Geological Quarterly, 2025, 69, 21
DOI: https://doi.org/10.7306/gq.1794

Archaeological and geomorphological research into a hillfort in the Jasło Foothills (SE Poland): constraining the origin and age of the earthen ramparts

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Pasterkiewicz, W., Gębica, P., Sobucki, M., 2025. Archaeological and geomorphological research into a hillfort in the Jasło Foothills (SE Poland): constraining the origin and age of the earthen ramparts. Geological Quarterly, 69, 21; https://doi.org/10.7306/gq.1794

Associate Editor: Wojciech Granoszewski

Archaeological and geomorphological research was carried out in the area of a presumed hillfort in Wietrzno-Wola Albinowska, Krosno district, to determine the origin and nature of the earthen ramparts visible at the surface and to describe the changes they have undergone over the past centuries. The oval fortifications have dimensions of 420 x 460 m and an area of >16 ha. The NW section of the hillfort was examined using two trial excavations. Relics of the fortification take the form of a partially preserved earthen rampart, damaged by subsequent geomorphological processes and agricultural activities. The characteristics of the sediments building the earthen rampart show that these are of anthropogenic origin. The hillfort in Wietrzno, due to its form, size and settlement context, can be associated with the Late Bronze Age to Early Iron Age interval.

Key words: earthen ramparts, grain size analysis, the late Bronze Age/early Iron Age, Carpathians.

INTRODUCTION

Archaeological research supplemented by geomorphological studies in the eastern part of the Polish Carpathians (the Jasło-Sanok Depression) has a relatively short history. The first studies date back to the end of the last century and focused on Neolithic barrows located in the Warzyce Ridge, including their lithostratigraphic characteristics, and the natural geomorphological processes observed on their earthen mounds (Komornicki et al., 1990). Interdisciplinary studies, combining archaeological, geomorphological and palaeobotanical research, have reconstructed changes in terrain morphology, vegetation and soil cover in the Low Beskid, that occurred during periods of prehistoric settlement, primarily as a result of human activity (Szczepanek, 1987, 2001). These studies also encompassed rock raw material deposits and their influence on the location of flint workshops (Koszarski, 2001). Geomorphological studies combined with geophysical analysis have also been used to explain the origin of earthen mounds in the area of Dukla and Wietrzno (Gębica et al., 2021).

In 2021, excavations and geomorphological studies were carried out at site no. 23 in Wietrzno-Wola Albinowska, in the Jasło Foothills (Krosno district). The site is located in the northern part of the village of Wietrzno, in the Wola Albinowska hamlet (previously known as Wola Obrwinowa; Historical-Geographical Dictionary of Polish lands in the Middle Ages). The first mentions of the village appear at the end of the 14th century and concern its establishment under Magdeburg law (Sarna, 1898).

The main aim of the research was to identify the origin and nature of earthen fortifications within the area of the presumed hillfort, to establish their anthropogenic origin, and to describe the changes they underwent over the past centuries. Regarding the conservation inventory, site no. 23 (area AZP 112-73/86) is designated as a settlement trace from the Bronze Age (Ginalski and Muzyczuk, 1991). Therefore, one of the goals was to constrain the age of the embankments (ramparts) of the hillfort.

RESEARCH METHODS

ARCHAEOLOGICAL RESEARCH

Archaeological research was conducted according to the methodology established for this type of site (see Możdzioch, 2019; Misiuk et al., 2020). Excavation trenches were designed

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Received: January 27, 2025; accepted: June 17, 2025; first published online: August 4, 2025

perpendicular to the course of the hillfort fortifications, in order to encompass not only the rampart but also the zone at its foot. Exploration of layers was carried out manually every 20 cm. Moveable artefacts (ceramics) and samples were located three-dimensionally within each exploration unit. Trench exploration was carried out until reaching the subsoil, i.e., the natural layers that did not contain or cover anthropogenic remains. Field studies were supplemented by an analysis of landforms using available historical maps from the late 18th century (Austrian 1:28,800 from 1861–1864, 1869–1887, and 1:2,880 from 1851; topographic maps 1:10,000 from 1965) as well as aerial photographs taken in 1944 (scale 1:16,000) and orthophotomaps from 2003.

GEOMORPHOLOGICAL RESEARCH

The geomorphological analysis of landforms within the archaeological site and its immediate vicinity were performed. Its basis was to determine the morphometric parameters of the forms (shape, height, width, slope, depth of cut, etc.), to define their genesis (natural forms, shaped by natural geomorphological processes of erosion and accumulation; and anthropogenic forms, resulting from human activities), as well as to constrain the age of the forms. The analysis also included a lithological description of the deposits exposed in two trenches through the earthen rampart and their genetic interpretation. Macroscopic analysis of the sediments included grain size analysis was performed using a Malvern Mastersizer 3000 laser diffraction particle size analyser. The classification of rock fragment sizes according to Udden (1914) and Wentworth (1922) in the modification by Urbaniak-Biernacka (1975) was used. Statistical parameters of grain size in the phi scale according to Folk and Ward (1957) were also calculated: mean grain diameter (Mz), sorting ($_1$), skewness (Sk_1), and kurtosis (KG), using the Gradistat 5.11 PL beta program for calculations. In addition to sediment grain size, the amount of calcium carbonate was measured using a Scheibler apparatus, while the content of carbon (and therefore subsequently organic matter) was determined with a VarioMicro Cube CHN elemental analyzer.

RADIOCARBON DATING

Two samples of charcoal discovered in excavation trench no. 1 and 2 were radiocarbon dated, at the Absolute Dating Laboratory in Skała near Kraków. Radiocarbon data calibration and statistical modelling were performed using the *OxCal v.4.4.4* program, using the *INTCAL20* calibration curve (Reimer et al., 2020). The calendar years provided in the paper include a standard probability distribution of 68.2% (Millard, 2014).

LOCATION OF THE SITE

The study area is located on the southern edge of the Jasło-Sanok Depression within the Outer Flysch Carpathians (Fig. 1; Starkel, 1972a, b, 2001). Geomorphologically, it constitutes the southern part of the Jasło Foothills, divided here into the Faliszówka Plateau (or Kobylany) and the Pachanowa Ridge to the south (Gilewska, 1986). It borders the Jasło Basin to the west and the Targowiska Hills to the east. The characteristic features of landforms in this region are flattened parallel ridges intersected by parallel valleys belonging to the catchment area of the Jasiołka and Łęcki Potok rivers (a right tributary of the Iwielka River; Chowaniec et al., 2002a, b). The altitudes range from 534 m a.s.l. (in the vicinity of Franków Hill in Nadole) to ~290 m a.s.l. near the villages of Makowiska and Sośniny. The highest elevations on the Kobylany Plateau are Dzwonnicka (407 m a.s.l.), Dział (413 m a.s.l.), Grodzisko (426 m a.s.l.), and the highest peak, Franków (534 m a.s.l.). The elevation differences (denivelations) in the area average 50-90 m, with maxima reaching up to 150 m.

