

PLACE AND IMPORTANCE OF WELLS IN SETTLEMENTS OF CENTRAL EUROPEAN COMMUNITIES IN LATE ANTIQUITY

AN EXAMPLE OF THE PRZEWORSK CULTURE
FROM KWIATKÓW (WOJ. WIELKOPOLSKIE/PL)

The aim of this article is to outline the meaning and importance of the well within the settlement of the Central European communities of Late Antiquity, especially sites of the Przeworsk culture. Particular emphasis will be placed on the finds obtained from the territories of Poland on the background of the discoveries from the *Barbaricum* territories, associated with the Pre-Roman Iron Age and the Roman Iron Age. The main focus of research into the eponymous features is their place in the space of the settlement while the issue of their function will be only briefly raised¹. The most important aspects and examples of settlements within which wells were recorded are presented. These are the selected and representative sites, showing the differences in place and the significance of the main features within the settlement.

The reason for this article was the discovery of more than 100 wells at a settlement representing the Przeworsk culture in Kwiatków 11/20 (gmina Brudzew, pow. turecki, woj. wielkopolskie/PL). Almost all of them were associated with a vast settlement of the Przeworsk culture, dating mainly to the periods of the Roman Iron Age and the Migration Period (Piotrowska 2015; 2016, 63-95; Kot/Piotrowska/Schellner 2015; Rzepecki/Kot/Piotrowska 2016; Kot/Piotrowska 2016b, 292-294). Due to the favourable conditions i.e. the deep recession in the ground and the humid environment, the majority of the wooden elements of their constructions were preserved. Although in recent years the number of wells discovered in the settlements of the Przeworsk culture has increased significantly, the number of these features recorded at Kwiatków remains unprecedented. For this reason and due to its interesting geological situation, the mentioned settlement and the water intakes² discovered within its area were given more attention. The other researched site, presented in a more detailed way, is the settlement of the Przeworsk culture in Mąkolice (gmina Głowno, pow. zgierski, woj. łódzkie/PL). Both locations were excavated in their entirety or almost entirely and they represent two different types of spatial development, which makes them even more attractive to discuss³. These two sites from Central Poland show a different spatial organization with the placement of the well within – thus they contribute a lot to the discussion on the placement of these features within the settlement space (fig. 1).

CHARACTER OF THE DATA AND STATE OF RESEARCH

Unfortunately, the number of discovered settlements does not go hand in hand with the number of recorded wells, which is explained by the fact that the sites in question were only partially investigated. As is known, the majority of rescue excavations which occur prior to the construction of motorways are limited in size to that of the future road. The site in Kwiatków was an exceptional one compared to other settlements of the

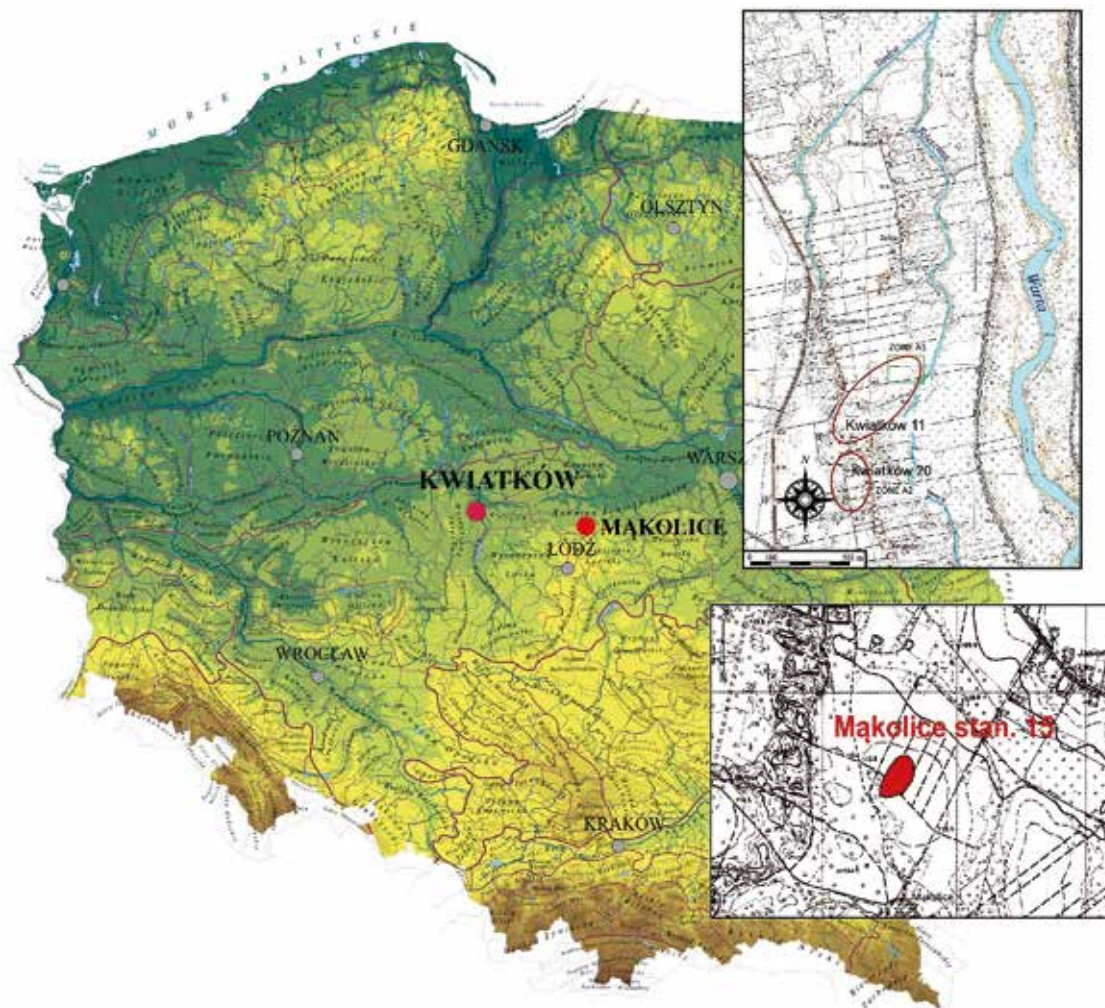


Fig. 1 Location of the sites Kwiatków 11/20 (woj. wielkopolskie/PL) and Mąkolice 15 (woj. łódzkie/PL). – (Map M. Piotrowska; after Kot/Piotrowska 2016a, 108 fig. 1).

Przeworsk culture throughout the territories of Poland. In this case, neither the size nor the outline of the excavations was imposed by the investment. Rescue excavations preceding an extension of the lignite open-cast mine helped to explore the settlement space with the impressive example of the wells. In the case of the site in Mąkolice, it was possible to capture the settlement almost entirely despite the fact that the research was conducted in connection with the construction of a motorway. The partial exploration of settlement areas inevitably causes problems locating wells within the site. It can be also difficult to draw conclusions about its complex spatial structure. Water intakes are being discovered more and more frequently on archaeological sites. Recently, the number of these features known from the settlements of the Przeworsk culture has significantly increased – this fact is not reflected in the number of publications, though (Piotrowska 2017). This situation is due to an enormous increase in developer-led excavations, plus from the times of the Przeworsk culture, wells became more important and therefore more of them were dug compared with earlier periods. The same applies to the area lying west to Poland where, from the 1st century AD, the significance of the well in the water supply of the population increased considerably; however, only a few excavations provide information about its function and place within the settlement

(Leube 2009, 162). Other limitations arise from the method of elaboration of the sources and their publication. The settlements which have been explored in their entirety and monographed belong to rare cases. The sources for the subject matter are quite numerous, but usually, we find only brief mentions of them on the occasion of some initial research results. The articles about wells often show these features from one site rather than presenting this issue more general but of course, there are some exceptions (e.g. Nowakowski/Waluś 1986; Schöneburg 1996; Biermann 2001; Schirmer 2005; Leube 2009; Piotrowska 2015; 2017). The monographs about the wells are rather rare and they are usually master or doctor theses treating these features from chosen areas (e.g. Zawisza 1983; Gaude 1995; Bączyński 2000; Schmidt 2003; Albrecht 2014; Greif 2015).

