

Marcin M. Przybyła*, Michał Podsiadło**, Damian Stefański***

PREHISTORIC DEFENSIVE STRUCTURES IN THE SZRENIAWA VALLEY

ABSTRACT

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This paper presents the results of the non-invasive search for defensive settlements from the Neolithic and Bronze Age periods in the Szreniawa valley and in its closest upland area (Proszowice Plateau and the Miechów Upland). This investigation was carried out in 2018 by archaeologists gathered in the "Stater" Association of Field Archaeologists and was funded by the Ministry of Culture and National Heritage. During this study geomagnetic tests and surveying were carried out on 18 sites, which were selected on the basis of satellite image analysis. The total investigated area covered 40 hectares. Spatial analysis of the artefacts compared with the course of magnetic anomalies allowed the determination of the chronology of the investigated settlements. The outcome of this project points to the presence of at least 15 well-documented prehistoric defensive settlements of various types found on 10 archaeological sites. The discovered settlements can be attributed to the Lublin-Volhynian, Funnel Beaker-Baden, Trzciniec and Lusatian cultures.

Keywords: Neolithic, Bronze Age, fortified settlement, enclosures, magnetic investigations
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* Dolmen Marcin Przybyła, Michał Podsiadło s.c., pl. Serkowskiego 8/3, 30-512 Kraków, Poland; dolmen@onet.pl

** Dolmen Marcin Przybyła, Michał Podsiadło s.c., pl. Serkowskiego 8/3, 30-512 Kraków, Poland; thergo@o2.pl

*** Archaeological Museum in Kraków, Senacka 3, 31-002 Kraków, Poland; d.stefanski@uj.edu.pl

1. INTRODUCTION

The Nida Basin macroregion is part of the Małopolska (=Lesser Poland) Upland located in the western part of the historical Małopolska province. The majority of the macroregion is covered by a fertile patch of loess, which encouraged and facilitated extremely intense settlement starting from the very beginning of the Neolithic period, and making that area exceptionally rich in prehistoric finds. Additionally, large valleys, steep slopes and remarkable promontories supplied the prehistoric societies with many potential places of defensive advantage. The Nida Basin is drained by the Nida, Szreniawa and Nidzica Rivers, which are Vistula tributaries (Fig. 1). This study focused on the Szreniawa valley. It starts near Wolbrom in the Olkusz Upland, but the majority of its eighty-kilometre course is in the Miechów Upland and Proszowice Plateau. Although the valley was repeatedly surveyed, mainly due to the systematic action conducted by IHKM PAN (Institute of Material Culture History of the Polish Academy of Sciences; Kruk 1970; Rydzewski 1972), some data pointing to a presence of defensive structures in the region has been acquired only recently. This study was an initial survey at the Funnel Beaker-Baden culture settlement feature in Gniazdowice in the Proszowice district (Przybyła *et al.* 2015) and at the Trzciniec culture settlement feature in Ciborowice in the Proszowice district (site investigated under the National Science Centre grant realized by Institute of Archaeology of Jagiellonian University in co-operation with M. Przybyła). It should be emphasised that both sites show alternate concepts of landscape management. The first of them is located on an outstanding, naturally fortified promontory on the edge of the upland, while the second one lies on a flat promontory of terraces, which slope steeply to the bottom of the river valley.

These new findings made the Szreniawa valley and its direct upland a test area to verify the thesis that, contrary to current opinions in the subject literature (e.g., Nowak 2009, 173), prehistoric defensive settlements in southern Poland are not rare phenomena, but a permanent, widely present element of settlement networks. The proposed tool to verify this thesis was comprehensive geophysical testing and surveying. The potential of non-invasive investigation has been proved recently in the area of the Dobużek Scarp (Chmielewski *et al.* 2015), in Silesia (Furmanek 2017; Furmanek and Wroniecki 2017) and in the northern Nida region (Wroniecki 2016) where the use of aerial photography and magnetometry method allows for the identification of prehistoric defensive settlements.

The program of non-invasive research, including geophysical investigation and surveying, was carried out by the Association of Field Archaeologists STATER with the participation of archaeologists from Jagiellonian University and the Archaeological Museum in Kraków as part of the project "Prehistoric fortified sites in the Szreniawa valley". It was co-financed by the Ministry of Culture and National Heritage under the program "Cultural Heritage", priority "Protection of archaeological monuments", of the National Heritage Institute (project no. 108560/18).



Fig. 1. Location of the examined sites in the Szreniawa valley (western and eastern part). Drawn by M. Podsiadło, M. M. Przybyła

2. RESEARCH METHODOLOGY

Magnetic investigation was selected as the main element of the project. It allowed for the fastest and the fullest coverage of large spaces; additionally, it was suitable to discover linear anomalies like ditches, trenches and moats (David *et al.* 2008, 16-21). Magnetic measurements were made using a fluxgate magnetometer (gradientmeter, Misiewicz 2006, 74-98) 4.032 DLG by Foerster Ferrex, equipped with two probes with a resolution of 0.2 nT. Measuring lines were spaced 1 m. apart. The number of measurements per 1 square meter was 10. The data was collected in bidirectional mode. The obtained results are presented on magnetic maps developed in the Terra Surveyor 3.0.29.3 program. Geodetic and magnetic data were integrated in the QGIS program.

The first step was to analyse the available databases of satellite images (mainly Google Earth Pro and geoportal.gov.pl) of the Szreniawa valley. This allowed the selection of about 30 interesting locations, characterized by visible linear soil and vegetative markers (Okupny 1998, 237). These sites were tested by magnetic investigation. In the case of linear anomalies discovered, detailed surveys with the help of GPS receivers were conducted. Moreover, in most cases digital terrain models were made using ISOK data. The Lidar Point Cloud was reclassified and triangulated to a 0.5 m raster, and then analysed to search for remnants of potential prehistoric landforms and visualized using the SAGA GIS, QGIS and Relief Visualization Toolbox (RVT) software.

During the project, magnetic investigations were carried out on 18 sites, over a total area of 40 hectares. These resulted in the discovery of at least 15 defensive structures of various types at 10 sites. On the next 3 sites weakly readable potential structures were identified. Most of them group into three well-readable, chronological and cultural horizons.

The following abbreviations representing different cultural entities are used throughout the text: Linear Pottery culture (LBK), Lengyel-Polgár cycle (L-PC), Pleszów-Modlnica group (P-MG), Lublin-Volhynian culture (L-VC), Wyciąże-Złotniki group (W-ZG), Funnel Beaker culture (FBC), Funnel Beaker-Baden culture (FB-BC), Corded Ware culture (CWC), Mierzanowice culture (MC), Trzciniec culture (TC), Lusatian culture (LC), Przeworsk culture (PC).

3. THE FIELD INVESTIGATIONS

The scope of this paper concerns only the sites where the magnetic anomalies revealing ditches or palisades can be clearly interpreted as prehistoric. For instance, in case of the Łękawa site in the Kazimierza Wielka district, the result of the investigation is ambiguous, and reveals probably 20th century trenches. In many sites, such as Jaksice 6 and Przesławice 1 in the Miechów district, Chorążycza 2 and Piotrkowice Wielkie 1 in the Proszowice district,

Orłów 4 in the Kraków district or Wierchowiska 4 in the Olkusz district, despite test investigations, no linear anomalies were found.

3.1. Biskupice, Miechów district, site 14-17 (AZP 96-57/142-145).

This site is located on a large triangular promontory at the confluence of the Szreniawa and the Cicha Rivers. Two linear structures were identified. The first positive anomaly is interpreted as a ditch (Fig. 2: feature 1). It cuts off the southern part of the promontory. Magnetic research covered about 60% of its length; however, the remaining part is clearly visible on satellite images, so reconstruction of the entire feature is possible. In the central part, the ditch covers the greater portion of the plateau. To the west, it passes to a natural ravine leading to the Szreniawa valley, and to the east the ditch reaches the Cicha riverbed. The fortified structure has an area of 15 ha and measures 570 × 320 m. The observed anomaly (Fig. 2: feature 1) is continuous (disregarding disturbances caused by the presence of a closed depression); however, in the central part, a gap of a few meters – possibly the gateway passage – is visible. This may be confirmed by a circular spatial arrangement (Fig. 2: feature 3) with a diameter of almost 50 m, clearly visible on the inner side of the ditch and adjacent to the hypothetical passage. A second linear anomaly was partially

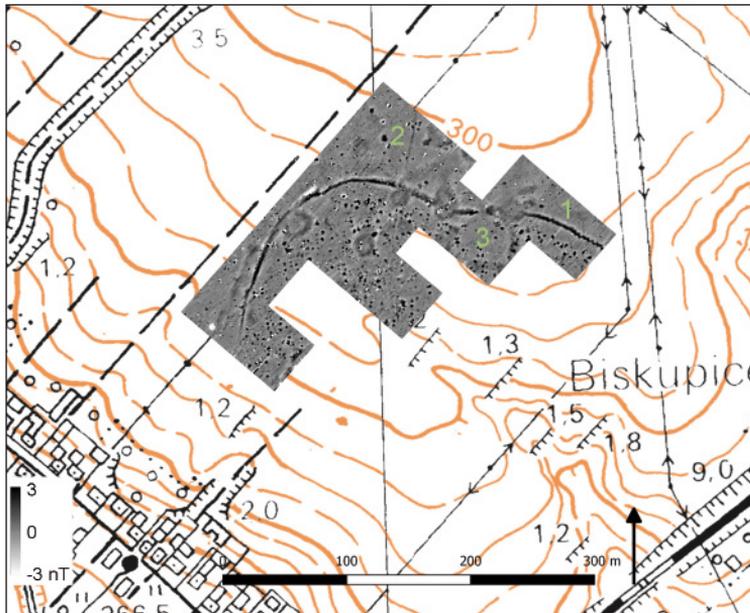


Fig. 2. Biskupice, Miechów district, site 14-17. The magnetic map in greyscale imposed on a topographic map. The green numbers indicate anomalies discussed in the text. Drawn by M. Podsiadło, M. M. Przybyła

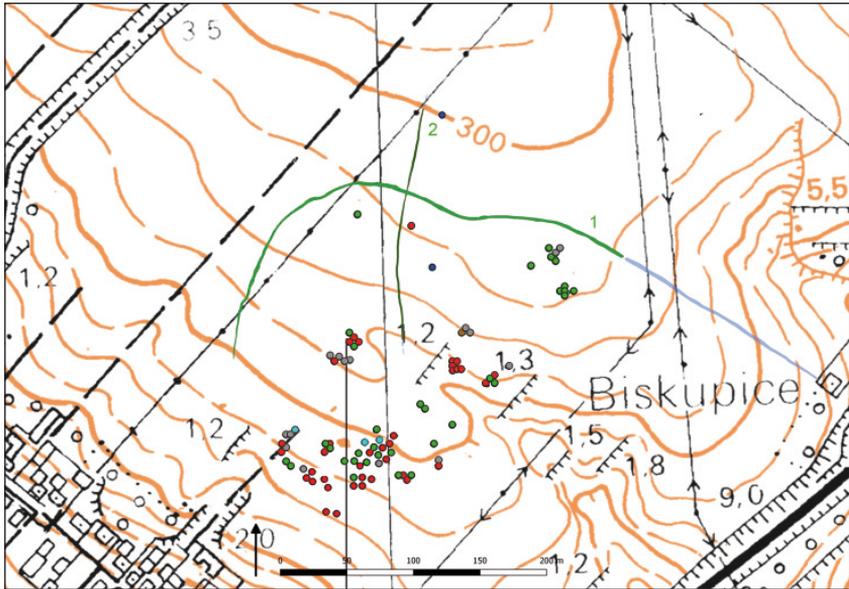


Fig. 3. Biskupice, Miechów district, site 14-17. The course of archaeological features on a topographic map: green – archaeological features discovered as magnetic anomalies, blue – archaeological features visible on satellite images. The dots indicate the distribution of artefacts: red – Trzciniec culture, green – Lublin-Volhynian culture, gray – prehistoric times. Drawn by M. Podsiadło, M. M. Przybyła