Geologically, the area discussed is located within the Silesian unit (the southern part of the Iwonicz-Zdrój-Draganowa folds) dated to the Cretaceous (Fig. 2; Świdziński, 1953; Jankowski and Kopciowski, 2006, 2014). The dominant rock formations are the lower Krosno Beds (sandstones and shales) of the Paleogene. In addition, in the hilly plateau areas, there are the Inoceramian Beds (Cretaceous-Paleogene), the Menilite Beds and transitional beds, as well as the Hieroglyphic Beds (shales and sandstones), the Magura Beds, the Ciężkowice sandstones and the Mszanka sandstones (all Paleogene in age). The flysch formations are overlain by Quaternary weathered clays containing sandstone clasts, 1–3 m thick. The Jasiołka, Wisłoka, and other smaller stream valleys are filled with Quaternary alluvial deposits consisting of gravels with a mixture of sands, with the upper part built with alluvial loams and reaching a thickness of several meters (Rączkowski et al., 2002). On the steepest slopes, there are weathered loams and slope debris, as well as aeolian loess and clayey silts (Wójcik, 2003).

DESCRIPTION OF THE SITE

The site occupies a flattened ridge with an elevation of 417 m a.s.l. and an extensive slope descending to the south at almost 12° (Fig. 3A). The hill is located between two steep-sided V-shaped valleys through which two unnamed streams flow. To the south, the hill is bounded by the slopes of a stream valley marked on maps as the Albinowski Stream which, 1.5 km farther, flows into the Jasiołka River (a tributary of the Wisłoka River; Fig. 3B). The V-shaped valley to the west has a length of >800 m and is characterized by an uneven thalweg. In the upper part, over a section of ~160 m, it is characterized by moderately steep slopes overlain by bog soils. The middle part, almost 300 m long, has steep, asymmetrical slopes cut down to a depth of over 3 m, with inclinations exceeding 50°. The valley carves into exposed strata of the Krosno Beds with a NW–SE course, creating small steps in the bottom, reaching a depth of 0.8 m. In the lower part, the valley widens and changes its direction from N–S to NW–SE. In this section, it takes the form of a wide depression with gentle slopes.

The steeply descending valley located to the east of the hill is just under 500 m long. In the upper part, it is narrow and incised by up to 9 m into strongly weathered rock layers. The slopes are asymmetrical. The left slope has a slightly gentler inclination than the right slope, of ~60°. The middle and lower parts of the valley are wide-bottomed (up to 20 m across), forming an extensive basin.

On the slope descending from the hilltop to the east, there is a sunken line (holloway), marked on available maps from the 18th century. The holloway connects the village of Wola Albinowska with its hamlet, Sośnina (Fig. 4B). It runs in N–S and is parallel to the valley of the unnamed stream. Currently, the road surface in the holloway is hardened and deeply incised, reaching a maximum depth of 7 m in the lower part of the slope where it ends with an embankment.

The preserved course of the hillfort fortifications is currently difficult to reconstruct unambiguously based on field observations. Much more information is provided by laser scanning (LIDAR) analyses of the terrain surface and by aerial photo-

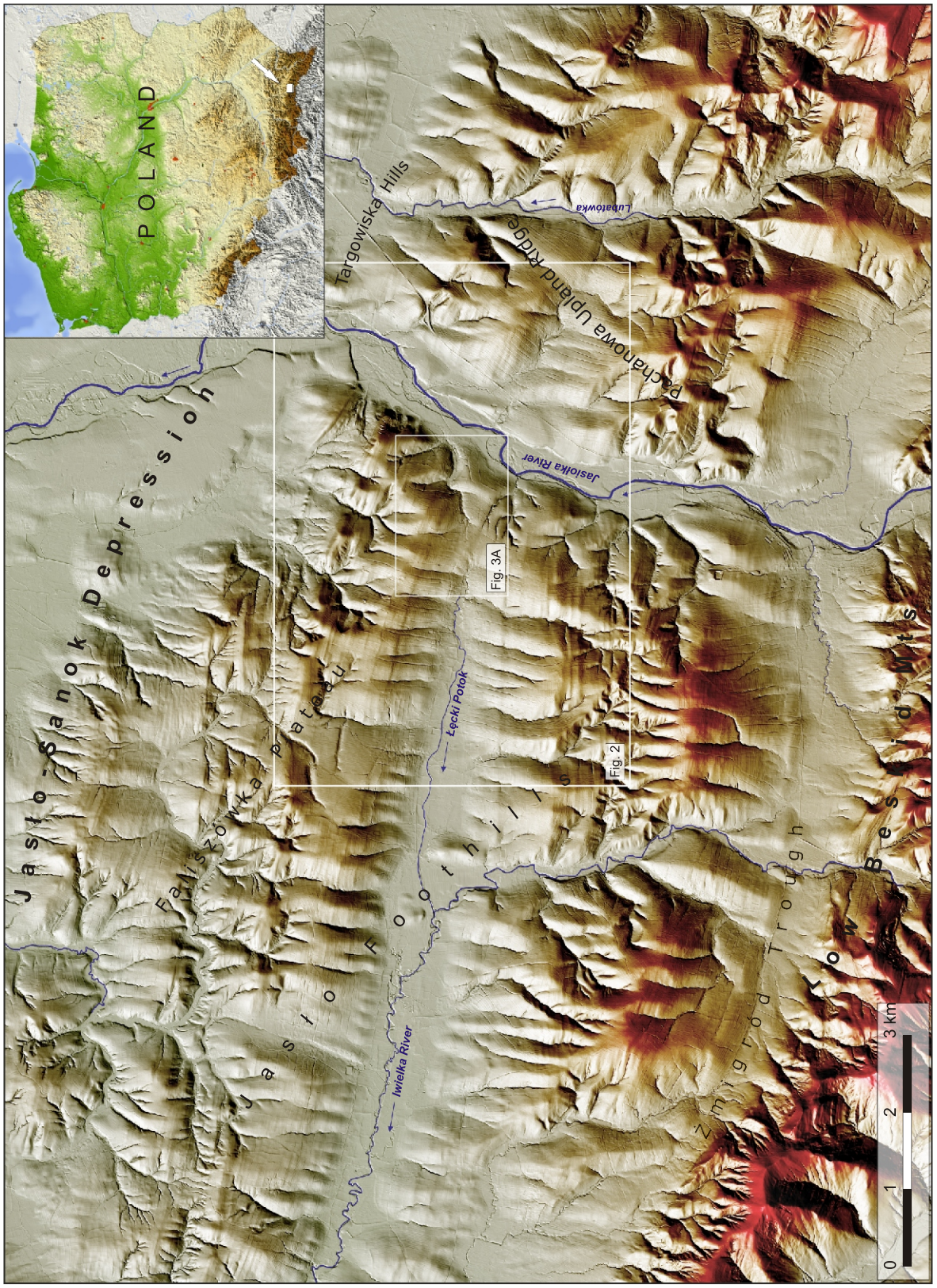


Fig. 1. Geomorphological regions in the area of Dukla and Nowy Żmigród (based on Starkel, 1972b; Gilewska, 1986)