THE PLACE OF THE WELL WITHIN THE SETTLEMENT

In the areas devoid of natural sources of water, the process of settling in new places most likely started with the construction of a well. The number of these features and their location depended on the size and nature of the settlement. The type of soil and the level of groundwater were also vital issues. Wells recorded in the Przeworsk culture settlements differ with respect to the construction methods and their state and preservation. Their number also varies – from one to over 100, which is undoubtedly related to the area under research, but also to the character of the sites. The wells also occupied a different place in the settlement's space, which was certainly connected with their function. Therefore, the location of these features to some extent reflected the residential and economic structure of the settlement. And so, water was necessary to keep house, as well as to perform some specialised craft activities such as tanning, pottery manufacturing or weaving.

The location of the well depended on several factors, such as hydrogeological conditions, economy and craft, and the topography of the area. The first of the mentioned factors is rarely discussed although the natural environment is very important. Unfortunately, it happens that the information contained in the publications does not give reasons for talking about the internal structure of the settlement, which also conditioned the choice of a place for the described features. This additionally hinders the process of the ascription of them to the specific zones within the settlements. The analysed settlements were divided into groups and some selected examples of the sites were presented based on the location of the discovered wells (**tabs 1-2**). The areas of the settlements fulfilling economic functions are the zones related to agriculture, livestock breeding and crafts (Michałowski 2003, 145). In addition to wells, the study zones yielded, among other things: clusters of hearths, furnaces, features related to grain drying and various workshops. The residential part of the settlement is the zone where remains of buildings are excavated such as: dugouts (deeper sunken hut/pithouse) and half-dugouts (not so deep sunken hut/shallow pithouse)⁴, which were the main building (house/workshop) type with posts at most of the sites. Sometimes log houses (blockhouse) and longhouses constructed of posts were also registered in the residential zone⁵. The households often include other features such as hearths, granaries, and pits. Both of the zones partially overlap within the sites and it is sometimes difficult to separate them and so they are treated as residential-economic zones⁶.

It should be reiterated that the settlements presented hereafter and the location of the wells in their context is, in most cases, based on the fragmentarily researched settlements, with the exception of the sites in Kwiatków and Mąkolice. Most likely, the majority of the settlements did contain the features in question and only the state of research and the lack of comprehensive research of the sites influence the current state of our knowledge. Attempts were made to select the sites that had been explored and elaborated to a satisfactory degree, showing some interesting aspects of the placement of the well within the settlement.

no.	site	number of wells	dating	additional information about the location of the wells
1	Kolonia Wola Branicka (woj. łódzkie)	1	Late Roman Iron Age and Early Migration Period	close to the group of hearths outside the settlement
2	Chabielice (woj. łódzkie)	1	Late Roman Iron Age and Early Migration Period	outside the residential and economic zones of the settlement but relatively close to an agglomeration of half-dugouts and a natural water spring
3	Ślęza site 13 (woj. dolnośląskie)	1	Late Roman Iron Age and Migration Period	far north part of the inhabited area
4	Cichmiana (woj. wielkopolskie)	1	Younger pre-Roman Iron Age	outside the high-density residential area
5	Wólka Łasiecka (woj. łódzkie)	1	phases B2-C2 of the Roman Iron Age	economic part of the settlement
6	Jeziorsko (woj. łódzkie)	1	phase B2 of the Roman Iron Age	economic part of the settlement
7	Daniszew site 21 (woj. wielkopolskie)	1	Migration Period	economic part of the settlement
8	Daniszew sites 18/1 and 19 (woj. wielkopolskie)	6	Migration Period	lower-lying area subjected to economic exploitation
9	Łęczycza (woj. łódzkie)	3-4	Roman Iron Age	outside the settlement, located along a line measuring c. 60 m
10	Wilkowice (woj. dolnośląskie)	4	Early Roman Iron Age	periphery of the area, far outside the residential area – in the economic-production zone, near the natural watercourse
11	Kolonia Orenice (woj. łódzkie)	2	Younger pre-Roman Iron Age	production part of the settlement associated with the pre-treatment of flax
12	Witów sites 14-15 (woj. łódzkie)	12 and 8 features classified as wells-retteries	Younger pre-Roman Iron Age	peripheral part of the settlement – in its economic zone

Tab. 1 Examples of the chosen sites with wells recorded within the economic zones, the peripheries or in the area outside the settlement boundaries.

WELLS IN THE ECONOMIC ZONES, THE PERIPHERIES OR THE AREA OUTSIDE THE SETTLEMENT BOUNDARIES

In this part of the article, some selected settlements will be outlined with regard to the location of wells in the peripheral areas (in the economic zones or outside the housing area) (**tab. 1**). In the examples of these settlements, the economic zones were separated from the residential areas. The finds included both single features and their small agglomerations (Moszczyński 1994, 98-99; Frąsiak/Gwóźdź/Siciński 2000, 79-80; Żmudziński/Michnik/Szwed 2001, 250; Bednarczyk/Romańska/Sujecka 2010, 423; Bender 1980, 360. 377; Łaskiewicz 1986, 175; Żychliński 2009, 142; Poklewski 1963, 315; Kopeć et al. 2001, 224-225).

In the area of the analysed Przeworsk sites, wells occurred alone or in the vicinity of other features, e.g. hearths (see: Moszczyński 1994, 98-99). In certain cases, links between the water intakes and the economic zones did not raise any doubts (see: Bender 1980, 360. 377; Łaskiewicz 1986, 175). Some of these features were located near natural watercourses, probably due to the groundwater level and the presence of natural springs (see: Kopeć et al. 2001, 224-225; Bobrowski et al. 2006, 68; Frąsiak/Gwóźdź/Siciński 2000, 79-80). Here, the residential areas were probably located beyond the reach of the overflowing rivers, and the lower-lying areas (where the wells were recorded) had an economic use (**tab. 1**, nos 2. 8. 10). A few of the presented settlements were characterised by the clear division into the residential and the economic zones sometimes with a circular arrangement and a clearly separate, central square (**tab. 1**, nos 2. 4; Frąsiak/Gwóźdź/Siciński 2000, 79-80; Bednarczyk/Romańska/Sujecka 2010, 423). The production parts of some

of the sites yielded the hints for flax pre-treatment, in which process wells were needed to exchange water in the retteries (**tab. 1**, nos 11-12; Siciński 2008, 79. 84; Nierychlewska/Tyszler 2008/2009, 105. 107). »Moving« those features out of the area of the residential zone could also be associated with some unpleasant odour that accompanies the process of the flax retting.

Wells located outside the settlements and in their peripheral or economic zones are known from the sites dated to the younger Roman Iron Age up to the Migration Period (Poklewski 1963, 315; Bednarczyk/Romańska/Sujecka 2010, 423; Żychliński 2009, 142).

WELLS WITHIN THE RESIDENTIAL AND RESIDENTIAL-ECONOMIC ZONES OF THE SETTLEMENTS

Wells are features that are also recorded in the residential areas of the settlements as well as in the residential-economic zones. Their location in these parts of the site differed and depended on the spatial organization pattern. Most probably, some of the settlements in which only the houses were discovered, had an economic base that was not researched during excavations. There are few sites that yielded water intakes both in the residential and economic areas, which is mainly due to the limitation of the area being investigated.

The eponymous features occurred within the settlements with longhouses and granaries. In some cases it cannot be specified, however, whether the wells located to the rear of the longhouses were used by the occupiers of the farmsteads or were communal and widely available for all the inhabitants of the settlement (**tab. 2**, no. 1; Makiewicz et al. 2008). The same problem with the interpretation is in the case of the wells found to the west of the Polish lands (Leube 2009, 162). On the other hand at some sites, the situation of the water intakes indicates their connection with the longhouses – wells were discovered at the back of individual longhouses (**tab. 2**, no. 9; Marchelak 2017, 298-299). Sometimes, the centrally located wells probably served the whole community living in the settlement (**tab. 2**, nos 2-3. 8. 10-11; Woyda 1978, 90; Moszczyński 2000, 202; Garbacz 2009, 95-97; Siciński 2011, 73 map 3; Kot/Piotrowska 2016a). The locations of the discussed features also varied – some were recorded among other features e.g. in the vicinity of the cluster of hearths and were interpreted as communal facilities or between elevations at the site what may be connected with the direction of the groundwater flow (**tab. 2**, no. 4; Machajewski 2016, 216. 218. 251). The water intakes were also registered in the vicinity of the dugouts and the buildings of post-construction – they formed complexes of features (**tab. 2**, nos 4-5. 9; Jurkiewicz/Machajewski 2006, 136. 144; Machajewski 2016, 218; Marchelak 2017, 308. 312-313). These wells might have been connected with the functioning of homesteads in the area of the settlements (**tab. 2**, nos 6-7; Frąsiak/Siciński 2003, 106; Krzyszowski 2012, 145. 152 fig. 3; Skowron 2014, 115). The water intakes also occurred in the zones of various purposes – in the production parts and in the residential areas (**tab. 2**, nos 8-9; Woyda 1978, 90; Marchelak 2017, 308. 312-313).