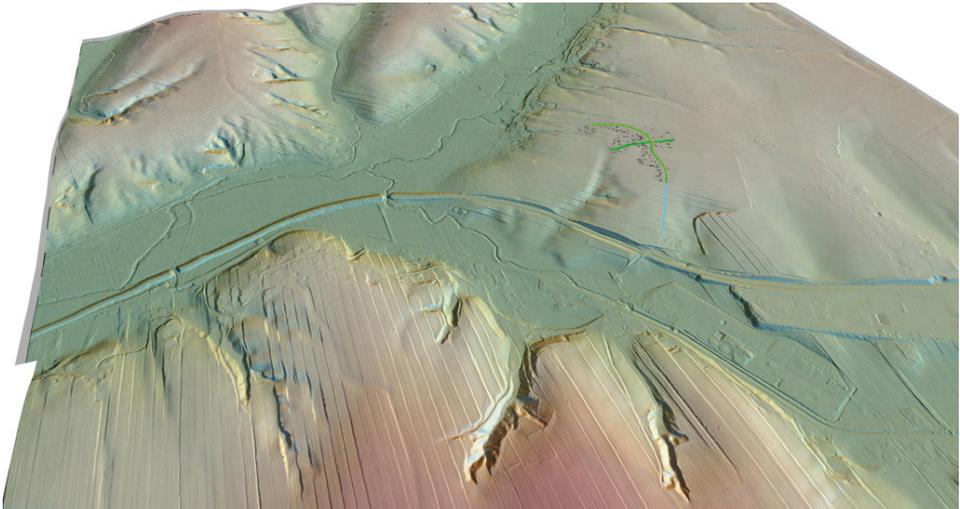


Fig. 4. Biskupice, Miechów district, site 14-17. Digital terrain model with course of archaeological features. Drawn by D. Stefański

examined – about 180 m. It is also interpreted as a ditch (Fig. 2: feature 2). It is narrower and shallower or less well-preserved than feature 1. At present, it is impossible to determine its full course. Possibly, it cut off only a part of the southeastern slope of the promontory. Numerous positive point anomalies are interpreted as archaeological features. They concentrate in the area surrounded by feature 1, which indicates their chronological and functional relationship. Importantly, there is also a zone without anomalies. It is about 15-20 m wide, running along the inner side of the ditch, and it can be interpreted as the rampart area.

During the survey, 83 artefacts, mostly potsherds, were acquired. They can be dated respectively to the Neolithic period – the late phase of L-VC (26 potsherds); the Bronze and early Iron Age – the classic phase of TC (35 potsherds), single LC potsherd; and prehistoric times (21 potsherds). The spatial distribution of artefacts (Fig. 3) shows their correlation with both defensive structures. L-VC artefacts are present all over the site, but they concentrate in its eastern part, coinciding with the area surrounded by feature 2. TC artefacts, although more numerous, were accumulated mostly in a smaller area in the western part of the promontory.

Summing up, it should be stated that relics of two defensive structures were recognized at the site (Fig. 4). The older structure was dated to the late phase of the Eneolithic L-VC (Zakościelna 2006, 80), and is located on the eastern slope of the promontory, facing the river, whereas, the younger one dates to the classic phase of TC, representing the A2b period of the Bronze Age (Górski 1997, 14).

3.2. Górka Stogniowska, Proszowice district, site 4 (AZP 100-60/11)

The site is situated on a flat promontory at the confluence of the Szreniawa and Jagielnica Rivers. Magnetic measurements (Fig. 5) revealed the existence of numerous anomalies interpreted as archaeological features, including three linear positive anomalies interpreted as ditches (Fig. 6: features 1-3; 7). The first ditch has an arched course and cuts off a southwestern part of the promontory. Unfortunately, recognition of its northern part is no longer possible due to the existing housing development there. The readability of the anomaly was quite good in its western part, but worse in the eastern part. A complete reconnaissance of the settlement is not possible, but assuming that the ditch in its northern part turns gradually towards the Szreniawa, it would enclose an area of about 10 ha. Only small sections of features 2 and 3 have been recognized. They are probably elements of one fortification system, as evidenced by their parallel course. It can be presumed that they surround the culmination, creating an oval structure of over a dozen hectares.

Over the course of the survey, 79 artefacts, mostly potsherds, were acquired. They can be dated respectively to the Neolithic period – LBK (10 potsherds) and the Bronze and early Iron Age periods – TC (28 potsherds), LC (1 potsherd). Additionally, numerous ma-

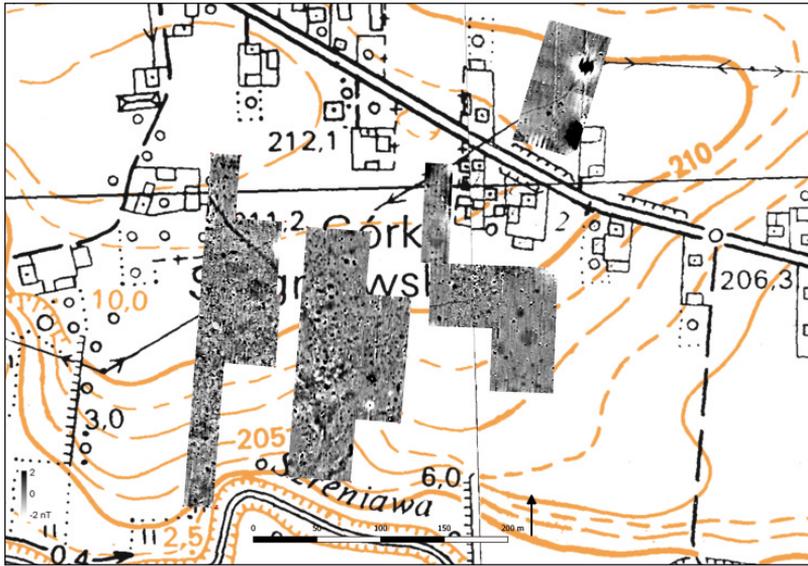


Fig. 5. Górk Stagniowska, Proszowice district, site 4. Magnetic map in greyscale imposed on a topographic map. Drawn by M. Podsiadło, M. M. Przybyła

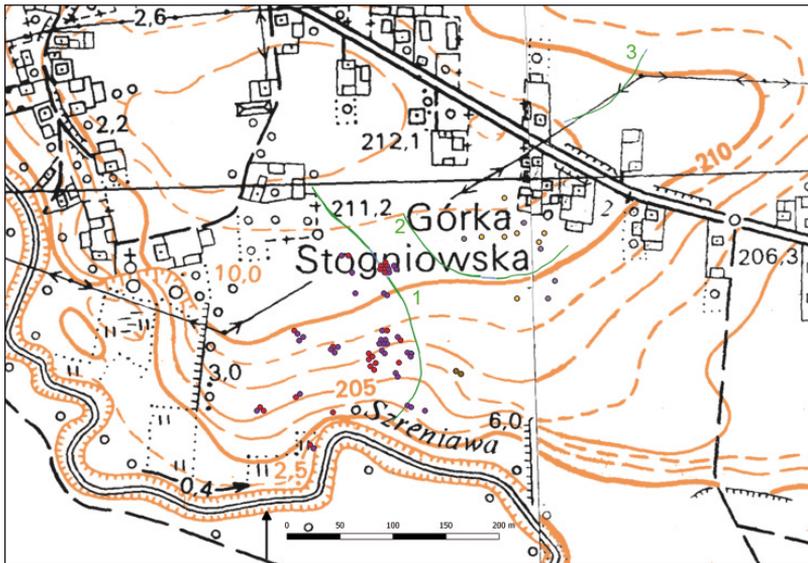


Fig. 6. Górk Stagniowska. Proszowice district, site 4. The course of archaeological features marked on a topographic map. The green numbers indicate anomalies discussed in the text. The dots indicate the distribution of artefacts: red – Trzciniec culture, violet – Przeworsk culture, yellow – Linear Pottery culture. Drawn by M. Podsiadło, M. M. Przybyła

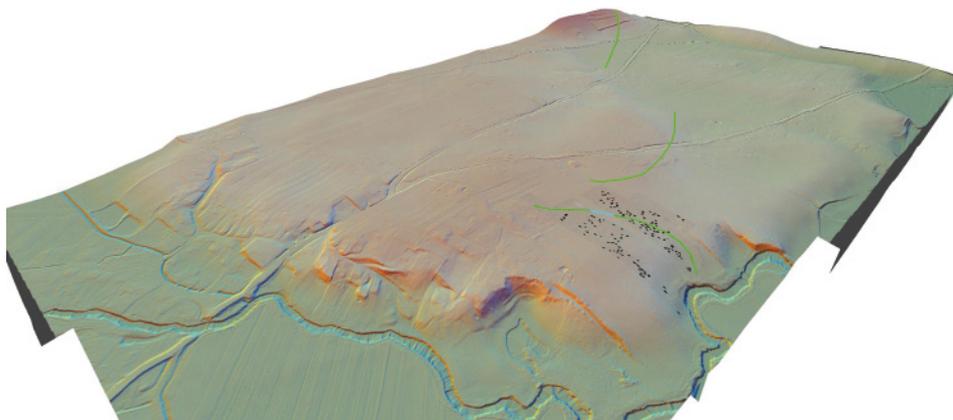


Fig. 7. Górkę Stogniowska. Proszowice district, site 4. Digital terrain model with course of archaeological features (vertical scale x5). Drawn by D. Stefański

materials can be dated to the younger phase of the Roman period. Spatial analysis of the artefacts shows that the TC correlates with the area surrounded by feature 1 (Fig. 6), which links it with this cultural unit. In the case of features 2 and 3, the situation is unclear. Admittedly, only artefacts of LBK were acquired from that the area, however, further investigation is required to determine the chronology of that establishment.

3.3. Kępa, Kraków district, site 2 (AZP 99-58/79)

The site is located on an elevation at the edge of the Szreniawa valley. The settlement is situated on a slope having the desired southern exposure. It is enclosed from the north by the river, and from the south by a steep, high slope. The magnetic investigation and the analysis of satellite images (Fig. 8; 10) revealed a long ditch (ca. 1 km). The area enclosed by the ditch presently covers 22 ha. However, considering the apparent shift of the riverbed, it was slightly smaller in the past.