The location of the study area is marked by a rectangle

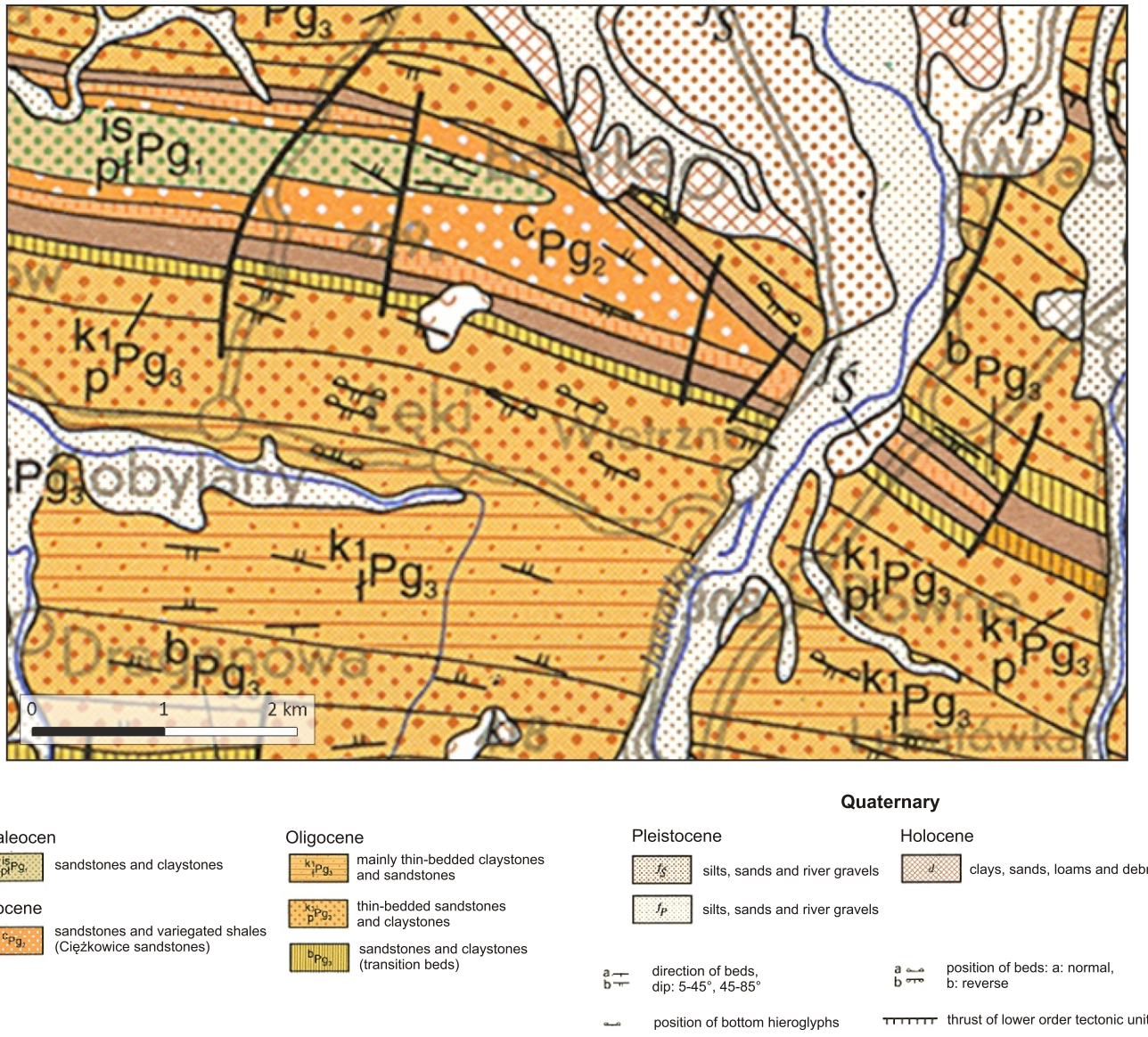


Fig. 2. Geological map of the pre-Quaternary deposits (after Rączkowski et al., 1992)

graphs (Fig. 5A). The hillfort ramparts are an artificial form (embankments) with a slightly oval shape and a longer side on the E–W axis reaching ~460 m. The length of the ramparts measured N–S is ~420 m. The area inside the hillfort (in the yard or *majdan*) covers >16 ha. Calculating the exact area covered by the fortifications is not possible due to the destruction of the ramparts in the southern part of the site.

The fortification embankments were not marked on the first maps from the partition period, i.e. the 18th and 19th centuries (Fig. 6A, B). It is very likely that the embankments were not easily visible at that time and were not considered attractive from a military point of view. However, important information comes from the cadastral map from 1851 (Fig. 6C). The plan shows arable fields and meadows in an open-field system, creating an irregular structure associated with the former agricultural economy (Nowak, 2022). Some fields have an elongated outline, where one side has an arc shape, tangential to the edge of the embankment. Such forms are particularly visible in the western and eastern parts of the fortification. The slopes of the embankments and the roads in their vicinity were covered with vegetation at that time. Moreover, the map from the third photograph (Franciscan-Joseph period) from 1869–1887 at 1:25,000 scalle also records information about the course of the defensive layout.

The area of fortifications shows significant variation in hypsometric profile (Figs. 3B and 5). In the northern section, there is a clear plateau ~430 m across, sloping towards the south. Approximately halfway through the profile, there is a slope of ~50–55 m towards the south, i.e. towards the Albinowski Stream. At this point, the surface has a slightly convex shape. This slope is also characteristic of other ridges extending to Kobylany village, at the distance of >3 km. Like the form on which the hillfort was based, these are wide ridges, characterized by flattened sections of plateaus and separated by numerous V-shaped valleys perpendicular to the main ridge.