The study group of settlements is presented on the example of a detailed description of the Przeworsk culture settlement in Mąkolice (**tab. 2**, no. 11). The site in Mąkolice in the area of the Łowicz-Błonie Plain can be treated as one which was researched to a large extent (**figs 1-2**). The area located in the vicinity of the site has a distinct lowland character with little denivelation and predominance of sandy sediments in its surface geological composition (Forysiak/Twardy 2011, 7-10). The settlement was situated on a sandy plain with an admixture of fine gravel, sloping gently northwards, within a poorly marked elevation zone. In the same areas, the afore-mentioned sands are covered by a thin layer of aeolian accumulation. From the eastern side, the elevation with the site abuts a valley and a small watercourse (Forysiak/Twardy 2011, 8). Taking

no.	site	number of wells	dating	additional information about the location of the wells
1	Konarzewo (woj. wielkopolskie)	3	mid of the 4 th century	in the immediate vicinity of the houses
2	Kobylniki (woj. świętokrzyskie)	2	Roman Iron Age	in the very centre of the settlement
3	Kolonia-Wola Branicka (woj. łódzkie)	3	Late Roman Iron Age	one in the centre of the settlement, two in the northern and eastern parts of the inhabited area
4	Izdebno Kościelne (woj. mazowieckie)	15	phase C2 of the Roman Iron Age	in the gap between elevation and among other features, next to the homesteads
5	Janków (woj. łódzkie)	15	Roman Iron Age and Migration Period Phases B2-D	mostly in the vicinity of the dugouts and the above-ground buildings in post-construction
6	Wytryszczki site 3 (woj. łódzkie)	1	Migration Period	within a homestead
7	Sługocinek site 13 (woj. wielkopolskie)	1	Roman Iron Age	in the immediate vicinity of a small building of post-construction
8	Biskupice (woj. łódzkie)	2	Roman Iron Age	one in the production part, one in the residential area, in the middle of the central square, around which (among other things) residential buildings clustered
9	Ludwinowo (woj. kujawsko-pomorskie)	30	Roman Iron Age	in the vicinity of the longhouses, also next to the smaller buildings of post-construction and next to economic pits
10	Zadowice on Proсна (woj. wielkopolskie)	1	Roman Iron Age	at the central point of the settlement
11	Mąkolice (woj. łódzkie)	2	Roman Iron Age and Migration Period Phases C2-D1	one in the central point of the settlement, one in the peripheries associated with the production zone
12	Kwiatków (woj. wielkopolskie)	103	Roman Iron Age and Migration Period Phases B2-D	in the vicinity of the pithouses, next to the pits with posts and as a single, isolated features and groups of them

Tab. 2 Examples of the chosen wells recorded within the residential and residential-economic zones of the settlements.

the knowledge of the preferences of the Przeworsk culture population into consideration, it should be noted that the site area had high settlement values. The geological structure of the area adjacent to the site and the varied lithology of the quaternary formations, and especially the large sandy areas, were conducive to a settlement. Various soil types were recorded in the vicinity of the site. A potential source of water intake for the inhabitants of the settlement was the Malina River – located about 400-500m away from the site. A high level of groundwater table and the sandy ground constituted favourable conditions for the construction of two wells discovered within the settlement area (Forysiak/Twardy 2011, 9-10).

It seems that the spatial distribution in this site was a result of an intended organizational plan. On the basis of the surveyed surface, the cautious conclusion can be formulated that the superior element ordering the settlement's space was the separation of the »residential« and »economic« zones. Both of the zones were separated from each other by an area which was almost completely devoid of archaeological features (fig. 2). This central place was probably of vital importance for the movement within the settlement. Interestingly, it had an oak well with a round casing made of a hollowed tree trunk, characterised by a poor state of preservation – only the type of wood used for the construction of the casing was determined. The fill of this well located in the centre of the settlement yielded fragments of wheel-thrown and hand-made pottery of the Przeworsk culture.

Among the finds from the northern part of the site, the features which can be interpreted as workshops or shallow pithouses or buildings of both – residential and economic purpose, which also cluster around a

- POSTHOLES
 - HEARTHIS
 - ECONOMIC PITS
 - PITS OF UNDEFINED FUNCTION
 - STORAGE PITS
 - PRODUCTION PITS
 - SHALLOW PITHOUSES WITH POSTS
 - SHALLOW PITHOUSES WITHOUT POSTS
 - WELLS
 - RANGE OF THE SITE
 - RANGE OF THE MOTORWAY
 - ECONOMIC ZONE OF THE SETTLEMENT
 - RESIDENTIAL ZONE OF THE SETTLEMENT
 - EXCAVATED AREA
 - CENTRAL ZONE OF THE SETTLEMENT WITH THE WELL
-
- S WELLS
 - SP CLUSTER OF THE HEARTHIS (1-3)
 - DBS LONG HOUSE (1-2)
 - SS GRANARY (1-3)
 - PDBS LONG HOUSE (7)
 - BS PITHOUSE/WORKSHOP (1-12)
 - B PRODUCTION/STORAGE DWELLING (1-3)
 - P FENCE (1-4)



Fig. 2 Mąkolice 15 (woj. łódzkie/PL). Spatial development of the Przeworsk culture settlement with marked function of the features. – (Illustration M. Piotrowska; after Kot/Piotrowska 2016a, 115 fig. 7).

smaller, empty square – prevailed. In this zone there were also clusters of hearths, economic pits and storage pits and the other well was located in their vicinity. This feature classified as water intake, was very poorly preserved and did not allow more detailed conclusions. In turn, the southern part of the settlement was almost devoid of production and economic features. In addition to the longhouses, the »residential« zone yielded some constructions interpreted as granaries and »barns« as well as three small and shallow pithouses (half-dugouts). In the southern part of the settlement, there was a farmstead, whose »core« was a longhouse. The house was accompanied by a similarly built, but smaller in size, post-building, also by some shallow pithouses (half-dugouts) and post-structures – granaries. However, we cannot rule out that the sections outside the investigation area also had farmsteads with wells (Kot/Piotrowska 2016a). The chronology of the entire settlement was based on the analysis of the ceramic material, which should be dated to the phases C2-D1 of the Roman Iron Age and the Migration Period (Kot/Piotrowska 2011, 190).

Let us now introduce the settlement where the largest number of wells have been discovered so far – the site in Kwiatków (**tab. 2**, no. 12). Not only the number of water intakes distinguishes this settlement from other Przeworsk culture sites but also its geological conditions. Kwiatków is located within the geomorphological mesoregion of the Koło Basin. The vicinity of the site has a plain character with two terrace levels. This settlement was located on the flat surface of the lower terrace of the Warta River valley. The sediments represent the aeolian sedimentary environment and form a small, degraded dune or an aeolian cover formed in the Holocene. The flat patches of a lower terrace were separated from the west by the channel of a small stream Siedza, and from the east by the channel of a slightly larger stream Teleszyna (**fig. 1**). In the Holocene, the area was characterised by an abundance of flowing water of a multichannel system and also the stability of a shallow, and thus easily accessible, groundwater table. Groundwater reservoirs were constantly fed by the precipitation and numerous watercourses flowing concentrically into this basin (Twardy et al. 2017, 7).

What is unique about this area is the existence and disappearance of a forest from the turn of the Alleröd to the Younger Dryas. Noticeably, the bottom parts of most of the wells were relatively shallowly located, i.e. 1.1-3m below the humus layer. Most of these water intakes were built in the places where the organic-mineral deposits of the so-called middle unit were present in the substrate. A typical feature of the organic series is a presence of numerous tree remains in the form of collapsed trunks, branches or roots and carps *in situ*, which are characterised by a good state of preservation (Peters-Zganiacz et al. 2015; in print). What is interesting, the builders of the wells, during the preparation of the pits for casings, encountered some fragments of trees and other remains of the fossil forest. The archaeological excavations revealed some traces of removal and cutting the trunks or other residues of those trees that interfered with the work of the ancient builders. The groundwater stagnated there on the above-mentioned organic series – silts and clays containing remains of trees⁷. No organic deposits were recorded in the places where these organic series are cut by the channels of the multichannel system (Peters-Zganiacz et al. in print, fig. 8). The hydrological system of the Koło Basin near Kwiatków is characterised by a lack of natural springs. In the winter months – assuming that the small watercourses were completely frozen over – this could be a hindrance to life and husbandry, especially in view of the necessity of daily water provision to livestock. However, the possible lack of unfrozen surface water could be easily compensated by supplying underground water (Twardy et al. 2017).