During the survey, 299 artefacts, mostly potsherds, were acquired (Fig. 9). They can be dated respectively to the Neolithic period – unspecified (24 potsherds), LBK (3 potsherds) and CWC (1 potsherd); the Bronze and early Iron Age period – the classic phase of TC (77 potsherds), LC (72 potsherds) and unspecified (81 potsherds); the younger pre-Roman period – PC (6 potsherds); and prehistoric times (35 potsherds).

The TC artefacts are characterized by an even distribution throughout the site, which links it with the defensive feature (Fig. 9). Also, the characteristic of this fortification system is analogous to other large settlements related to the TC, such as Słonowice.



Fig. 8. Kępa, Słomniki district, site 2. Magnetic map in greyscale imposed on a satellite map. Red arrows indicate the soil markers revealing an archaeological feature. Edited by M. Podsiadło, M. M. Przybyła

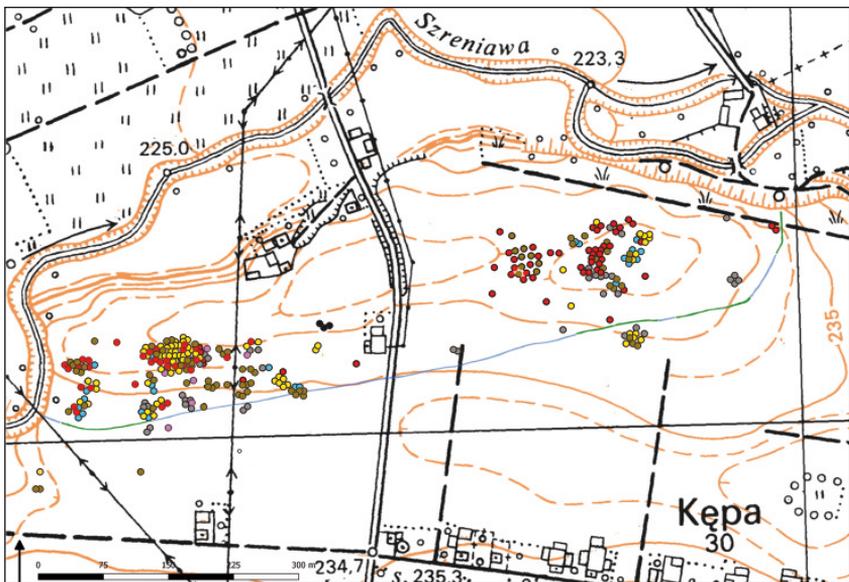


Fig. 9. Kępa, Słomniki district, site 2. The course of archaeological features on a topographic map: green – archaeological features discovered as magnetic anomalies, blue – archaeological features visible on satellite images. The dots indicate the distribution of artefacts: black – Linear Pottery culture, blue – Neolithic, red – Trzciniec culture, green – Lublin-Volhynian culture, yellow – Bronze Age, brown – Lusatian culture, violet – Przeworsk culture. Drawn by M. Podsiadło, M. M. Przybyła

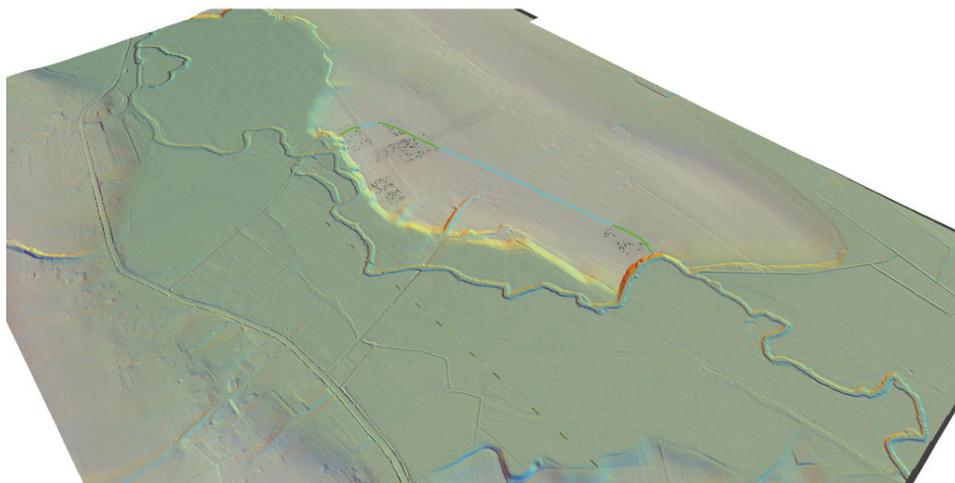


Fig. 10. Kępa, Słomniki district, site 2. Digital terrain model with course of archaeological features (vertical scale $\times 5$). Drawn by D. Stefański

3.4. Malkowice, Proszowice district, site 7-8 ("Góra Grodziska"; AZP 100-63/42, 43)

The site is situated on a conspicuous promontory – the Grodziska Hill – rising over 60 m above the bottom of the river valley. It is in a place of strategic importance – at the junction of the Szreniawa and Vistula Rivers. Investigation points to at least two independent systems of defensive settlements (Fig. 11-13). The largest one covers the entire area of Grodziska Hill. A ditch is marked by a poorly readable positive magnetic anomaly (Fig. 11; 12: feature 1) that runs diagonally across the eastern slope of the hill; it begins in a natural canyon, passes the culmination of the hill and then, at the top of the northern slope, it turns west where it becomes less readable. It splits into two parallel features (1 and 1a), which connect below the summit of Grodziska Hill and head towards the steep slope in the west. That ditch encloses an area of 4.2 ha, measuring 330×180 m.

The system of ditches is located at the culmination of the hill. It encloses a much smaller area of ca. 1.5 ha, which measures about 160×140 m. It consists of a single ditch (Fig. 12: feature 2) separating a small space at the edge of the escarpment, and two parallel ditches (Fig. 12: features 3 and 4) encompassing the peak of Grodziska Hill. On the top of Grodziska Hill one more structure is visible. It is a sequence of small point anomalies (Fig. 12: feature 5), which can be interpreted as an oval palisade surrounding an area of less than 1 ha. It is quite readable in its western and southern parts, but on the northeast side the anomalies are no longer visible. This is probably due to the strong soil erosion at this loca-

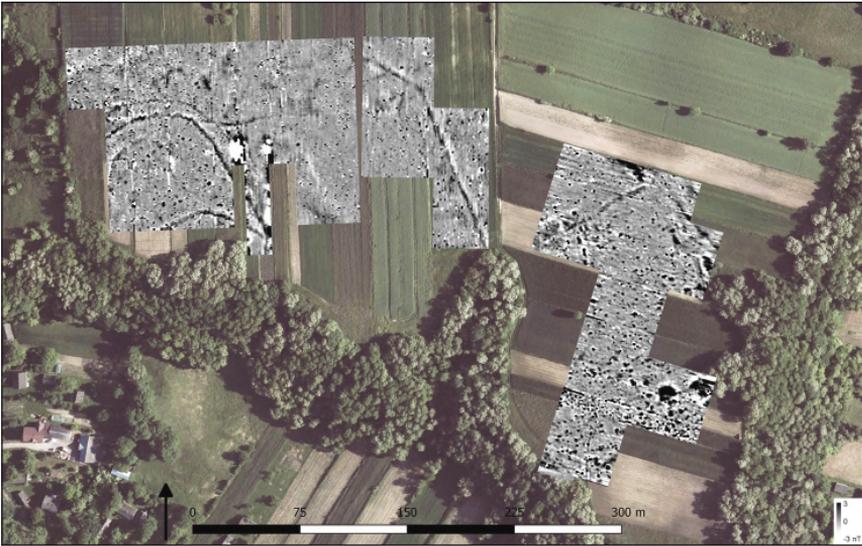


Fig. 11. Malkowice, site 7-8 ("Grodziska Hill") and Siedliska, site 1 in the Koszyce district. Magnetic map in greyscale imposed on a satellite map. Edited by M. Podsiadło, M. M. Przybyła

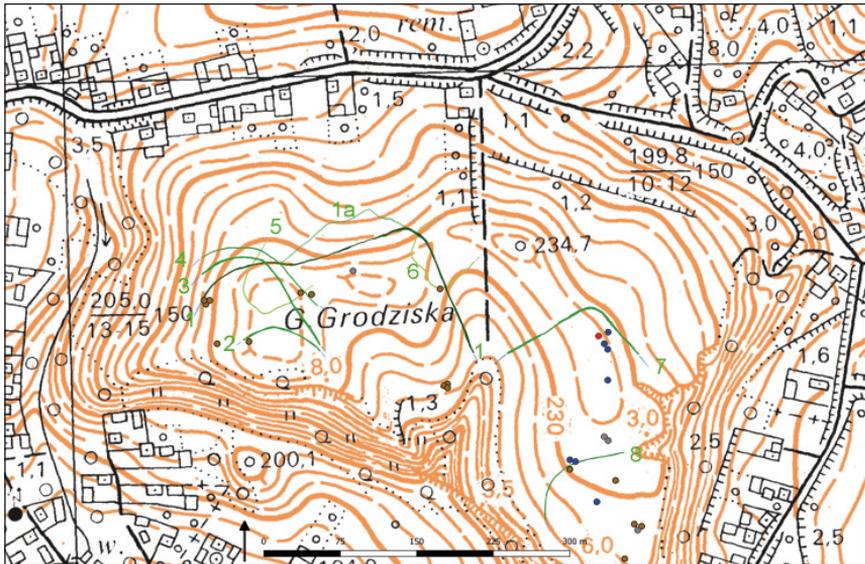


Fig. 12. Malkowice, site 7-8 ("Grodziska Hill") and Siedliska, site 1 in the Koszyce district. The course of archaeological features marked on a topographic map. The green numbers indicate anomalies discussed in the text. The dots indicate the distribution of artefacts: brown – Lusatian culture, blue – Lengyel-Polgar Cycle, grey colour – prehistoric times. Drawn by M. Podsiadło, M. M. Przybyła

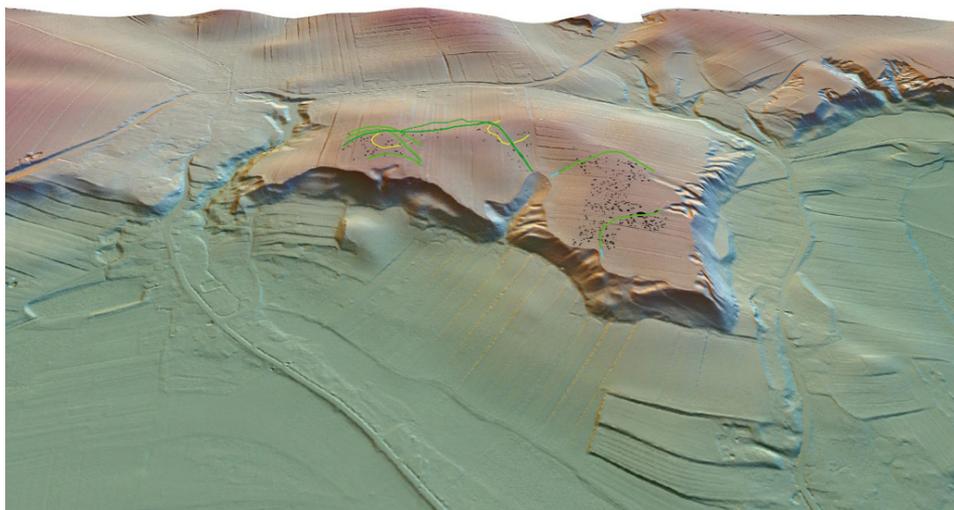


Fig. 13. Malkowice site 7-8 ("Grodziska Hill") and Siedliska, site 1 in the Koszyce district. Digital terrain model with course of archaeological features. Drawn by D. Stefański

tion. Finally, in the northern part of the eastern slope, there is another similar structure (Fig. 12: feature 6), which can be also interpreted as a palisade.