The area inside the embankments is currently cultivated, with larger and smaller plots of land (ranging in size from 30 to a maximum of 100 ares), separated by hedges, and with small agricultural terraces. Until the mid-1990s, the area was intensively used for agriculture, but it is now overgrown, and forest is

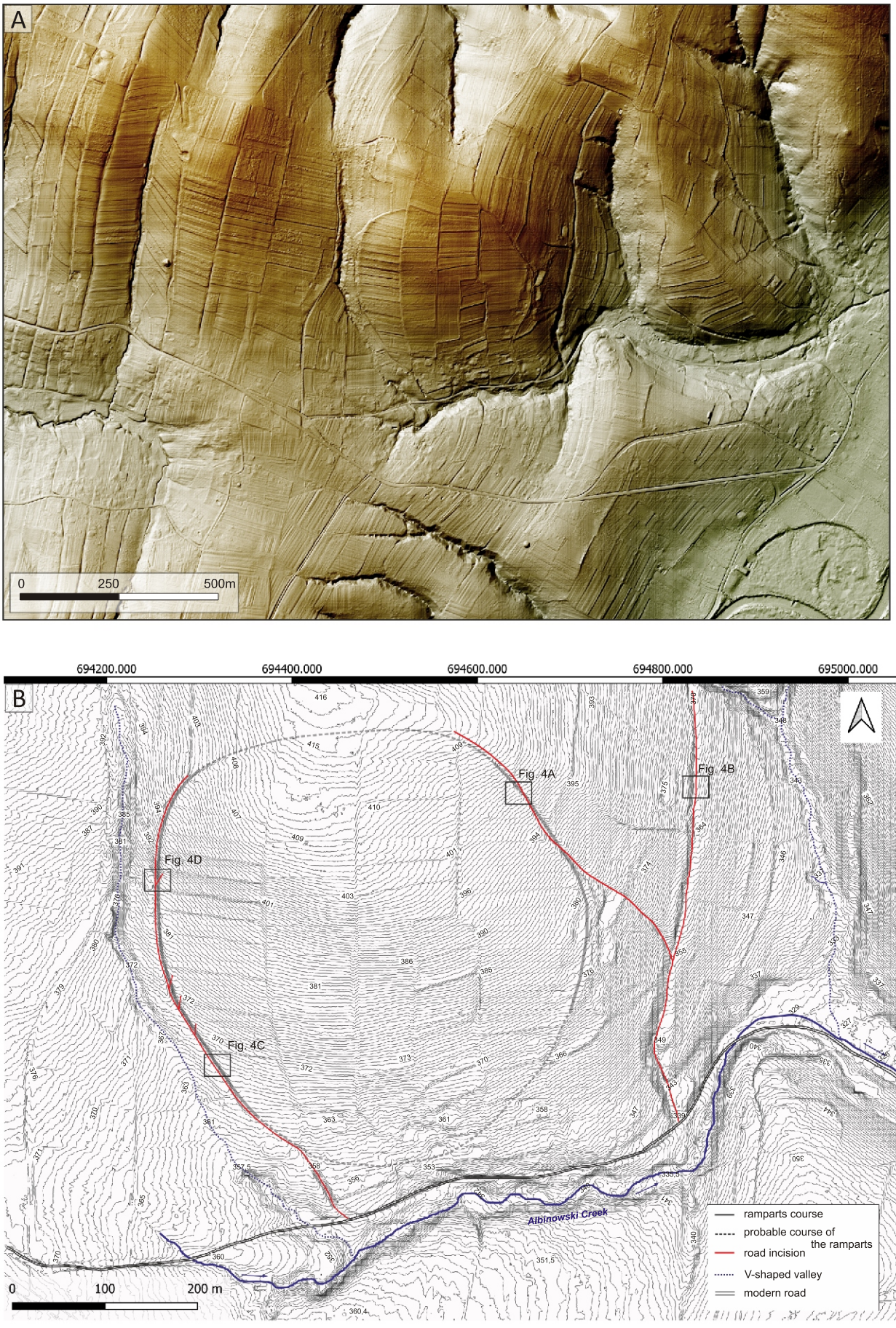


Fig. 3. The study area with visible ramparts of the hillfort in its central part (Wietrzno-Wola Albinowska, site 23, Krosno district; A), location of natural (V-shaped valleys) and anthropogenic (road cuts) landforms in the vicinity of the hillfort ramparts; frames indicate the places where the photographs were taken in Figure 4 (B)

