, two less characteristic pit cremation graves and one double urn grave. The character of the grave goods link the zone to other Kuyavian discoveries, containing elements of eastern provenience and connected with the migration of communities under the influence Scythian incursions at the end of the 6<sup>th</sup> century BC.

The next chronological unit is linked with the remains from the Pomeranian-Bell grave culture. The main discovery is a collective grave with 29 urns, containing the remains of 36 individuals. The burial has the features of the Pomeranian culture. However, Bell-grave culture elements present there, indicate the initiated process of assimilation of both cultural communities, dated to the beginning of the early La Téné period. It is also confirmed by the settlement material, attributed to the Bell-Grave culture with forms of the Pomeranian culture.

The largest cultural-spatial unit unearthed on the site is represented by an extensive settlement of the Przeworsk culture. Its explored part contained a residential zone, consisting of the remains of 10 large overground post buildings of framing construction, which covers an area of over 100 square metres. Besides, there were similar, smaller dwelling foundations, as well as other overground post constructions, which were part of economic backyard. Additionally, there were utility features in the form of various, diversified pits, wells and the remains of a lime kiln. The main element responsible for spatial organisation was an empty square with the adjacent residential zone and a separate utility zone. The character of the unearthed remains at Ludwinowo resembles the settlement from the area of the so called Free Germania. It is a unique settlement site of the Przeworsk culture on the area of today's Poland. The settlement complex encompassed a cemetery, whose heavily destroyed remains were unearthed at a distance of c.a. 270 m from the settlement, in the form of re-deposited cultural layers. Numerous movable materials, supported by C-14 dating, confirm that the settlement was functioning since the beginning of the younger Roman period (2<sup>nd</sup> half of the 2<sup>nd</sup> century BC) until the late Roman period (4<sup>th</sup> century BC), or possibly beyond that. Artefacts found in cemetery layers mainly indicate the younger Roman period (*terra sigillata*). However, there are reasons to believe that it developed alongside the settlement.

The youngest materials come from the late Middle Ages and Modern Times. Several clusters of features have been unearthed, which can be interpreted as part of larger village homesteads, which extend beyond the area of the excavations. The beginning of the site inhabitation in the late Middle Ages can be linked with the 2<sup>nd</sup> half of the 14<sup>th</sup> century. Its greatest development is dated to the 15<sup>th</sup> century, and its decline to the 16<sup>th</sup> century.