Despite repeated surveying, only 11 potsherds and one uncharacteristic lithic made from Jurassic flint were acquired. The potsherds can be dated to the classic (VBA-HaC) or the younger phase (HaD-LtA) of the LC, and it is assumed that this dates the largest defensive settlement. It is worth noting that in the northern part of the site a few potsherds of the LC were also discovered during the former AZP survey (Frankowicz-Szpunar *et al.* 2006).

Unfortunately, no artefacts were linked with a feature located at the culmination of the hill. An analogous feature, also undated, was recognized in Obrażejowice in the Proszowice district (Wroniecki *et al.* 2016). However, some analogies can be made with LBK settlements (Podborský and Kovárník 2006, fig. 4.2: 1, 8) or others that are known from the Bernburg and Michelsberg cultures and the late (Baalberg) phase of the FBC (*ibidem* fig. 4.4: 3; Gojda 2006, fig. 2.1; 2.2: 3; Šmíd 2017, fig. 21). Alternatively, many defensive structures consisting of multiple parallel ditches have been attributed to the late phase of the L-VC and the W-ZG. This is the case at Mikulin in the Tomaszów district, where multiple ditches have been found (Chmielewski *et al.* 2015), at "Grodzisko" (Sałacińska and Zakościelna 2007) and at Sandomierz-Wzgórze Zawichojskie (Kowalewska-Marszałek 2017). Surrounded by multiplied ditches, a W-ZG settlement was identified also at Podłęże in the Wieliczka district (Nowak *et al.* 2008), and at Pielgrzymowice in the Kraków district (site investigated by M. Kuś).

The last issue is dating the two palisades discovered. They interfere with the LC fortification, as well as with the triple ditch feature. It cannot be ruled out that they represent a settlement of Neolithic communities, like P-MG, which sporadically used to construct palisades (Zakrzowiec in the Wieliczka district; Jarosz *et al.* 2012, fig. 7). They can also be associated with the LC of the early Iron Age in Kraków-Bieżanów 15 site (Przybyła 2017, fig. 11).

3.5. Malkowice, Proszowice district, site 1 (AZP 100-63/6)

The site is located on a promontory adjacent to the eastern side of Grodziska Hill in Malkowice. The eastern slopes of the promontory descend directly to the Vistula valley, and the western slopes descend into Grodziska Hill (Fig. 11-13). The promontory has a tongue shape. The southern slopes are very steep becoming less inclined towards the northern part. The magnetogram revealed two positive linear anomalies (Fig. 11). The first one (Fig. 12: feature 7) runs through the culmination and is extended by two canyons cutting the eastern and western slopes of the promontory. The area of that structure is 3.6 ha. It measures 290 × 190 m.

Another positive linear anomaly (Fig. 12: feature 8) is less readable. It is in the southern part of the promontory, cutting off its final part, which has the steepest slopes. The course of the anomaly is semi-circular. In its northern part, the anomaly reaches the natural canyon that cuts the eastern slope of the promontory. In the southern part it reaches the edge of the river embankment. This ditch is much narrower than the previous one. Its size suggests it is a palisade groove. The area enclosed by the ditch has an area of 1.3 ha and measures 130 × 115 m. Within both ditches, numerous anomalies were identified: positive point anomalies – cavities, and inverted dipole anomalies interpreted as kilns or furnaces (Fig. 11).

During the survey, only 16 artefacts – potsherds and a single flint artefact – were found. They can be dated respectively to the Neolithic period – L-PC (6 potsherds), the Bronze Age and early Iron Age – MC (1 potsherd), LC (6 potsherds), and prehistoric times (3 potsherds).

Diagnostic data was provided by the spatial analysis of the artefacts (Fig. 12). LC artefacts occurred only in the southern part of the promontory, in the area surrounded by palisades (feature 8). In contrast, L-PC artefacts were found on the whole surface of the hill, up to feature 7. Therefore, it can be concluded that the larger structure was built by the population of the unspecified group of the Danubian cycle, most probably P-MG or L-VC.

3.6. Muniaczkowice, Proszowice district, site 1 (AZP 99-59/37)

The site is located on a highly exposed promontory. Its western part is delimited by the Szreniawa valley. The southern and western slopes are relatively steep. The northern one is less inclined. To the east, the promontory connects with the edge of the upland. During investigation, two independent fortification systems, revealed as a structure of positive

linear anomalies, were discovered (Fig. 14-16). The first anomaly is interpreted as a ditch (Fig. 15: feature 1). It cuts off the most exposed portion of the promontory (the western settlement) at its narrowest part. It starts from the Szreniawa valley, then goes north, surrounding the promontory, and then turns east along the northern slope of the hill. The anomaly is not equally well readable everywhere, as it almost disappears at the culmination. This is probably due to strong erosion in this location. Another ditch (Fig. 15: feature 3) runs parallel with the northern part of feature 1 and is possibly another element of the same fortification system. The additional fortifications on the northern slope seems justified by gentle slope, depriving the settlement of its natural defensive qualities.

A second ditch (Fig. 15: feature 2) encloses the eastern settlement, which is located on an elevation within the plateau, above the edge of the Szreniawa valley. In contrast to feature 1, it forms an oval structure. Unfortunately, it was not possible to carry out research on the entire course. The part located east of the modern road, in particular, was almost completely inaccessible to magnetic investigations. Also, the anomaly was not equally well readable throughout its course. The values of the anomaly were relatively low, which may indicate a significant degree of damage to the ditch.

Another ditch is in the middle part of the site (Fig. 15: feature 4). It has a semi-circular course. Its size points to a palisade groove structure. It crosses feature 1. Its arms are directed towards the eastern settlement. This may mean that both features – 2 and 4 – belong to the same fortification system. Magnetic investigations revealed numerous point



Fig. 14. Muniaczkowice, Koniusza district, site 1. Magnetic map in greyscale imposed on a satellite map.
Edited by M. Podsiadło, M. M. Przybyła

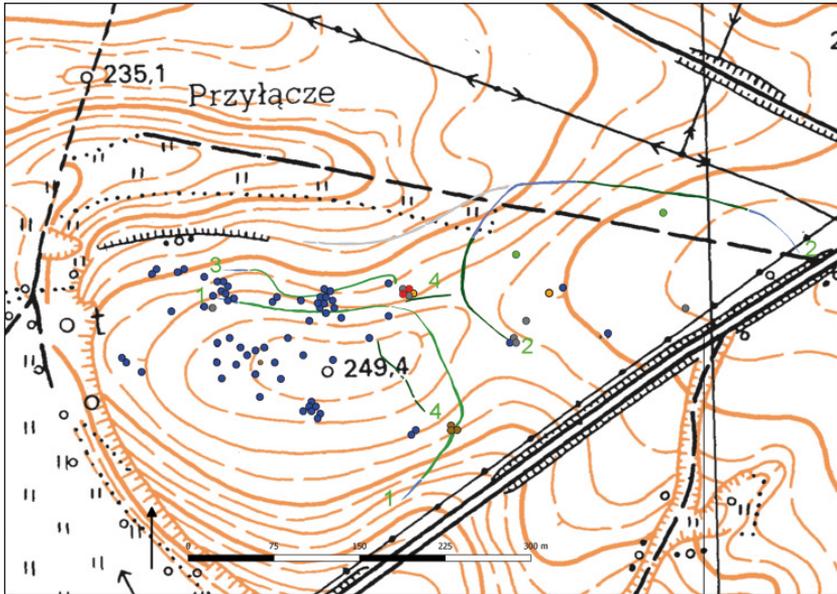


Fig. 15. Muniaczkowice, Koniusza district, site 1. The course of archaeological features on a topographic map: green – archaeological features discovered as magnetic anomalies, blue – archaeological features visible on satellite images. The dots indicate the distribution of artefacts: blue – Funnel Beaker culture, red – Trzciniec culture, green – Mierzanowice culture, yellow – Bronze Age, brown – Lusatian culture, grey – prehistoric times. Drawn by M. Podsiadło, M. M. Przybyła

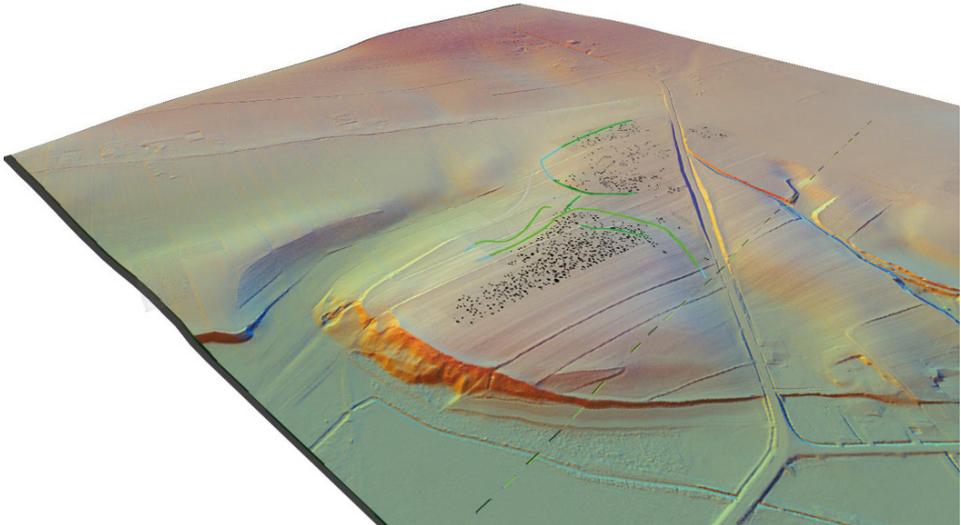


Fig. 16. Muniaczkowice, Koniusza district, site 1. Digital terrain model with course of archaeological features. Drawn by D. Stefański

positive anomalies. They group very clearly within both foundations. In the case of the western settlement, their spatial distribution is chaotic. In the case of the eastern settlement, they seem to be organized into linear systems, possibly connected with buildings constructed with large posts. The western settlement has an area of 7 ha. It stretches along a W-E axis and measures 360 × 220 m. However, the size of the eastern settlement cannot be accurately estimated due to its incomplete identification. If feature 2 surrounds the culmination similarly as in the western part, the area of the eastern settlement should cover an area of about 8 ha, and should measure 400 × 270 m. If ditch 4 is considered to be a part of that settlement, the area could reach 12 ha and could measure 500 × 350 m.