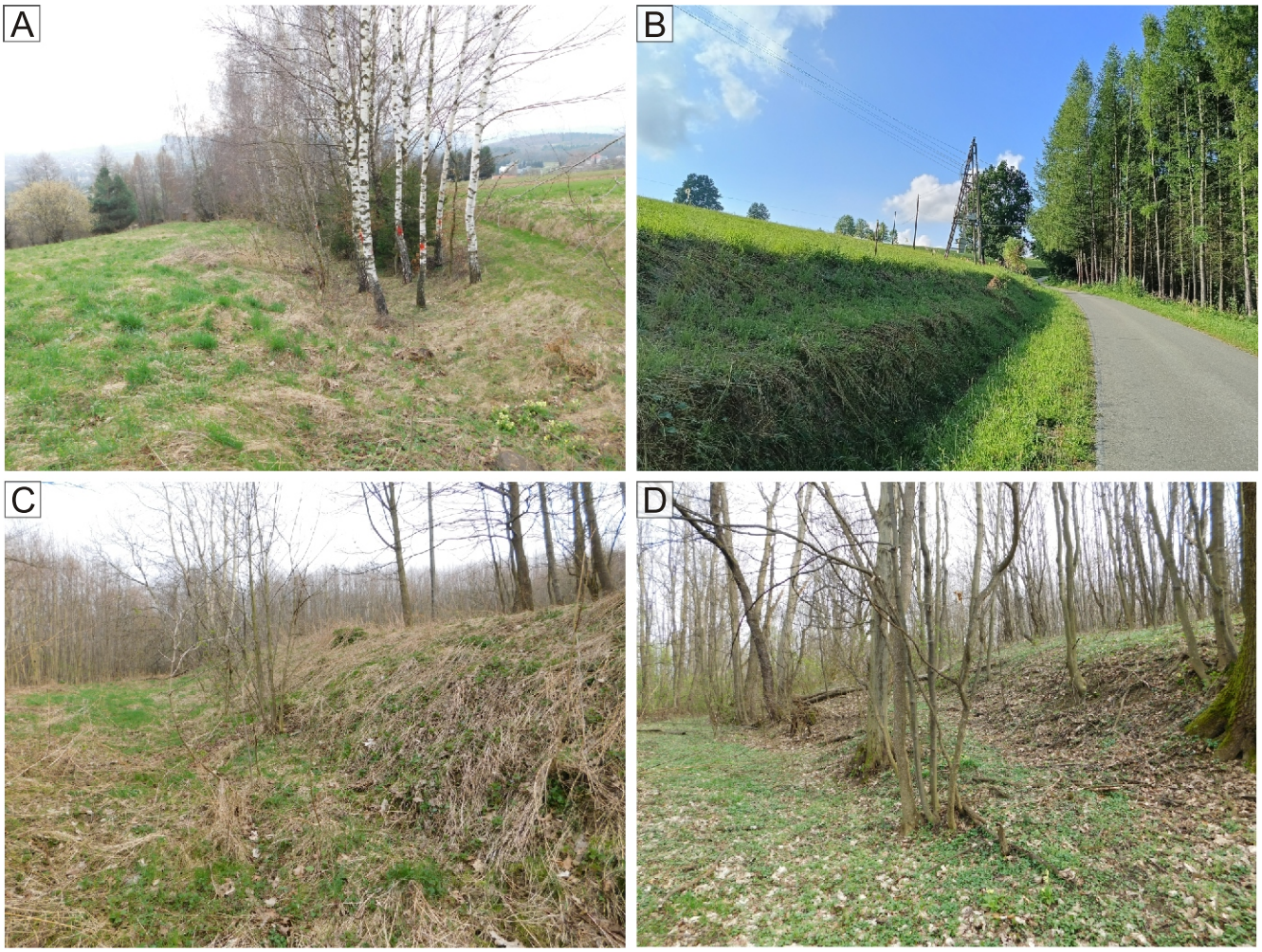


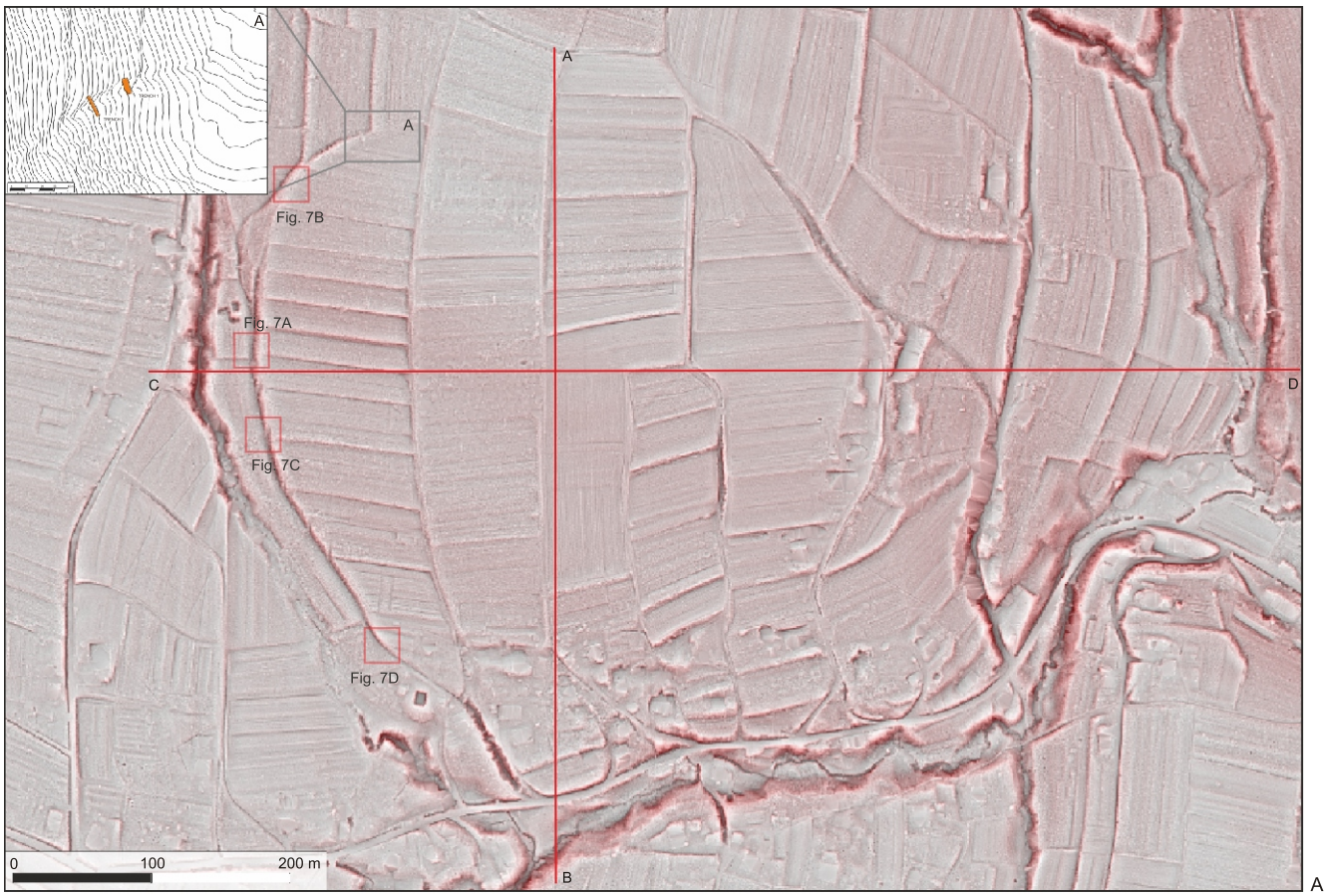
Fig. 4. Roadcut in the north-eastern part of the hillfort intersecting the rampart; currently unused and overgrown with trees and bushes (A); roadcut connecting Wola Albinowska with Sośnina, currently covered with a bituminous surface (B); a dirt road in the form of a holloway, running parallel to the foot, with visible shallow ruts, heavily overgrown (C); one of the branches of the road under the rampart, diagonally crossing the fortification; in the past used as access to cultivated fields (D)