In Kwiatków about 103 water intakes were discovered. The wells were characterised by round casings usually made of hollowed tree trunks and a casing resembling a quadrangular »box« generally of log construction. Oak wood was the main building material used for the construction of a well; occasionally, the wood of elm, alder, ash or pine was also used for this purpose. Certainly, the choice of durable oak wood was not accidental. Dendrochronological dates obtained for the wooden casings indicate that both types of wells –

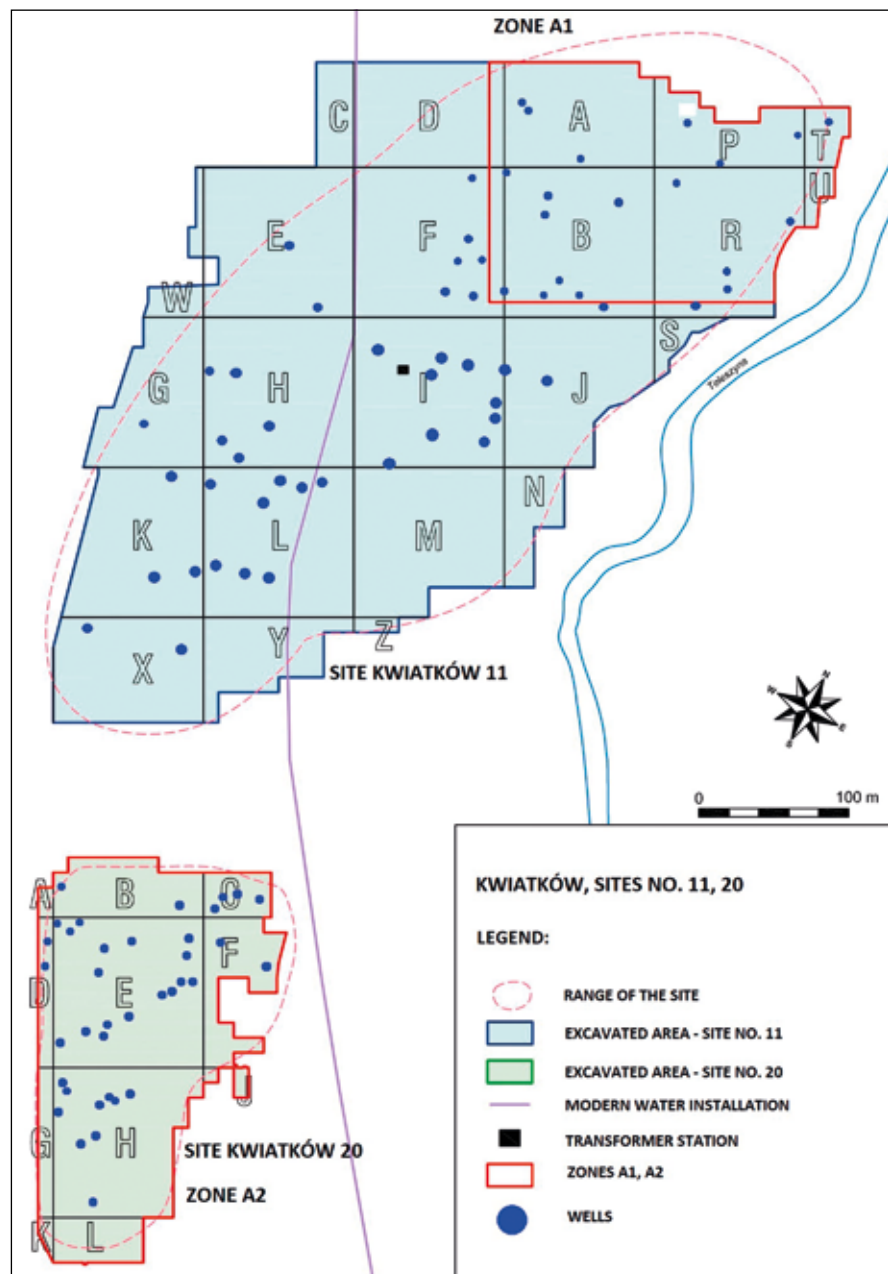


Fig. 3 Kwiatków 11/20 (woj. wielkopolskie/PL). Range of the sites and excavated areas with marked locations of the discovered wells. – (Illustration M. Piotrowska; after Rzepecki 2016, 7 fig. 2).

i. e. with a circular or quadrangular casing – were most likely to be used at the same time⁸. Therefore, a variety of construction solutions is noted, which we also find among these two types.

Wells occurred throughout the whole studied area which belonged to the Przeworsk culture population – though they did not have a »special«, separate place in the settlement space (fig. 3). They did not form distinct clusters but some regularities in their location were noticeable. As previously mentioned, their distribution throughout the site was quite regular, however, in some zones, they were less numerous. No wells were recorded in the central-eastern part of site no. 20 and in the south-eastern zone of site no. 11. Some considerable space devoid of these features can also be observed at the culmination point of the elevation – the central part of site Kwiatków 11, where the largest number of artefacts and features were recorded and where perhaps difficulties appeared according to the depth of the groundwater table. The slopes of the sandy dune constitute mainly the peripheral parts of the settlement in which quite numerous features asso-