During the survey, numbered artefacts were collected (Fig. 15). In the western settlement, Neolithic artefacts prevailed, including FBC potsherds (59 potsherds) – mostly FB-BC (Bronocice IV-V phase, Włodarczak 2006) – and 4 battle-axes. In addition, a single potsherd of the TC and 4 potsherds of the LC dated to the Bronze Age and early Iron Age periods were found. In the eastern settlement, artefacts were less numerous, and included potsherds and lithics from the FBC (2 potsherds), MC (2 potsherds), TC (3 potsherds), and prehistoric times (5 potsherds). The presence of MC artefacts is noteworthy. One of them is a lenticular axe made of chert. The second is a small potsherd decorated with pseudo-textile imprints, which is characteristic of the Giebułtów group of the MC (Kadrow and Machnik 1997, 116).

Summing up the results of the investigation, the western settlement should be dated to the FB-BC. The eastern settlement may be dated to the Bronze Age, perhaps the TC. Although the TC artefacts were found outside of feature 2 (but within feature 4), other findings support that interpretation. The first argument for this interpretation is the sub-structuring of the complex (features 2 and 4). Similar organization of a TC settlement is documented in Ciborowice, where the fortified centrum of the settlement is extended by two “suburbs” surrounded by palisades. A similar, multipart settlement of the TC is documented in Słonowice (Herbich and Tunia 2009). Alternatively, it is also possible to date it to the late phase of the MC. Defensive settlements of the MC surrounded by an oval ditch were discovered at Sadowie in the Kraków district (unpublished data from an ongoing investigation carried out by M. Przybyła) and at Kraków-Pleszów (Madej 1998). It is also possible that both systems of fortification were not contemporary, but were linked with the FBC. This is the case in Bronocice, where two chronologically different defensive settlements were identified: the first dated to Bronocice phase IV, the second to Bronocice phase V (Kruk and Milisauskas 1999, 173-175).

3.7. Opatkowice Proszowice district, site 2 („Ogrodziska”; AZP 99-60/45)

The site is in the central, most elevated part of the longitudinal hump between the Szreniawa and Ścieklec valleys. It is surrounded by a small, unnamed stream from the north. The site was selected because of its name, “Ogrodziska”, which means “stronghold”.

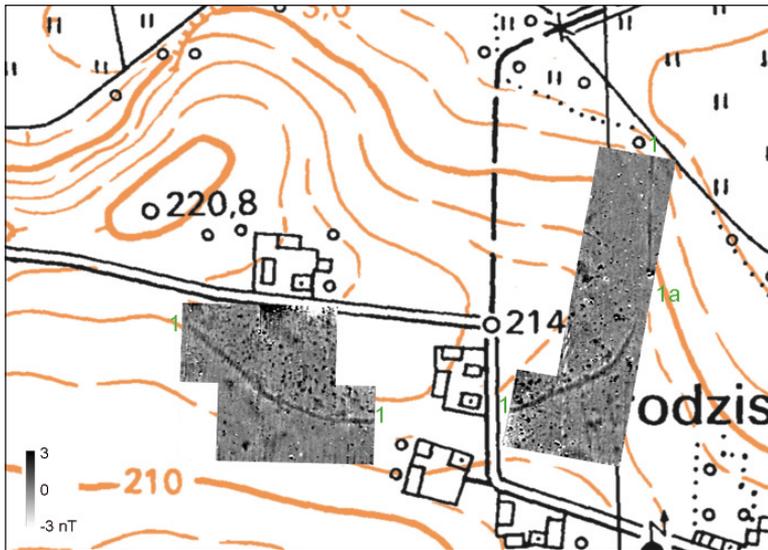


Fig. 17. Opatkowice, Proszowice district, site 2 („Ogrodziska”). Magnetic map in greyscale imposed on a topographic map. The green numbers indicate anomalies discussed in the text.
 Drawn by M. Podsiadło, M. M. Przybyła

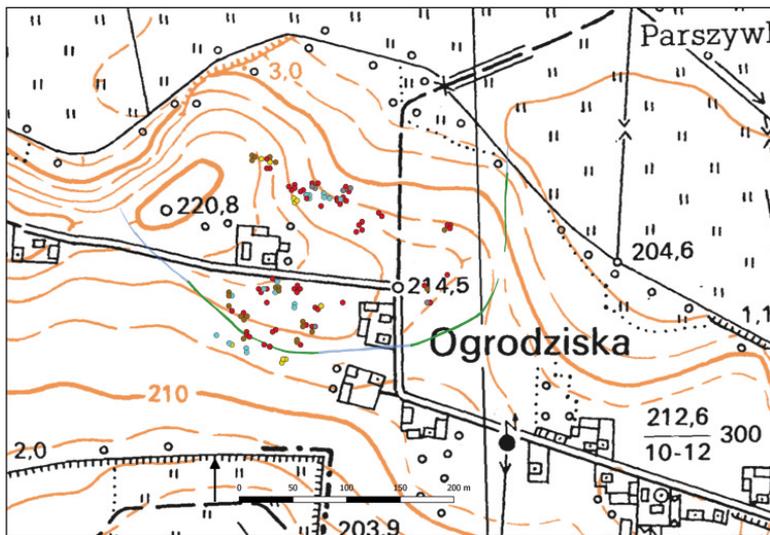


Fig. 18. Opatkowice, Proszowice district, site 2 („Ogrodziska”). The course of archaeological features on a topographic map: green – archaeological features discovered as magnetic anomalies, blue – archaeological features visible on satellite images. The dots indicate the distribution of artefacts: blue – Neolithic, red – Trzciniec culture, yellow – Bronze Age, brown – Lusatian culture, grey – prehistoric times.
 Drawn by M. Podsiadło, M. M. Przybyła

The analysis of satellite images revealed clearly visible soil markers, indicating the presence of a ditch surrounding the south and east elevation on which the settlement was placed. As a result of the magnetic investigations, a linear anomaly (Fig. 17: feature 1) and numerous point positive anomalies were discovered. Most of the archaeological features grouped within the area are surrounded by a ditch, which supports the thesis of their contemporaneity. Despite the relatively small range of magnetic tests, the entire establishment was successfully identified. The southern, southeastern and southwestern sides were enclosed by a single ditch. A gap in the eastern part of its course (feature 1a) may indicate an entrance to the settlement. The northern, northeastern and northwestern sides were protected by a stream. The settlement in Ogradziska has an exceptional predominant northern exposure, unfavourable from the point of view of insolation. Probably the natural defensive property of the place was its only advantage. The area of the settlement is 7.5 ha, and it measures 340 × 280 m (Fig. 17-19).

During the survey, 114 potsherds were acquired. They represent, respectively, the Neolithic period – probably the FBC (19 potsherds); the Bronze Age – the classic phase of the TC (46 potsherds), the LC (26 potsherds), and 13 potsherds of unspecified attribution; and prehistoric times (10 potsherds). Spatial analysis (Fig. 18) shows that the TC potsherds,

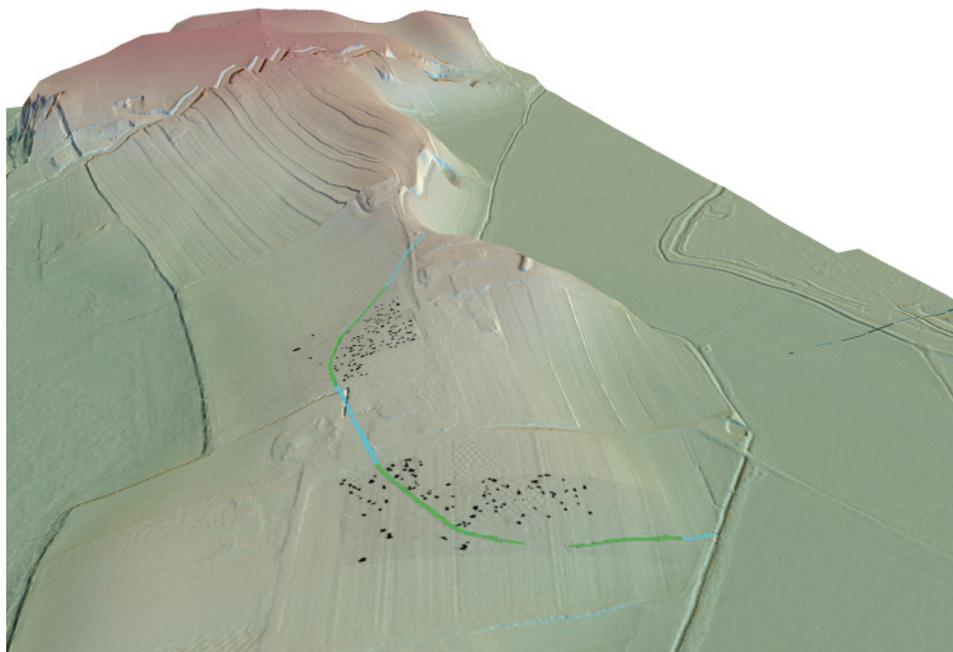


Fig. 19. Opatkowice, Proszowice district, site 2 („Ogradziska”). Digital terrain model with course of archaeological features (vertical scale x5). Drawn by D. Stefański

unlike the LC and FBC artefacts, were concentrated within the fortifications. In addition, a certain amount of TC potsherds come exactly from the neighbourhood of the ditch. This allows us to date the defensive settlement on the Ogrodziska hill to the classic phase of the TC.

It is also worth noting that about 300 m to the west of the area being investigated archaeological features of the MC and TC were discovered (Górski 2001).

3.8. Opatkowice, Proszowice district, site 3 (AZP 99-60/46)

The site is located at the southern end of a vast promontory at the junction of the Szreniawa and Ścieklec valleys (Fig. 20-21). From the west side, it is flooded by water from the Ścieklec river. Analysis of satellite images revealed the existence of soil markers that could potentially be interpreted as ditches. Magnetic studies confirmed the presence of two linear anomalies (Fig. 20: features 1 and 2). Unfortunately, they were poorly readable. This is probably the result of significant land erosion and the presence of modern infrastructure, generating interference. However, similarly to the previously discussed case at

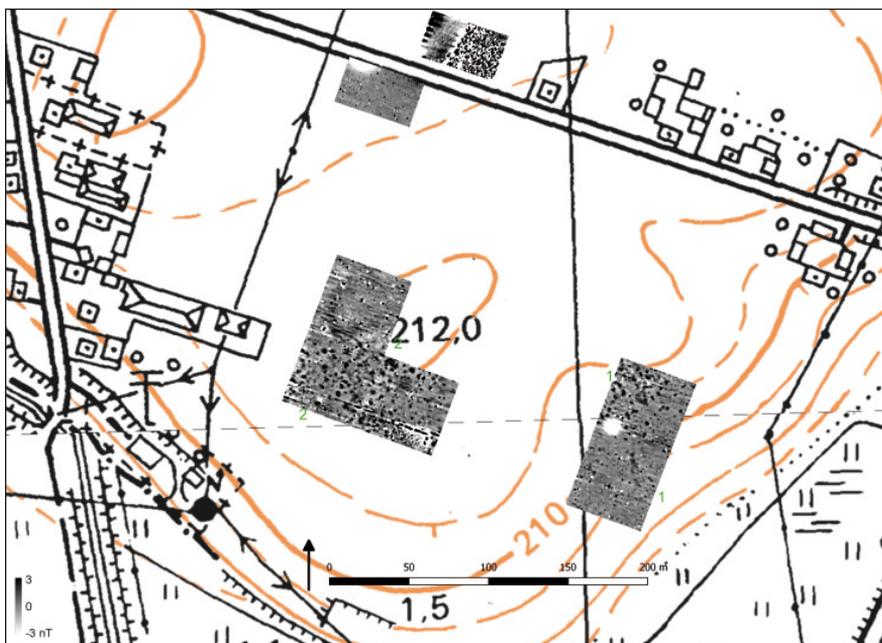


Fig. 20. Opatkowice, Proszowice district, site 3. Magnetic map in greyscale imposed on a topographic map. The green numbers indicate anomalies discussed in the text. Drawn by M. Podsiadło, M. M. Przybyła



Fig. 21. Opatkowice, Proszowice district, site 3. Digital terrain model with course of archaeological features (vertical scale x5). Drawn by D. Stefański

Biskupice, it can be reconstructed as a defensive settlement, fortified by a single ditch with a horseshoe course. The approximate area of the settlement is 4-5 ha. The survey found only 17 artefacts. They can be dated to the Neolithic – probably FBC (5 potsherds); the Bronze Age – TC (6 potsherds), LC (1 potsherd); and prehistoric times.