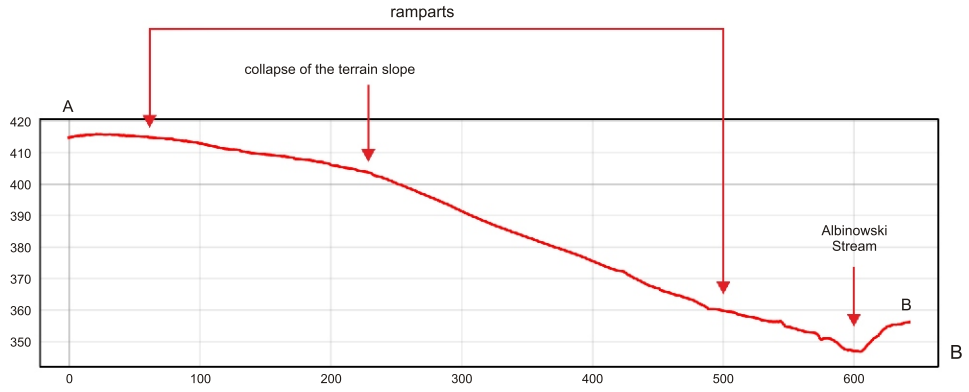
gradually encroaching on the eastern and northern parts of the hillfort. Due to agricultural activity and various natural processes, the state of preservation of the embankments currently varies. The greatest changes to the terrain affected the southern part of the hillfort, resulting from residential and economic development dating back to the 17th century or even earlier. Therefore, it is inferred that a section of the rampart, measuring 350 m in length and covering an area of ~1–1.5 ha, was destroyed. The remnants of the embankment are either invisible or poorly visible, making it difficult to determine their course. On the eastern side, the ramparts are slightly better preserved, with a small section ~100 m in length visible at the surface. The northern part of the hillfort has also undergone significant changes, with the rampart almost completely levelled as a result of agriculture in the last two hundred years and natural geomorphological processes. The best-preserved part is the western section, which is 130 m long (Fig. 7). It is curved, with a steep outer slope ~2.5–3 m high, sloping at an angle of ~50°. It gradually descends towards the south and north, becoming only a few tens of centimetres high, and then disappears on the southwest slope of the hill. The coping of the rampart has a slightly dome-shaped top, levelled on the inner side of the fortification by agricultural work. At the foot of the rampart, there are anthropogenic forms related to the development of the surface in the Modern and contemporary periods. This includes an intermittently used dirt road, which runs parallel to the rampart for ~400 m (Fig. 4C). It is up to 3.5 m wide, unpaved, shallowly incised, and currently overgrown. The surface shows ruts in some places, and some branches of the road cut across the rampart perpendicularly or diagonally (Fig. 4D). They take the form of road cuts made to facilitate passage to the fields inside the hillfort. Their depth is 0.5–0.7 m and width up to 2 m. Due to the levelling of the slope by ploughing, it is difficult to reconstruct the original width of the rampart inside the yard.

A similar anthropogenic form can be identified on the NE side of the rampart, over a length of 130 m and a width of ~3–5 m (Fig. 4A). It has the character of a clear road cut up to 1.5 m deep with a bottom width of 2.5 m. It has a trapezoidal shape in cross-section, with sides cut by ruts. Originally, this road must have bypassed the rampart, but probably due to the surface becoming boggy, its direction was changed by digging through the embankment, which was low at this location.

EXCAVATIONS CARRIED OUT IN 2021

As part of the research into the fortified settlement in Wietrzno-Wola Albinowska, two trial excavations were made, in the northwestern part of the hillfort, near the slope descending towards an unnamed stream, within plot no. 77 (Fig. 5A). Both





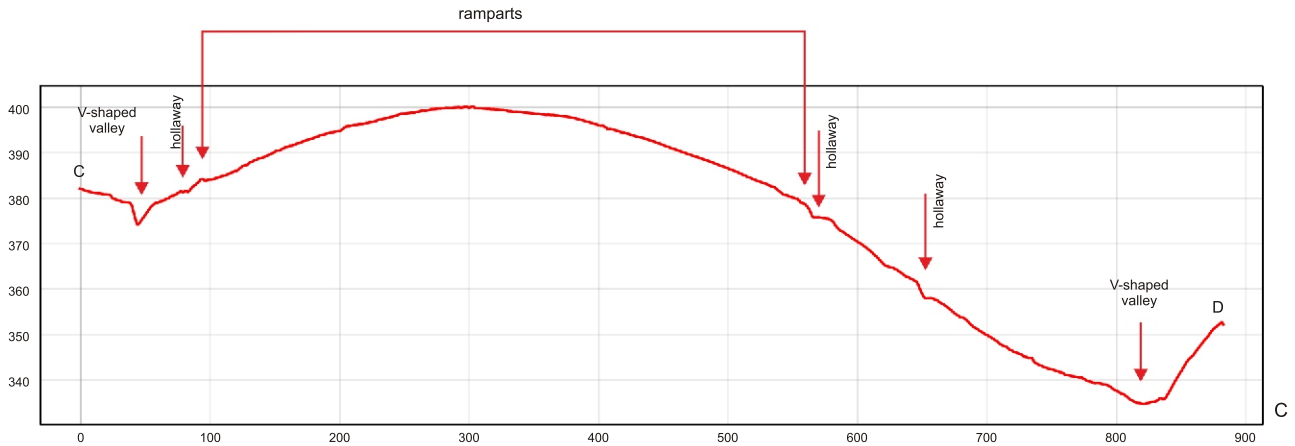


Fig. 5. The course of the ramparts of the hillfort in Wietrzno-Wola Albinowska, Krosno district, visible on the map of a Digital Terrain Model, and the location of archaeological excavations (A); frames indicate the places where the photos from Figure 7 were taken; terrain profiles along N–S (B) and E–W (C) axes (B, C)

Fig. 6. The village of Wietrzno-Wola Albinowska against the background of the 2nd military photograph of Galicia and Bukowina (Franciscan period, 1861-1864; A), the 3rd photograph (Franz Joseph period of the Habsburg Empire, 1869–1887; B) and on the cadastral map from 1851 (C)

The clear course of the hillfort ramparts is marked by access roads and the shapes of cultivated fields (map source: https://maps.arcanum.com/en and the State Archive in Przemyśl)

excavations were designed perpendicular to the layout of the fortifications, in order to capture not only the embankment but also the zone at the foot of the rampart.

Excavation no. 1 was 11 m long and 2 m across. It was expanded on the northwest side with an annex measuring 8.5 0.5 m. The total excavated area of the trench was 26.25 m^2. Within the excavation, a surface layer of turf ~0.1 m thick (Fig. 8A) overlay a homogeneous, brownish, humic, sandy silt layer, which was recently ploughed, 0.4–0.5 m thick. Below this was a dark brown silt, slightly sandy, 0.2–0.25 m thick, with an lateral extent observed in excavation no. 1 of ~7 m. This layer is considered to be a fill of the bottom part of the earthen embankment of the hillfort. The upper part of this layer was clearly altered by ploughing and contained a mixture of humic substances. Beneath the dark brown sandy silt layer, there was yellow natural subsoil, silty with sand, which gradually transitioned into sandstone. At its boundary with natural subsoil (the weathered bedrock), individual pieces of charcoal were found. Samples were taken and subjected to taxonomic and radiocarbon dating analysis.