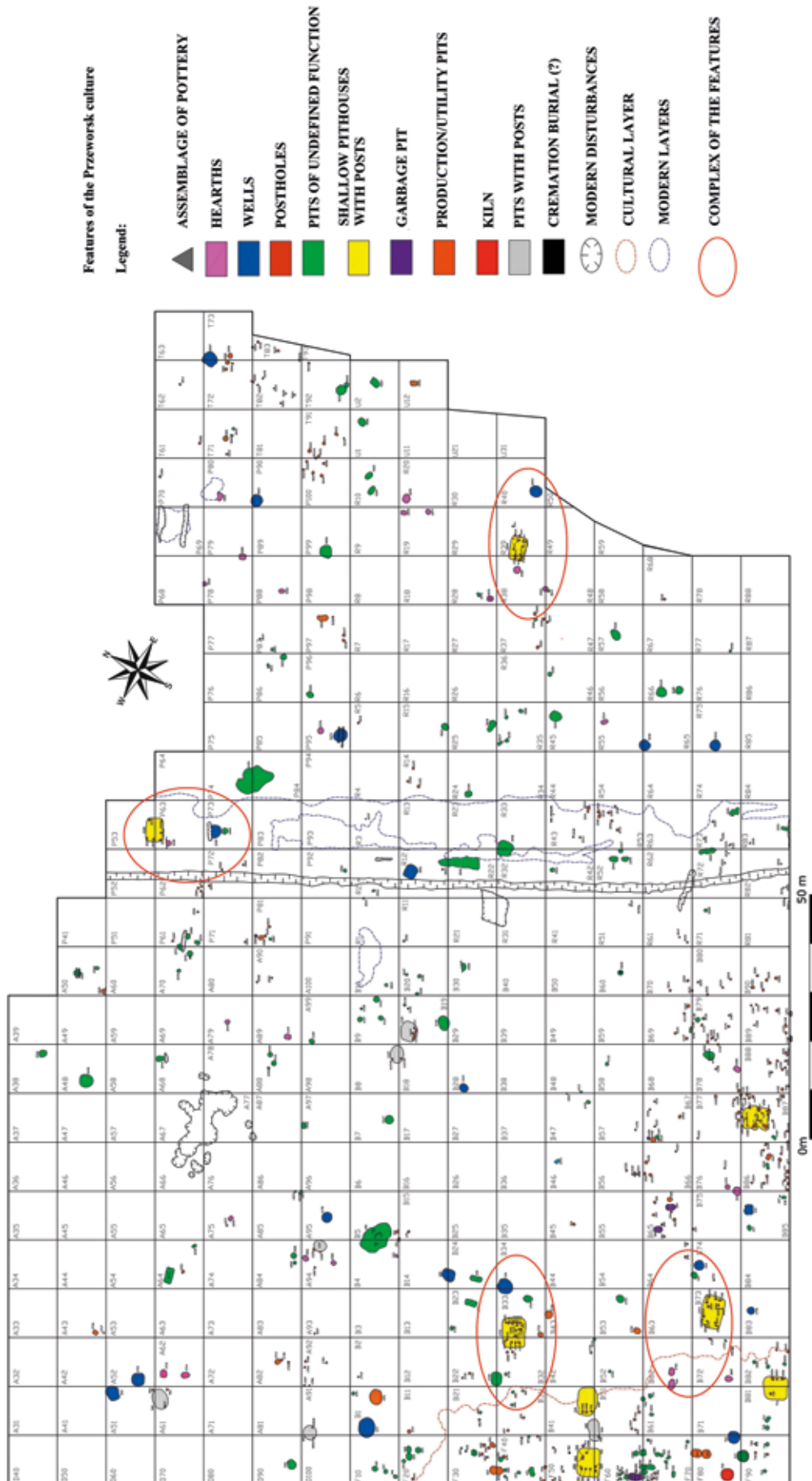


Fig. 4 Kwiatków 11/20 (woj. wielkopolskie/PL), zone A1. Features of the Przeworsk culture with marked function. – (After Piotrowska 2016, suppl. 5 fig. 1).

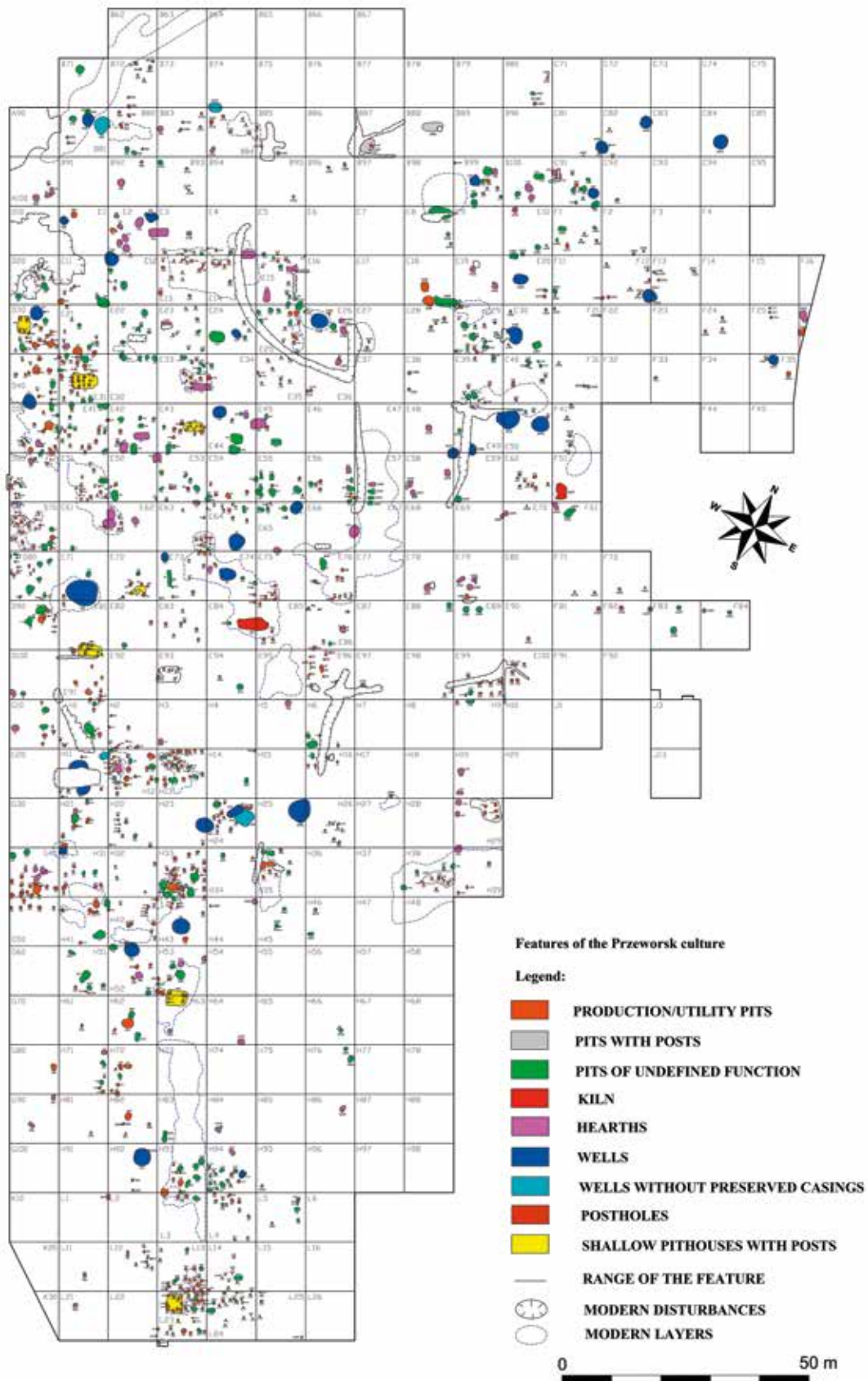


Fig. 5 Kwiatków 11/20 (woj. wielkopolskie/PL), zone A2. Features of the Przeworsk culture with marked function. – (After Piotrowska 2016, suppl. 5 fig. 2).

ciated with the Przeworsk culture (e.g. A1 zone) were also discovered. The southern part of this elevation was the location of site Kwiatków 20 (zone A2 was partially characterised by a later chronology than that of site no. 11 [Kot/Piotrowska 2016b, 293-294]). At the current state of research, after analyzing zones A1 and A2, no distinct production zone was observed, which (for example) would be associated with specialised crafts and might justify so many wells (figs 4-5). Undoubtedly, such a large number of features must have been connected with a high demand for water. The location and functional ties with other features are compelling issues while analyzing the wells from the Przeworsk settlement in Kwiatków.

It is clearly noticeable that some of the wells were in the immediate vicinity of the pithouses (shallow dwellings/half-dugouts) erected within post-constructions and with associated features. These are small complexes, which usually included: a pithouse, pits, hearths, sometimes kilns and post-holes. Based on the location of the well, it can be stated that they were situated at the »backyard« of those small buildings. It seems that it was a common »model« in this settlement (Kot/Piotrowska 2016b, 295). Some of these half-dugouts were accompanied by two wells. To summarise – the issue of a connection between the well and the mentioned buildings leaves no doubt. These complexes were separated on the basis of the isolated »model« clusters of features recorded in the peripheral, eastern part of zone A1, where no complicated stratigraphic pattern was noted (figs 4. 6). It is known that analogous complexes occurred also outside the researched and monographed zones A1 and A2. It can only be assumed that they created the basic network for settlement housing. These small buildings differed in the number of posts but they had similar sizes and alignment i. e. mostly east-west.

In zone A1, as already mentioned, in addition to the complexes of features whose core was a half-dugout with a well, it was also observed that wells occurred in the immediate vicinity of the pits with traces of post-holes which were accompanied by hearths and/or pits with quadrilateral profiles (vertical cut of the edge; fig. 4). Water intakes were recorded in the eastern part of that zone together with remnants of above-ground post-constructions and some production pits. Unfortunately, these assemblages from the periphery, just like the complexes with half-dugouts, did not provide any artefacts that would allow defining the occupation-production type, i. e. the craft which required the presence of the well. The mentioned complexes of features in this peripheral, eastern part of zone A1 »closed« the settled area from this side. Between them and the features from the western part of the zone, where similar complexes were registered, there is some space free from features or artefacts. Perhaps, that part was intended for breeding animals – this might be justified by the presence of single wells, located at some distance from one another in this section of the site. There is a certain regularity in their distribution, which may be related to the flow of groundwater – a linear arrangement at roughly similar intervals was observed in the case of some features (zone A1). They also occurred in similar configurations at site Kwiatków 11, outside zone A1.

In the case of zone A2, the situation is much more complicated due to the significant degradation of the southern part of the site (Kwiatków 20; fig. 5). Mainly, the bottom parts of the features were recorded there, most of which did not contain any artefacts. This is why it is difficult to find any relationships between the wells and the other springs which form the development pattern of the settlement, and thus to reconstruct the spatial development in particular phases of the settlement's use.