3.9. Przesławice, Proszowice district, site 3 (AZP 99-59/27)

The site is located at the eastern end of the hilly upland extending along the southern edge of the Szreniawa valley. Analysis of satellite images revealed two systems of well-readable ditches adjacent to each other. These ditches were additionally documented by aerial photographs taken by Piotr Wroniecki in 2015-2016 (P. Wroniecki personal communication). Both features were almost entirely examined by magnetic methods (Fig. 22). The western linear anomaly (Fig. 23: feature 1) is interpreted as a ditch. It is very well readable on most of its course, except for the southeastern section, where it is probably eroded. The ditch forms an oval and surrounds the culmination of the terrain (Fig. 24). It is possible to identify 5 clearly visible gaps, of several meters each, which are interpreted as the entrances to the complex. A further two such elements can probably be identified in the poorly readable, southeastern part of the anomaly. Inside the foundation, there is another, very weak linear anomaly, interpreted as a ditch (Fig. 23: feature 2), running parallel to feature 1. Although its creation by natural processes cannot be excluded, it seems rather as an element of the fortification (shallower ditch?). Within the settlement, but also beyond its borders, numerous anomalies interpreted as archaeological features have been discovered. The settlement covers an area of 3.2 ha and it measures 280 × 160 m.



Fig. 22. Przesławice, Koniusza district, site 3. Magnetic map in greyscale imposed on a satellite map. Edited by M. Podsiadło, M. M. Przybyła

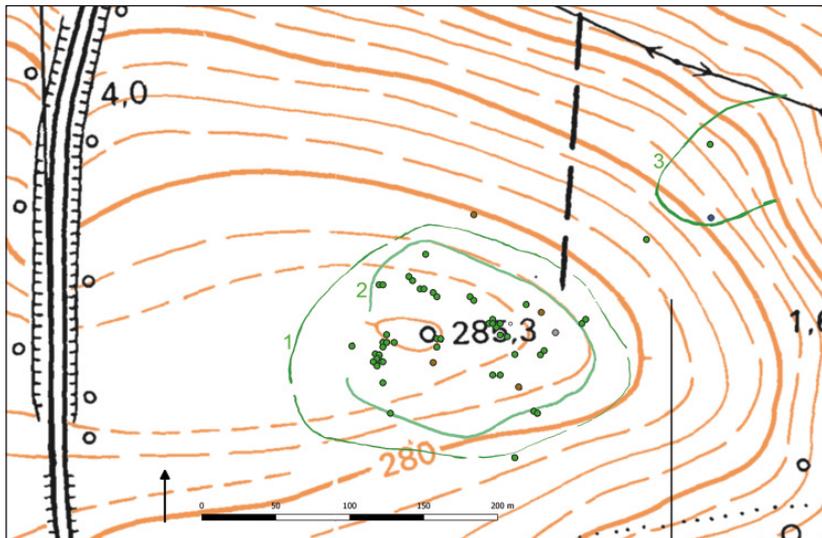


Fig. 23. Przesławice, Koniusza district, site 3. The course of archaeological features marked on a topographic map. The green numbers indicate anomalies discussed in the text. The dots indicate the distribution of artefacts: green – Lublin-Volhynian culture, brown – Lusatian culture, grey – prehistoric times, blue – late Middle Ages. Drawn by M. Podsiadło, M. M. Przybyła



Fig. 24. Przestawice, Koniusza district, site 3. Digital terrain model with course of archaeological features. Drawn by D. Stefański

The second foundation is marked by a linear anomaly interpreted as a ditch (Fig. 23: feature 3). Its location rather is unusual. It is in the middle part of the northeastern slope. There are no archaeological features within it.

During the survey, 32 potsherds of L-VC were discovered. The collection also includes a fragment of a stone axe, 2 potsherds from the LC and a fragment of late medieval ceramics. Almost all finds come from the area of the western settlement (Fig. 23), which allows it to be linked with the L-VC. Feature 3 is an atypical, rather non-residential construction. A single fragment of medieval ceramics, which was found in its neighbourhood, may link it with the Middle Ages.

3.10. Włostowice, Proszowice district, site 5 (AZP 100-62/44)

The site is situated on a very wide promontory over the northern side of the Szreniawa floodplain. The results of a magnetic investigation are incomplete, but the investigation revealed an interesting structure (Fig. 25). At the spot of a visible soil marker, a linear anomaly was found (Fig. 26: feature 1). Its character is, however, unclear. It has illegible boundaries and variable values on the magnetogram. It cannot be ruled out that it is of natural origin. On the other hand, its course, which leads across the base of the promontory and through the culmination of the area, points to a defensive function. This observation is supported by a very intense cluster of positive point anomalies interpreted as archaeological features in the central part of the promontory. Among them, one can distinguish a regular, rectangular structure measuring 40×7 m. (Fig. 26: feature 4). It is oriented approximately along a north-south axis. This structure can be interpreted with great

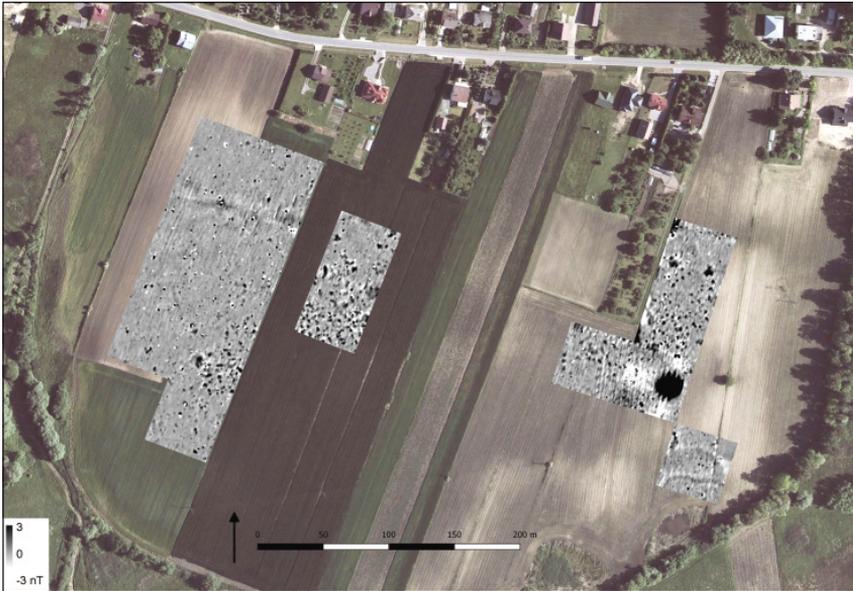


Fig. 25. Włostowice, Koszyce district, site 5. Magnetic map in greyscale imposed on the satellite map. Edited by M. Podsiadło, M. M. Przybyła

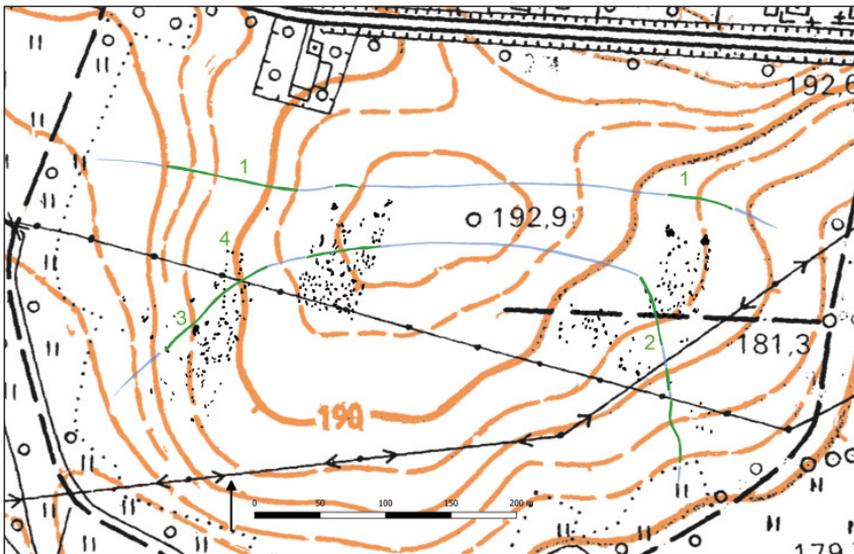


Fig. 26. Włostowice, Koszyce district, site 5. The course of archaeological features on a topographic map: green – archaeological features discovered as magnetic anomalies, blue – archaeological features visible on satellite images. Drawn by M. Podsiadło, M. M. Przybyła

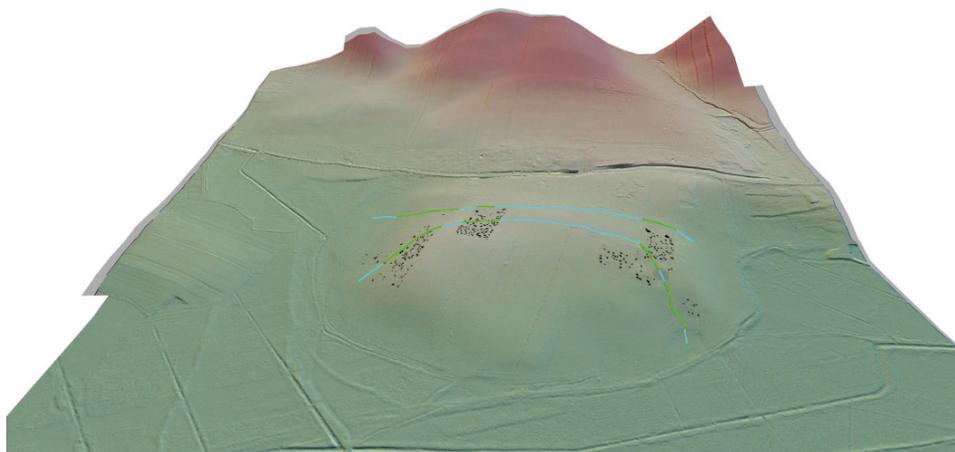


Fig. 27. Włostowice in the Koszyce district, site 5. Digital terrain model with course of archaeological features (vertical scale x5). Drawn by D. Stefański

certainty as a longhouse of the LBK, as it corresponds to the size, shape and orientation of large residential buildings of this cultural phenomenon known from Małopolska (Czekaj-Zastawny 2008, 39-42). Along the western border of the archaeological features runs another, very poorly readable, linear anomaly (Fig. 26: feature 3), which clearly cuts through the LBK longhouse. At the location of the soil marker there is another, very weak, linear anomaly visible (Fig. 26: feature 2). Unfortunately, it is located near a high voltage pole, which is a source of very strong disturbances. Additionally, its northern course was not investigated due to the presence of contemporary infrastructure.