Excavation no. 2 was established ~25 m southwest from excavation no. 1, and had dimensions of 15.5 2 m. The stratigraphic sequence of layers was similar to that of excavation no. 1 (Fig. 8B). Beneath the contemporary soil humus, 0.1–0.15 m thick, there was a brownish homogeneous, humic, sandy silt layer, transformed by ploughing (Fig. 9). Below it, a layer of dark brown sandy silt 0.25–0.3 m thick constituted the bottom level of the embankment fill. Similarly to excavation no. 1, it had a poor colour contrast; it was ~8.5 m in lateral extent, and also contained pieces of charcoal. Underneath the embankment, there was natural subsoil of dark yellow sandy silt, with small fragments of sandstone in its lower part. The bedrock was recorded at a depth of 0.4–1.0 m, marked by indistinct layers dipping NE–SW. In the northwestern part of the excavation, below a slope, a small hollow (~0.4 m) cutting into the embankment was found, filled with a silty, brownish-grey layer formed of material water-washed from the upper parts of the slope. In this layer, a pottery vessel fragment from the 17th/18th century was found. This area coincided with one of the access roads to the fields shown on maps from the mid-19th century.

PARTICLE SIZE, CARBONATE AND ORGANIC MATTER ANALYSES

One monolith was analysed to examine the properties of the soil forming the earthen ramparts of the hillfort. It was taken from excavation no. 2, from where the embankment had the greatest thickness. The sediments forming the studied profile S1 were classified as sandy silt. The average grain size (Mz) shows little variation (5.9–6.2 phi), at the border between medium coarse and coarse silt. In the upper part of the profile, within the embankment layers, there is a general reduction in grain size with increasing depth (Fig. 10). The layer below, of

Fig. 7. View of the hillfort rampart in the W part, i.e. where it is preserved to a height of ~3.5 m (A); the hillfort rampart in the SW part, where it was destroyed by residential buildings (B); state of preservation of the rampart in the NW part, current height of the rampart from 1 to 0.5 m; (C); the rampart in the SW part preserved to a height of ~1.5 m (D)

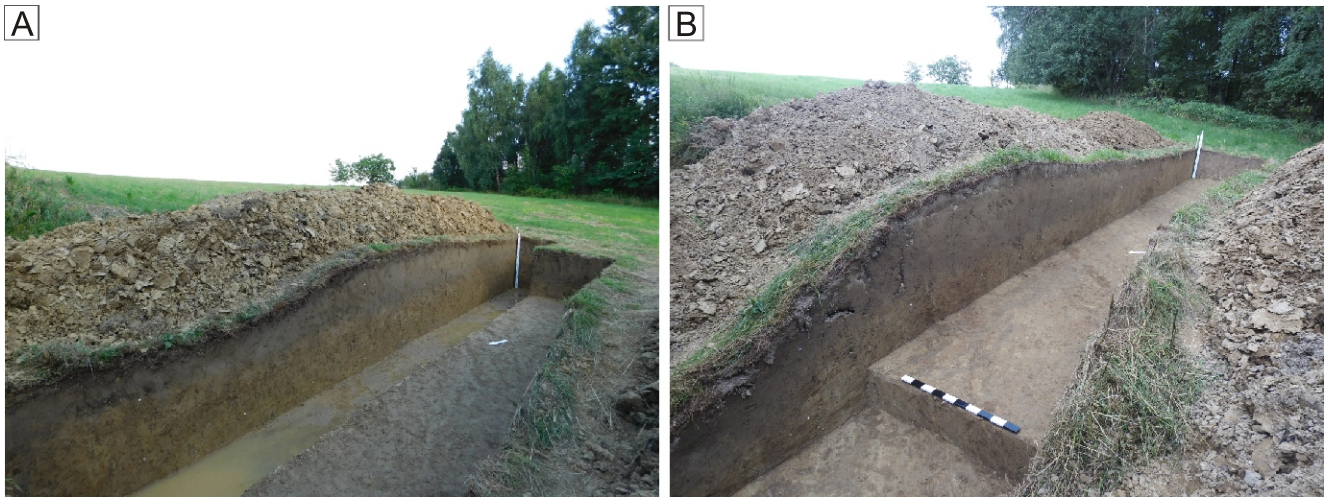


Fig. 8. North-eastern profiles of excavation no. 1 (A) and no. 2 (B) within the NW part of the hillfort

Beneath the arable layer, a dark brown layer is visible, which is a relic of the earthen rampart. The photo is taken from the SW, at the foot of the rampart

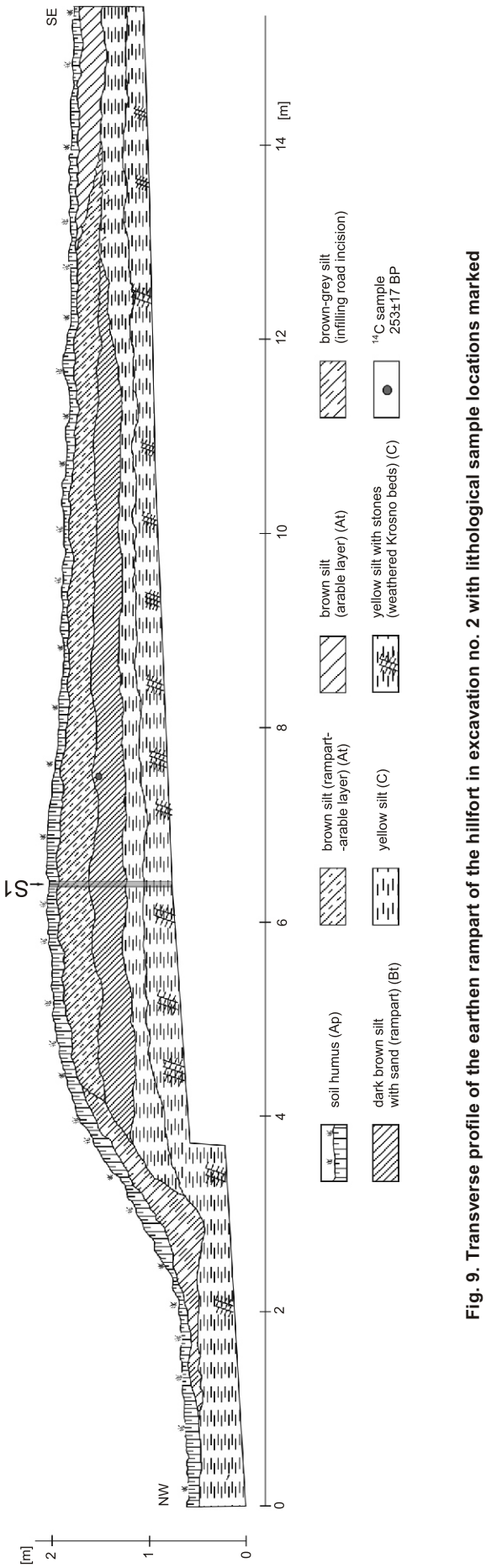


Fig. 9. Transverse profile of the earthen rampart of the hillfort in excavation no. 2 with lithological sample locations marked