Dendrochronological dates obtained for the wells from Kwiatków indicate that some of these features functioned over the same or nearly the same period of time. The »life span« of the water intakes with a wooden casing is estimated at c. 30 years or more. Therefore, it is difficult to capture this period of time in the archaeological material whose vast majority is pottery. The issue is all the more difficult as, probably, the upper parts of the wooden constructions of the inactive wells were disassembled for reuse in the casings of new water intakes. The full series of dates obtained for the majority of planks forming the casing of the structure in the case of feature 250 (outside zone A1) show e.g. that the differences between the precise

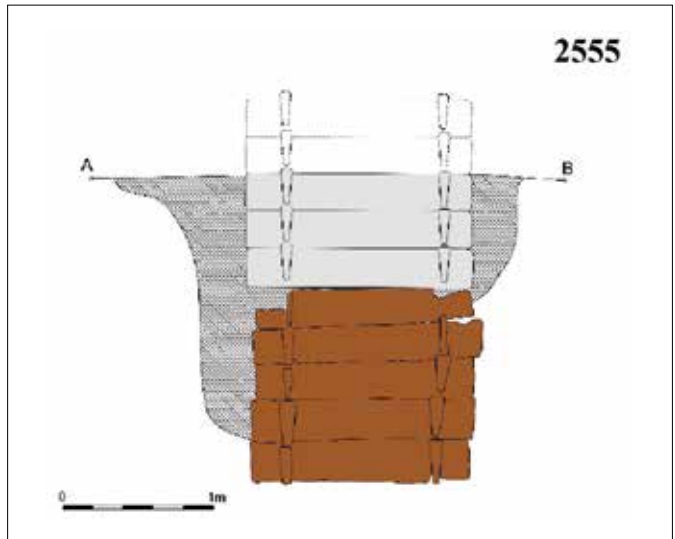
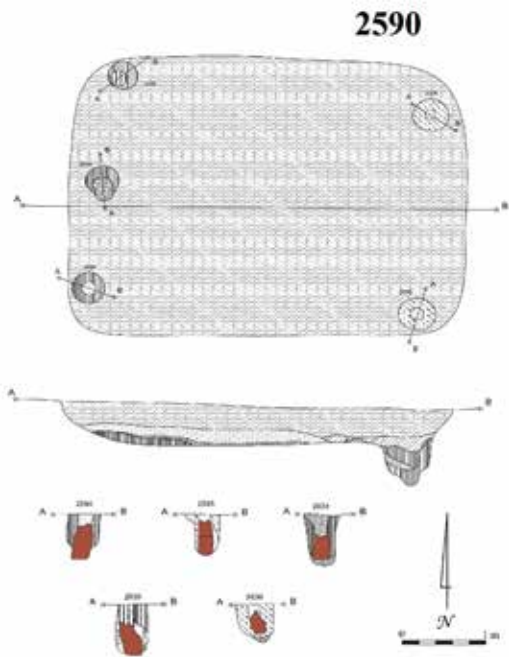


Fig. 6 The complex of the features from Kwiatków 11/20 (woj. wielkopolskie/PL), zone A1 – areas: P53, P63, P73. The complex consists of shallow pithouse no. 2590 with preserved parts of posts, post-holes, well no. 2555, hearth no. 2558. – Reconstruction of the post-location in pithouse no. 2590. – (Drawings M. Piotrowska / M. Michałowicz).

dates for tree felling are almost 50 years, while in the case of feature 2581 (zone A1), where each plank was dated, the differences in exact dates reach up to 20 years (Krąpiec 2016). Simultaneous use of the study features is indicated by the dates obtained for zone A1. The wells located near the dugouts and the ones forming complexes with other features had a similar time span to the water intakes recorded as single finds in this part of the settlement, being in certain isolation from other springs. To exemplify, analogous chronological designations were also obtained for two wells located abreast in the north-western part of zone A1. Dates obtained for zone A1 and the rest part of Kwiatków 11 mostly indicate the 2nd century.

Zone A2 of the site yielded also wells whose dendrochronological dates originate from the 2nd century, as well as some water intakes dated to the Migration Period. These features formed groups of water intakes, also occurred as single finds and formed functional relationships with other features like hearths or kilns. The dates obtained for Kwiatków 20 show that some wells were also used at the same time – they formed small clusters. Other wells were built later – the dates indicate that the trees used for casings were cut down after the 3rd century (unfortunately, no precise dates are available). Interestingly, wells from the east-northern and southern parts of Kwiatków 20 delivered the dates indicating the 4th and 5th centuries.

What is interesting is that only three features, out of over 100 wells recorded, had double casings. Two of them represented double log constructions, and in the third one, a hollowed out trunk was inserted into a quadrangular casing. Observations made for the water intakes indicate that, usually, when the well was no longer usable, a new one was dug in its vicinity. The presence of only three (already mentioned) double casings proves that the location of those features was exceptionally convenient for the residents of the settlement and that they tried to extend the well's life span by inserting a second structure into it (Piotrowska 2016, 71. 78). It is possible that the former elements of the settlement building did not allow for digging new water intakes near it. It is worth noting that they were not isolated, single wells but rather features recorded in the zones where numerous finds of the Przeworsk culture occurred (zone A1: well no. 724; zone A2: wells nos 437 and 1573).

DISCUSSION

In order to create a comprehensive view of the matter and to provide a spatial analysis of the settlement, it is necessary to explore many components such as natural environment (location of aquifers, place in the micro-region, topographic factors, history of the development of the settlement), the settlement phases, and to analyse the distribution of individual features, their relationship and succession. The conclusions presented below are based on the available data, many of which are open to question. As can be seen from the review above, the wells were located both within and outside the settlements. In the case of those situated on the outskirts or already outside the high-density residential area, both single wells and several such complexes were recorded. Often, they were located in the lower parts of the site due to the easier access to groundwater or just above the natural watercourses or reservoirs. These features, even though situated outside the settlements or at their ends, were usually located relatively close or, less frequently, at a greater distance. The wells located in this way were connected with the neighbouring half-dugouts, hearths, charcoal piles, features intended for the pre-treatment of flax, furnaces and other structures. The wells located in the economic zones or outside them were situated both within the settlements with a clear division into the residential and economic parts and in the settlements with an erratic building pattern or the settlements with the square left as an empty space.

The residential and residential-economic zones are successive parts of the settlements in which the main features were recorded. They were located, among other features, at the back of the longhouses. It is worth

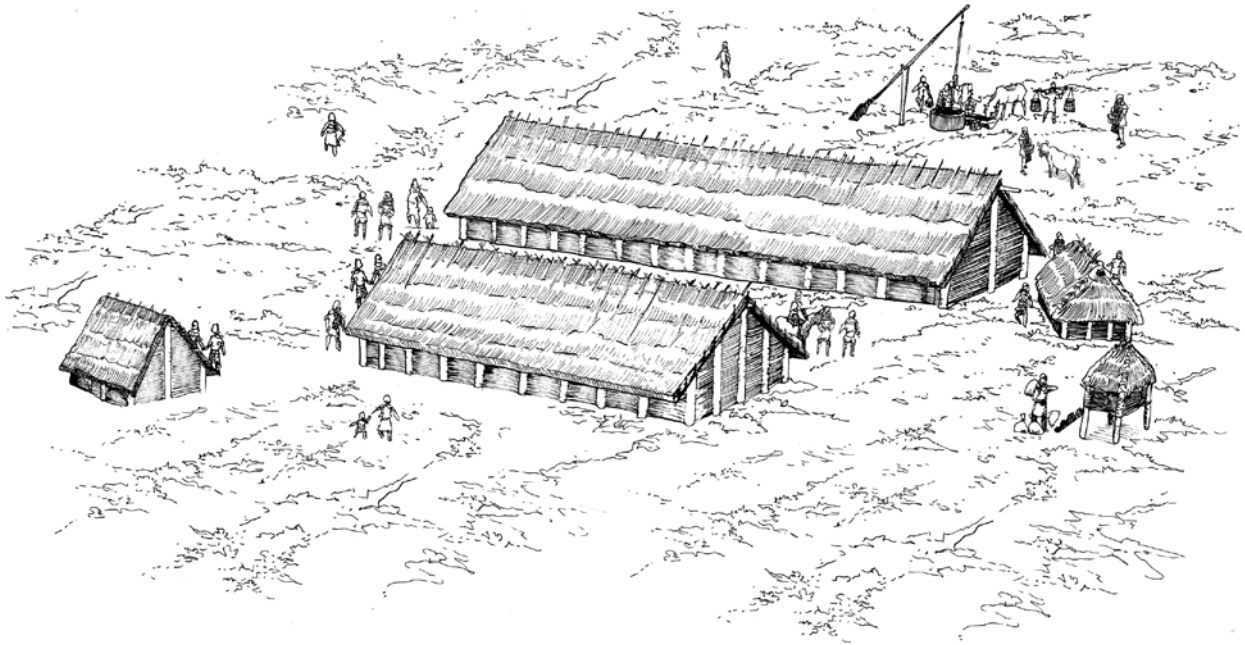


Fig. 7 Reconstruction of the view at the southern part of the Przeworsk settlement in Mąkolice (woj. łódzkie/PL). – (Drawing M. Wiechno).