Over the course of the survey, 107 artefacts, mostly potsherds, were acquired. They represent, respectively, the Neolithic period – 30 potsherds and a stone adze from the LBK, 21 other Neolithic potsherds (most probably FBC); the Bronze Age – TC (5 potsherds), LC (8 potsherds), unspecified (7 potsherds); and 11 potsherds dated to the younger pre-Roman period.

In conclusion, it should be stated that relics of multi-phase prehistoric settlement were recognized at the site (Fig. 27). The oldest LBK settlement was located in the central and western part of the promontory. Features 2 and 3 could be linked with the hypothetical fortification of the FBC settlement. That settlement covers about 6-7 ha, and measures 270 × 450 m. Settlements of the TC, LC and the younger pre-Roman period were recognized in the central and eastern part of the promontory. The character and chronology of feature 1 remain unknown. This ditch cuts off the entire area of the promontory, cutting into the bottom of the valley. It covers an area of about 15 ha and measures 560 × 300 m. Taking into account formal similarities, this structure may also be related to the FBC or alternatively to the TC.

4. THE CHRONOLOGY

The discovered defensive settlements can be grouped into three clearly defined, chronologically and culturally compacted horizons. It could be argued that these horizons also reflect other fortified prehistoric sites in western Małopolska. The exception to this rule is the defensive settlements of the LC, which appear to be continuous through the almost 1000 years of existence of that cultural phenomenon.

4.1. The late Lengyel-Polgár cycle horizon

In Małopolska, the late L-PC horizon includes W-ZG and the late, and perhaps classic phase of L-VC. It could be dated between 4100-3800 BC. The first of those entities is dated to 4300-3800 / 3750 BC (Nowak 2014, 252); however, the only published defensive settlement in Podłęże is relatively late, and its chronology was established at the beginning of the fourth millennium BC (Nowak *et al.* 2008, 103). In the case of the L-VC, according to the chronological framework proposed by A. Zakościelna (2006, 90), this period would correspond to phase II (i.e. classic phase: 4200/4000-3800 BC) and phase III (i.e. late phase: 3800-3400 BC). In another view, the chronology of phase III is set to the period between 4000-3800 BC (Chmielewski 2008). This range could be supported by the chronologies of the burial from Książnice (4050-3940 BC), the graves from the defensive settlement in Złota-Grodzisko (Wilk 2016, 21-22) and also the defensive settlements in Sandomierz-Wzgórze Zawichojskie (4026-3956 BC, Włodarczak 2017, 97) and in Bronocice (3913-3758 BC, Kruk *et al.* 2018, 70).

That horizon also relates to numerous other well-recognized defensive structures from Małopolska (Fig. 28). This is the case for the intensively excavated sites of the L-VC at Złota in the Sandomierz district (Sałacińska and Zakościelna 2007), at Sandomierz-Wzgórze Zawichojskie (Kowalewska-Marszałek 2017), at Bronocice in the Pińczów district (Kruk and Milisauskas 1981, 73), and of the W-ZG at Podłęże in the Wieliczka district (Nowak *et al.* 2008) and Pielgrzymowice in the Kraków district. This horizon also includes several new finds of the L-VC in eastern Małopolska, which were recognized during ongoing, mostly non-invasive research like Mikulin (Chmielewski *et al.* 2015). Finally, there is a certain number of ambiguously dated, poorly recognized sites known from archival research that can also be linked with this horizon (Nowak 2009, 172-173).

The new finds of the L-VC settlements in Biskupice and Przesławice (and probably also in Siedliska), recognized in the course of this project, provide more evidence to support a conclusion. Both of them are the most westerly located defensive settlements of the L-VC and among the most western settlements of the entire culture. The presence of these sites seems to be evidence of tension in inter-group relations and is caused, as the authors assume, by the westward movement of L-VC settlement in their late phase, and by their increasing control of loess areas in western Małopolska (Zakościelna 2006, 84).

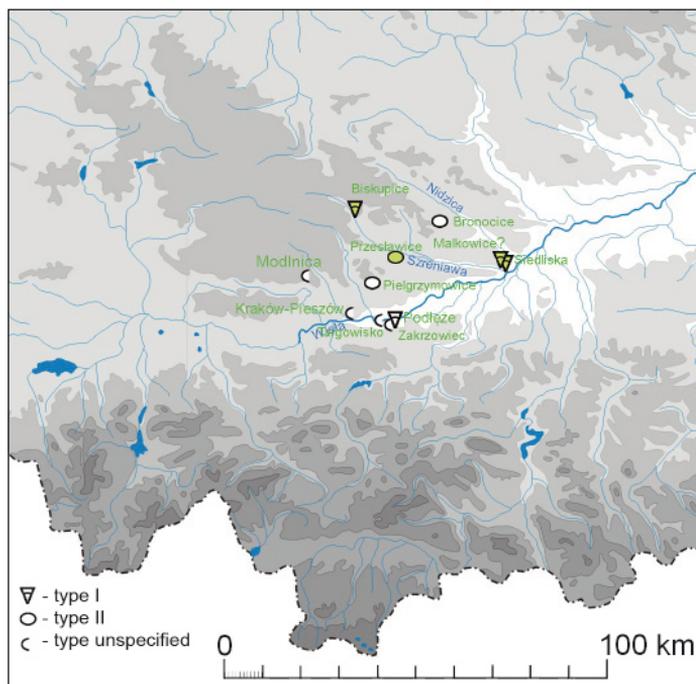


Fig. 28. The western part of Małopolska. Location of defensive settlements from Pleszów-Modlnica group, Lublin-Volhynian culture and Wyciąże-Złotniki group, yellow – sites discovered during the research.

Drawn by M. M. Przybyła

A separate topic is the presence of fortified settlements in the context of P-MG. They are represented by ditches and palisades discovered at Zakrzowiec in the Wieliczka district (Jarosz *et al.* 2012, fig. 7), Kraków-Pleszów (Godłowska 1976, 51), Modlnica in the Kraków district (Żurowski 1933) and probably at Targowisko in the Wieliczka district (Nowak 2009, 173). The P-MG communities were developing in the second half of the 5th millennium BC (Kaczanowska 2006, 52), which implies a possible overlap with the discussed phenomenon. In this light, the Siedliska site, which was investigated during the project and could be associated with the P-MG, may support such a hypothesis.

4.2. The Funnel Beaker-Baden culture horizon

At the end of the fourth millennium BC, in western Małopolska, important transformations of the settlement network took place. The existing FBC structure south of the Szreniawa River was disintegrated and replaced by the settlement of the allochthonous BC. North of the river, the development of the FBC still continued, strongly influenced by the Baden

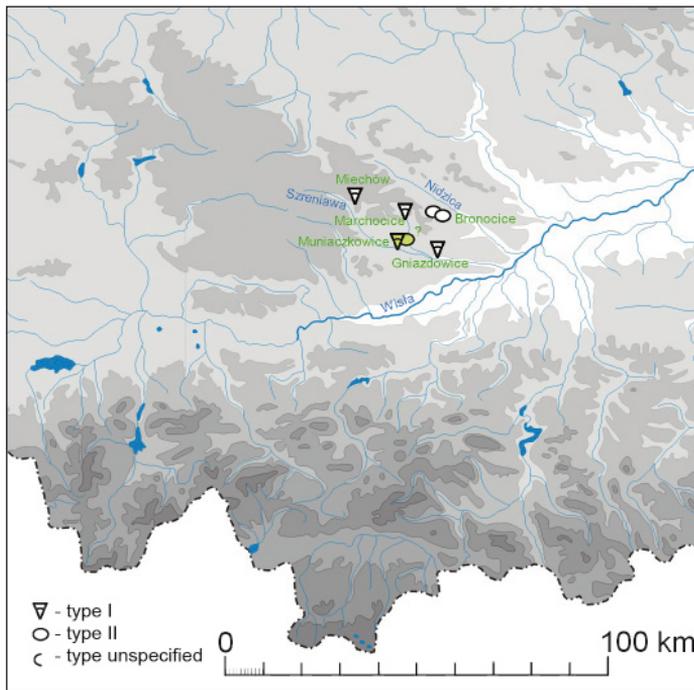


Fig. 29. The western part of Małopolska. Location of defensive settlements of Funnel Beaker-Baden culture. Yellow color – sites discovered during the Szeniawa valley survey. Drawn by M. M. Przybyła

culture, leading to the specific form of the syncretic FB-BC (Kruk and Milisauskas 1999, 174; Zastawny 2008). This stage corresponds to the period of reduction and concentration of settlements. The previous stage – “central places period” or the classic phase – were characterized by numerous large settlements surrounded by a network of satellite sites. During the period of reduction and concentration, only a few, but very extensive, central settlements remained active, surrounded by smaller sites (Kruk and Milisauskas 1999, 135, 174). In contrast to the previously discussed settlements of the L-PC horizon, the defensive sites of the FB-BC phase are relatively less numerous, and are territorially restricted to the Nidzica basin and the northern part of the Szeniawa basin. The chronology of that horizon is based on radiocarbon and stylistic dating of the Bronocice settlement in the Pińczów district, where the two youngest phases, i.e. BR IV and BR V (Kruk and Milisauskas 1983, 272), are connected with the FB-BC. In both phases ditches appeared, although their function in phase IV is debatable (Kruk and Milisauskas 1999, 175). Radiocarbon dates obtained for both phases set the ranges in 3350/3300 – 3200-3100 BC for BR IV and 3150/3100-2900-2800 BC for BR V (Kruk *et al.* 2018, 77). It allows the framing of the entire horizon between 3300-2800 BC. Apart from the settle-

ment at Bronocice, only three other sites belong to this horizon (Fig. 29). Two of them were investigated almost exclusively by non-invasive methods. This is the case for Gniazdowice in the Proszowice district (Przybyła *et al.* 2015), which is also located in the Szreniawa valley, and also for Marchocice in the Miechów district in the Ścieklec valley – the northern tributary of the Szreniawa (Dulęba *et al.* 2015), which according to the authors of this paper can be linked with the FBC. Another site is at Miechów in the Miechówka valley, which is also a tributary of the Szreniawa River (the site investigated by K. Peschel, A. Buszek, G. Pryc, M. Przybyła and I. Pieńkos). The western, and possibly also the eastern settlement at Muniaczkowice, which were tested during the project, significantly add to that list.