recalling the examples known from Western Europe – where wells were found within particular farmsteads (Zimmermann 1976, 54-55 fig. 36; cf. Leube 2009, 162). They were also recorded in the immediate vicinity of some smaller clusters of post-construction buildings and half-dugouts. Perhaps some of them functioned as workshops which needed direct access to water. In such cases, they should be considered to be »private« wells. Moreover, wells occurred both in the central points of the residential zones and on their outskirts. Then, we can assume that the features were used by the majority of the residents. At some sites, the distribution pattern of the wells was quite regular, without clear clustering – but almost a »lattice« spatial pattern of these features was noted. The sites whose wells were associated with particular zones within a given settlement – residential or economic ones – are rare, which is related to the frequently mentioned (usually), only partial exploration of the Przeworsk culture settlements. They were recorded both within the empty square and outside the central zone, left devoid of the housing between the residential and economic buildings.

Here, it is worth devoting more attention to the settlement of the Przeworsk culture at the site in Mąkolice. In this case, its spatial organization probably reflects a certain vision of order transferred in a micro-scale to the discussed settlement. One of the basic categories of human reasoning is the category of space (Nowicka 2000, 430). In addition to the pragmatic reasons such as the proximity to water, probably also other premises were taken into consideration when analyzing the development of the settlement or even the interior of the house itself. Both beliefs and knowledge of the dwellers about the surrounding world were manifested in various areas of everyday life (Tomicka/Tomicki 1975, 14). The spatial development of a village or a settlement, in the concept of its inhabitants, could be in a sense a repetition of the order contained in the vision of the organization of the world. Here, a perfect example may be the settlement in Mąkolice. The spatial arrangement of this settlement has a concentric character whose centre is determined by the zone with a centrally located well (figs 2. 7). It is noteworthy that to this day, the central point of some villages or towns is the square with a well where the life of the inhabitants concentrates. In the old village, the social life took place at the wells, which were »wells for common use«. This – thanks to the location in the centre

of the settlement – was a place of meetings (Górak 1988). Social awareness is least sensitive to changes and in the case of certain principles of world view, changes take place at the slowest pace. In addition to the afore-mentioned concentric order, we can say that there existed three zones: central, residential and production, which reflect the tripartition which is a universal division (Tomicka/Tomicki 1975, 67-68). The centre of the settlement was the zone which separated the two parts of the settlement of different functions, but at the same time it was the area where both spaces »flow into each other«.

The issues of the location of the wells in the space of the settlements and their functions have only been outlined in this article summarizing the knowledge about the well in the Przeworsk culture (Nowakowski/Waluś 1986). The authors of this publication point out that the location of the wells in the central zones of the settlements probably had a special meaning. A feature from the settlement in Tłuste (Ternopil obl./UA) may serve as an example here – the well was probably protected by some construction based on posts. The post-holes in the vicinity of the well yielded some artefacts which can be interpreted as foundation sacrifices (Nowakowski/Waluś 1986, 54). Thus, it is probably not only the place of a water intake but also the feature defining the centre of the settlement – the point of reference for the spatial arrangement – in an analogical way to what we observe in the case of the above-described site in Mąkolice.

In Central Poland, where the above-mentioned settlement was located (Mąkolice), in the late period of the Roman Iron Age and during the Migration Period (so in the time corresponding to its chronology), the buildings within the settlements related to the Przeworsk culture were concentrated around the square which was left as an empty space. A characteristic feature of the Przeworsk settlement throughout the entire period of its functioning was a division into the residential and economic-production zones (Michałowski 2003, 146). Also, the former popular farm building system was used here – a farmstead with a longhouse, an »auxiliary« building and other features (Michałowski 2003, 101-102). In this case, however, the well was a »common« feature, used by all residents and not just a feature located at the back of the farmstead. There is no doubt that the functioning of the described settlement organism required planning and respect for the separateness of both areas of activities carried out by the inhabitants. In the case of this settlement, both zones (residential and economic) were separated by a square with a well with other features were more or less concentrically located around. In the case of the settlement in Strobin (woj. łódzkie/PL), the features were also characterised by the location around an empty square, the centre of which (this time) was a small building (Abramek 1998, 209). This type of building is known from the settlements discovered in the area of the Vistula-Oder interfluvium (Leube 1998b, 3; Domański 1998, 224). A clear division into the residential zones, consisting of above-ground post-buildings and production buildings, separated by an empty space was recorded at the site in Jazów (woj. lubuskie/PL), as well as to the west of our lands in Tornow-Lütjenberg (Lkr. Oberspreewald-Lausitz/D; Domański 1998, 222. 224). The spatial arrangement in which the housing concentrated around an empty space was also recorded in such sites as Feddersen-Wierde, Flögeln-Eekhöltjen (both Lkr. Cuxhaven/D), Hodde (Syddanmark/DK) or Nauen-Bärhorst (Lkr. Havelland/D) (Hvass 1982; Brabandt 1993, 88 fig. 28; Zimmermann 1992, fig. 70).

The case of the settlement in Kwiatków is different – the residential and economic zones overlapped, which is not a new phenomenon for the Przeworsk settlements, but it was mainly encountered in the cases of the production settlements (Michałowski 2003, 150). The housing pattern in Kwiatków was irregular and dispersed, which is a characteristic of the villages of the described culture (Michałowski 2003, 102). Their layouts i.e. small clusters, separated from each other, are also quite typical (Michałowski 2003, 89). In Kwiatków, the discovered complexes of features formed small concentrations which can be cautiously called »farmstead-like«, where the central point was a half-dugout (shallow pithouse, perhaps of both residential and economic function) of post-construction with a well at the back (figs 4. 8). A similar location pattern of the well was observed in Jankowo (woj. łódzkie/PL; Jurkiewicz/Machajewski 2006, 151).

In Kwiatków the groundwater was quite shallow (except the central part of the site: the culmination of the elevation), and digging the well was additionally facilitated by the presence of the sand-rich ground, which probably had an additional influence on the number of the wells. In the case of this interesting settlement, a hypothesis can be formulated about the existence of »private« wells, supplying water to other users of single, small buildings/half-dugouts, and their presence were motivated by mere pragmatism. Definitely, it was far more convenient to have direct access to water in the settlement than to have to go to the river each time it was needed – the decisive factor was probably the desire to have access to clean water at the back of the individual, small »farms«. The hypothesis of the economic use of these features seems tempting, e. g. for the pre-treatment of fibre (for example flax soaking) as well as the recognition of the mentioned small buildings as workshops related to some specific production. This is all the more interesting as the only craft evidenced by the archaeological material at this site so far is spinning and weaving (spindle whorls and loom weights). However, it cannot be forgotten that fabric manufacturing was a common backyard occupation. Therefore, the key issue is to find an explanation for building so many wells. It seems that not all of the discussed features should be interpreted as wells intended as a water supply for the residents with the aim to utilise it for the economic and consumption purposes. These features were probably used for various purposes, hence their different location within the settlement area, which presumably led to a difference in the choice of construction methods and also in a different content of fills. Unlike the »private« wells operating within small complexes whose central point was a shallow pithouse, the single wells were probably features of a »public« nature i. e. they were intended for common use. It seems likely that the wells located in certain isolation from other features were, for example, reservoirs of drinking water for farmed animals. On the other hand, the number of features – from our perspective – may seem unusual. However, it should be remembered that the settlement in Kwiatków functioned for a long time, and the length of use of a single well could differ as well as its function (flax soaking, tanning). It cannot be ruled out that such a large number of wells functioning in a settlement for several centuries was a regular situation, considering the acreage of the settlement, the »lifespan« of a single well and the difficult access to the neighbouring anastomosing rivers during the Roman Iron Age (Twardy 2016).