4.3. The Mierzanowice and Trzciniec cultures horizon

This horizon relates to two cultural units (Fig. 30) of different traditions, which were chronologically overlapping between 1800-1650 BC in the Małopolska loess area (Kadrow and Górski 2003, 94). The chronological framework for the horizon should be set between

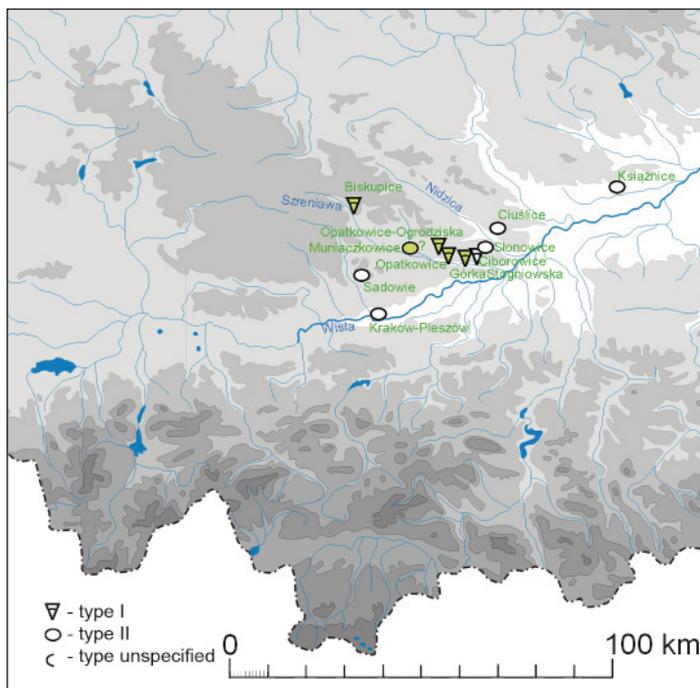


Fig. 30. The western part of Małopolska. Location of defensive settlements of Mierzanowice culture and Trzciniec culture. Yellow color – sites discovered during the Szreniawa valley survey. Drawn by M. M. Przybyła

2000-1400 BC. This corresponds to the A2 and B periods of the Bronze Age (*ibidem*, fig. 38). The oldest Mierzanowice culture defensive settlement in Książnice is dated to the early or the classic phase (Wilk 2014). The settlement of the Pleszów group of the MC in Trzcinica (Gancarski 1999a), which dates from 2100-2000 BC (Gancarski 1999b, 150), seems to occupy a similar position in the chronology. The younger defensive settlements are dated to the late phase of MC, that is, the period between 1800-1600 BC. This is the case for the eponymous site of the Pleszów group in Kraków-Pleszów (Madej 1998), and for Sadowie in the Kraków district (unpublished materials). One should also mention the site at Wojciechowice in the Opatów district, which was tested only by a small trench (Bąbel 2013, 42). Besides the defensive structures, ditches of unclear function are also known from Iwanowice in the Kraków district (Kadrow 1991, 25).

In the case of the Trzciniec culture, this horizon includes sites dated to its classic phase, which is its oldest phase recognized in western Małopolska. Worth mentioning is a huge settlement of over 20 hectares at Słonowice in the Kazimierza Wielka district (Herbich and Tunia 2009). A defensive ditch was also recognized at Samborzec in the Sandomierz district (Kamieńska 1966, 324-325, fig. 2). This is also the case for Ciuślice in the Kazimierza Wielka district, where a non-invasive investigation revealed a large foundation (Wroniecki *et al.* 2016), and for Ciborowice in the Proszowice district. During this project in the Szreniawa valley, another four sites were discovered: Kępa, Górka Stogniowska, Opatkowice-Ogrodziska and Biskupice. Possible traces of fortifications of the TC were also found at site 3 in Opatkowice. It could also be argued that the eastern settlement in Muniaczkowice may be associated with the discussed horizon.

The TC defensive settlements are remarkable for their size and for their dense patterning. On a short twenty-kilometre-long final section of the Szreniawa valley, at least 4 defensive settlements were discovered (Opatkowice-Ogrodziska, Górka Stogniowska and Ciborowice, and probably also in Opatkowice 3), spaced 2 to 4 km apart. The analysis of artefacts proves that they developed simultaneously in the classic phase of the TC. It seems that at least in the case of western Małopolska, defensive settlements were a common, and perhaps even the dominant, element of the settlement network of the TC.

4.4. The Lusatian culture

In the case of the defensive settlements of the Lusatian culture, it is not possible to assign a precise chronological horizon. In western Małopolska, they can be dated from the III period of the Bronze Age to the early La Tène Period (Fig. 31). The oldest fortified site was discovered in Wieliczka district Wieliczka, where the artefacts from the III BA were accompanied by a dagger dated to II BA (Fraś and Reguła 2001). Another site dated to III BA is known from Targowisko, Wieliczka district (Konieczny 2014, 113). Ditches are also known from the early phase of the Witów site, dated to III and IV BA (Bochnak 2004, 129, fig. 59; Gawlik and Godlewski 2010). A system of ditches, dated to IV-V BA,

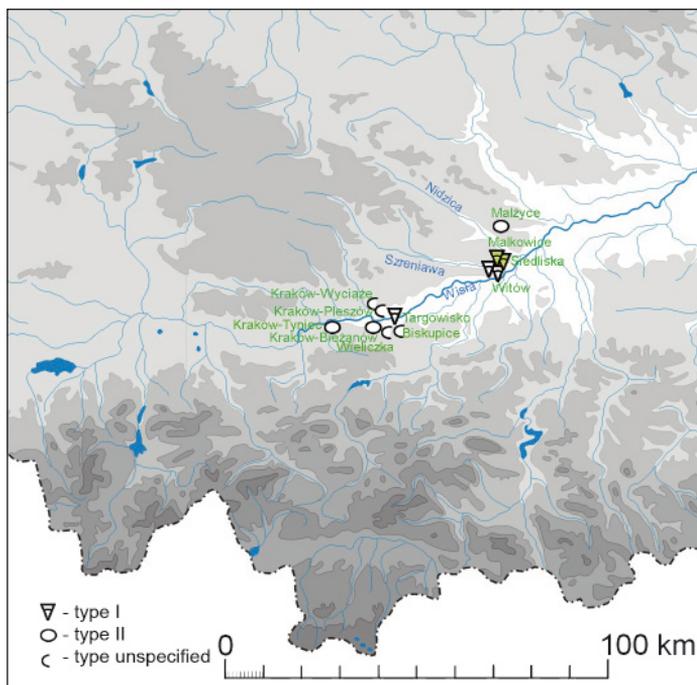


Fig. 31. The western part of Małopolska. Location of defensive settlements of Lusatian culture. Yellow color – sites discovered during the Szreniawa valley survey. Drawn by M. M. Przybyła

was found at Kraków-Pleszów (Kogus 1982, 336-339, fig. 1). Similar fortifications are also mentioned from Kraków-Wyciąże (Buratyński 1953, fig. 2). A circular palisade found at Kraków-Bieżanów (Przybyła 2017, 382) could be dated to the early Iron Age (HaC-D period). Non-invasive investigations carried out on a large fortified settlement at Malzyce, Kazimierza Wielka district, suggest the V BA-HaC period (Wroniecki 2016, 28). The youngest phase is marked by fortified settlements at Kraków-Tynec and at Biskupice in the Wieliczka district, dated to the turn of the Hallstatt and La Tène periods (Gedl 1982, 27-29).

For this project, the most interesting LC settlement is the one from Witów, dated to the late Bronze Age and the Hallstatt period (Gawlik and Godlewski 2010, 333). This site seems to be a complementary site to Malkowice and Siedliska. The settlement in Witów is located on a conspicuous promontory at the south end of the Szreniawa valley *vis-à-vis* the Malkowice-Siedliska complex. The close proximity of these contemporaneous sites at this particular location suggests a complex fortified infrastructure, which seems to have controlled a strategically important place at the junction of the Szreniawa and Vistula Rivers.

5. SUMMARISING

The research confirms the thesis that the Szreniewa valley is an area of intense prehistoric settlement, which frequently included defensive settlements. Summing up previous results (Gniazdowice, Ciborowice and Witów) with the current investigation, the number of defensive settlements reaches 20, which is an exceptional record in Poland. The authors are convinced that the continuation of this work would allow the discovery of at least several other such sites. It may be argued that the many defensive features in the Szreniawa valley do not result from the unique character of the discussed region, but from systematic examination. Therefore, similar results could be achieved by investigating other loess areas of southern Poland. These new findings allow us to rethink the social and political organization of the cultural units in question. The construction of monumental fortifications, consisting of ditches, ramparts and palisades enclosing an area of several or even several dozen hectares, undoubtedly requires complex organization of work, perhaps even the existence of developed hierarchical structures. The construction of fortified settlements can also be a confirmation of the existence of political tensions or a different kind of crisis, for example increased competition over access to the exploitation of natural resources. It is striking that the appearance of defensive settlements took place during periods of cultural, and probably also political and ethnic change. Such is the case of the defensive settlements of the L-VC, which appeared in the period of its migration to, and settlement of the western part of the Małopolska loess area, and at the time of the emergence of the early stage of the FBC in the region. The horizon of fortified settlements of the FB-BC can be correlated with the appearance of the Transcarpathian Baden culture in the western part of Małopolska. It ends with the appearance of a nomadic population represented by the CWC (Kruk *et al.* 2018, 78). Defensive settlements in the MC-TC horizon could have had a “confrontational” character. They can be correlated with the disappearance of indigenous settlement of the MC and the emergence and development of the allochthonous TC, which came probably from central Poland.

Analysing the preferred landforms and the shapes of fortifications, one can indicate the basic types of defensive settlements in western Małopolska.

Type 1 – settlements in naturally defensive places, usually on triangular promontories flanked on two sides by a river bank, riverbed, or by natural moats, like the marshy bottom of a river valley. The fortifications consist of one or several (2-3 parallel) ditches, or palisades that usually cut off the head of the promontory. These were built using naturally suitable landforms – the largest sparring of a promontory (e.g., the western settlement in Muniaczkowice) or natural ravines and erosion cuts (e.g., Malkowice and Siedliska). This type of settlement was recognized at Biskupice, Górka Stogniowska, Malkowice and Siedliska, the western settlement in Muniaczkowice, Opatkowice-Ogrodziska, and hypothetical settlements in Opatkowice and Włostowice. These have analogies in other settle-

ments known from western Małopolska like Targowisko, Marchocice, Witów (both stages), Obrażejowice and Gniazdowice.

Type 2 – settlements established on exposed hills or slopes, provided with circular, all-round ditches, without the use of natural elements. This is the less common type of defensive architecture. It includes the eastern settlement in Muniaczkowice and in Przesławice. These have analogies in other settlements known from western Małopolska like Słonowice, Kraków-Bieżanów, Malżyce, Pielgrzymowice and Sadowie.

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