The site Berlin-Biesdorf »Habichtshorst« yielded a large number of wells which were probably used at the same time (Schirmer 2005). In the case of this settlement, wells occurred both together with homesteads and without a clear connection with any buildings. Similarly as in the case of Kwiatków, despite the proximity of the river, direct access to water within the settlement was a high priority to its inhabitants of the quoted Berlin-Biesdorf settlement and it significantly increased the quality of their lives (Schirmer 2005). The factor that determined the place where the well was to be dug was easy access to water during the winter. As written by K. Schirmer, wells had a special cover protecting the water against freezing (Schirmer 2005). As it was mentioned earlier, in Kwiatków vicinity, there was a lack of natural sources – springs and the watercourses were completely frozen over in winter, so then wells were very important.

As it was mentioned above, wells in Kwiatków were located in various parts of the settlement. Water intakes occurred in small groups – from two to several, located next to each other. This can be explained by the need to build more of these features in the place which was convenient for the residents of the settlement after other wells ceased to be used due to, for example, the well silting up or the casing being destroyed. Also, there could be groups of wells that can be linked together due to their functionality. Such a situation was noted both in the case of the features associated with the end of the early period of the Roman Iron Age and for the water intakes from the Migration Period. Importantly, it seems that the model of the spacial development of the settlement in Kwiatków did not change for such a long period as both the northern (older) and the southern (partially younger) parts of the site yielded wells. Probably, over a couple of centuries, the economy of this settlement based on production or/and cattle breeding which

required a permanent supply of water. Therefore, it is concluded that close access to the water within the occupied area was a priority to the inhabitants of the settlement.

CONCLUSIONS

In conclusion, the spatial planning of the settlement was undoubtedly motivated by pragmatism, but perhaps it also reflected a certain perception of the structure of the world maintained by its ancient inhabitants. There were no differences in the layouts of the settlements where wells were discovered and those without these features. It is noticeable that the wells were quite often located outside the high-density residential areas, above the watercourses and in the economic and production zones, but sufficiently close to be a convenient reservoir of drinking water. The choice of a place for building these features can also be stimulated by the topographical and hydrological conditions. The settlements founded in the vicinity of rivers were usually located on elevations in order to avoid flooding. Wells in the lower parts of the site provide easier access to groundwater, though. The settlements of the Przeworsk culture in which wells were discovered were most often located in the vicinity of water reservoirs, and their presence is rightly explained by the convenience of having direct access to water within a given settlement, especially during winter. Single wells prevail in the settlements of the Przeworsk culture. They can be considered as »public shared« and their role was to supply the inhabitants with water. Occasionally, two or (more rarely) several artificial water intakes which were associated with the same site were recorded. The »private« wells were a less frequent phenomenon. The choice of the type of housing and consequently also the place where the well was built in the settlement space was influenced not only by the environmental factors but probably also by some cultural factors (see Michałowski 2003, 150). This is particularly noticeable when comparing the settlements from Mąkolice and Kwiatków located within the same zone (Central Poland), where we notice many differences in terms of space utilization. The two different models of the area development were most probably determined by various factors.

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Notes

- 1) The issue of only the well function will be the subject of a separate article due to the length's limit of the presented text.
- 2) »Water intake« is a synonym for the word »well« in this article. No »well ditches« were discovered within the presented sites.
- 3) The author of the submitted text took part in the excavations at both of these sites and analysed the results of the research.
- 4) The difference between dugout (deeper sunken hut – subterranean hut – pithouse) and half-dugout (not so deep sunken hut – semi-subterranean hut – shallow pit house) is the depth of these features. This issue was widely discussed by A. Michałowski (Michałowski 2002/2003, 162; 2008, 461. 467; 2011, 88. 101-102; Skowron 2006, 35). At the presented sites most of these buildings were constructed of posts (see Zimmermann 1998).
- 5) Longhouses, which were above-ground buildings were also characterized by the posts (see Zimmermann 1998).
- 6) Wells, in the context of the sites related to iron smelting, are a separate issue that will not be presented in this article.
- 7) The chemical composition of the sediments filling the study wells is a record of the mineral matter and the washed organic

matter through shallow underground and surface waters. The rate of water circulation could be rapid, and the waters themselves were characterized by a large proportion of suspension. However, the mean share of the organic matter is not high (in both cases, it is below 8%), hence the potential economic use of the waters cannot be ruled out here (Okupny 2017).

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Die Lokalisierung und Bedeutung von Brunnen in Siedlungen mitteleuropäischer Gemeinschaften in der Spätantike. Ein Beispiel aus Kwiatków (woj. wielkopolskie/PL) aus der Przeworsk-Kultur

Ziel dieses Artikels ist es, Bedeutung und Lokalisierung von Brunnen im Siedlungsgefüge mitteleuropäischer Gesellschaften der Spätantike zu umreißen. Ein besonderes Augenmerk soll dabei auf die im heutigen Polen dokumentierten Befunde gelegt werden. Der Grund für die Bearbeitung des Themas war der Nachweis von mehr als 100 Brunnen auf der der Przeworsk-Kultur zugeordneten Siedlung in Kwiatków 11/20, die, ebenso wie der derselben archäologischen Kultur zuweisbare Fundplatz in Mąkolice, großflächig und weitgehend vollständig untersucht werden konnte. Besagte Niederlassungen repräsentieren zwei unterschiedliche Typen der Siedlungskonzeption, was einen exemplarischen Vergleich beider umso attraktiver erscheinen lässt. Die Planung und Anlage von Kwiatków und Mąkolice unterlag zweifelsohne pragmatischen Gesichtspunkten, lässt jedoch auch eine gewisse Weitsicht in der Wahrnehmung und Ordnung des Lebensumfelds ihrer frühgeschichtlichen Bevölkerung erkennen. So konnten viele Unterschiede in der Nutzung verschiedener Siedlungsareale festgestellt werden, die durch die unterschiedlichsten Faktoren beeinflusst worden sein dürften.

Übersetzung: J. Greif

Place and Importance of Wells in Settlements of the Central European Communities in Late Antiquity. An Example of the Przeworsk Culture from Kwiatków (woj. wielkopolskie/PL)

The article's objective is to outline the meaning and place of wells in settlement space of Central European communities in Late Antiquity. A particular emphasis will be placed on the finds obtained from the territories of Poland. The reason for our interest in the presented issue was the discovery of more than 100 wells at the settlement of the Przeworsk culture in Kwiatków 11/20. The other investigated site, presented in more detail, is the settlement of the Przeworsk culture in Mąkolice. Both sites were excavated entirely or almost entirely and – even more interestingly – represent two different types of spatial development. The spatial planning of the settlement was undoubtedly motivated by pragmatism, but could also reflect a certain perception of the structure of the world maintained by its ancient inhabitants. Many differences in use of space were noticed which were probably determined by various factors.

Place et importance des puits dans les gisements des communautés d'Europe centrale de l'Antiquité tardive. Un exemple de la culture de Przeworsk de Kwiatków (woj. wielkopolskie/PL)

Le but du présent article est de donner un aperçu de la signification et de la place du puits dans l'espace des habitats des communautés d'Europe centrale de l'Antiquité tardive. L'accent est mis en particulier sur les découvertes issues de la Pologne actuelle. La raison pour laquelle on s'intéresse à la question des puits est la découverte de plus de 100 puits dans un habitat de la culture de Przeworsk à Kwiatków 11/20. L'autre site de recherche, présenté d'une manière plus détaillée, est celui de Mąkolice. Les deux sites ont été intégralement ou presque intégralement fouillés et représentent deux types différents de développement spatial, ce qui les rend encore plus intéressants à discuter. L'aménagement spatial des établissements a sans doute été motivé par le pragmatisme, mais reflétait aussi une certaine vision de la perception de la structure du monde qui était celle des habitants dans l'antiquité. De nombreuses différences en ce qui concerne l'utilisation de l'espace ont été identifiées, plusieurs facteurs expliquent ces variations dans l'implantation des puits.

Traduction: A. E. Gracey

Schlüsselwörter / Keywords / Mots clés

Polen / römische Kaiserzeit / Przeworsk-Kultur / Siedlung / Brunnen / Siedlungsplanung
Poland / Roman Principate / Przeworsk culture / settlement / wells / spatial planning of settlements
Pologne / époque romaine impériale / culture de Przeworsk / gisement / puits / aménagement spatial

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