natural subsoil, has a higher content of fine and very fine sand and a lower content of fine and very fine silt, which results in a higher average grain size. Throughout the profile, the sediment is similarly poorly sorted (1.9–2.0), close to very poor sorting, and has a slightly positive skewness (0.0–0.1). The kurtosis reaches its lowest values at 40–50 cm depth, which corresponds to the boundary between the two embankment layers, and is consistent with the bimodal grain size distribution at that depth. The organic matter content generally decreases with increasing depth, from just under 2% in the upper embankment layer to below 1% in the subsoil. Throughout the profile, there was no calcium carbonate.

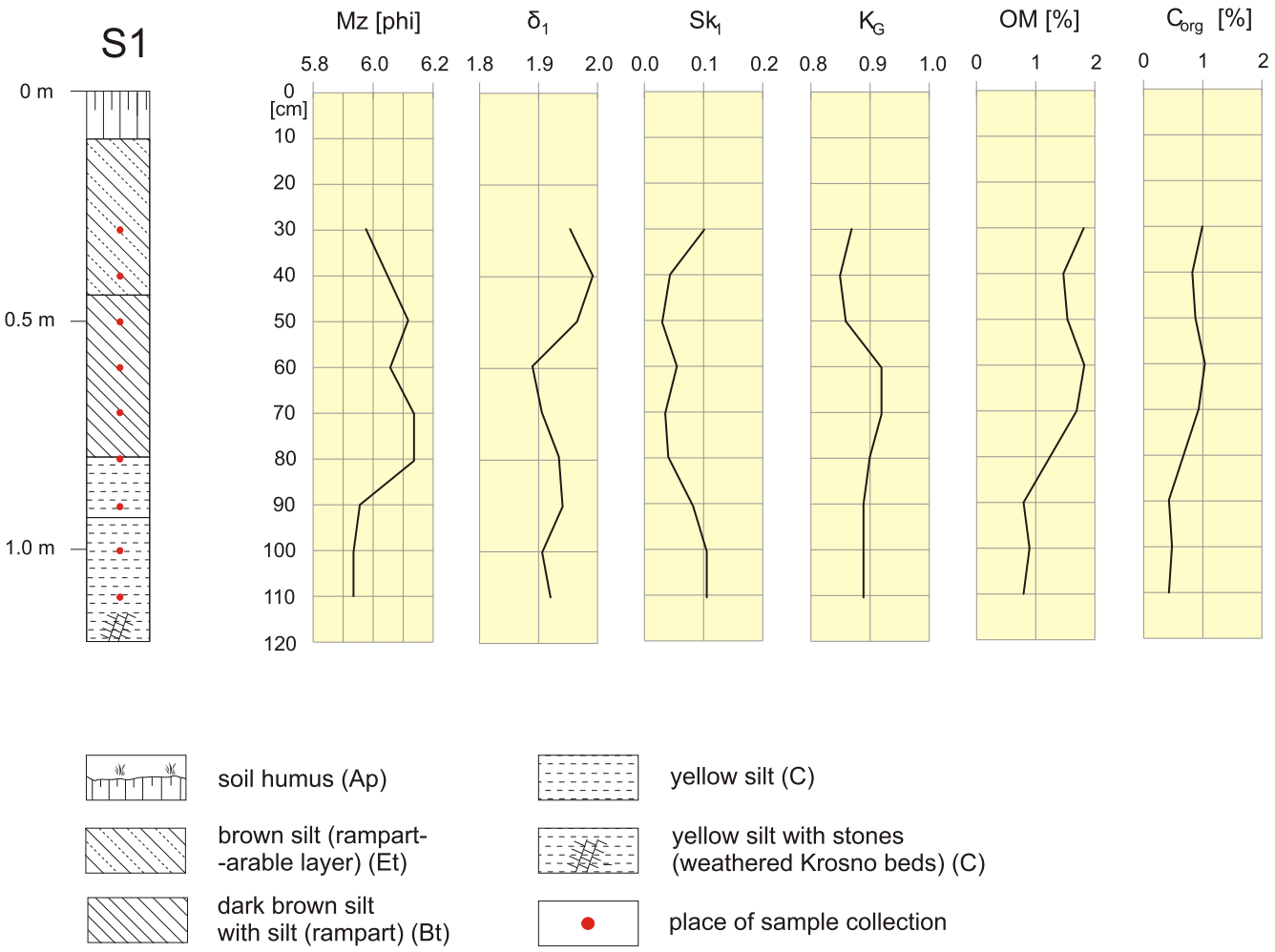
RADIOCARBON AND ANTHRACOLOGICAL ANALYSES

In 2021, two charcoal samples were collected for radiocarbon analysis. One was taken from excavation no. 1, below the layer of dark grey primary humus, ~75 cm below the surface. The date obtained was 11845 ±31 BP (MKL-A5572). The calibrated age was determined with a 1 (68.2%) probability range of 11816–11660 BC, corresponding to the Late Glacial period. Among the charcoal samples sent for dating, the presence of linden (*Tilia* sp.) and hazelnut (*Corylus avellana*) charcoal was noted. The radiocarbon dating indicates that the presence of these species in the primary deposit is unlikely. It is presumed that the fragments of charcoal may come from warmer plant habitats located south of the site and subsequently transported by wind.

The charcoal samples from excavation no. 2, taken from a depth of ~0.6 m, yielded a date of 253 ±17 BP (MKL-A5801); the calibrated date at the 1 level was determined as in the range of 1642–1661 AD. This date documents the modern stage of land use around the settlement. This sample is from within the edge of the rampart, near a small depression used as an access road to fields during the Modern period. It is uncertain whether this charcoal is from a secondary deposit or whether there was an object (e.g., a charred post) that can be chronologically placed in the 17th century.

DISCUSSION

These archaeological studies, despite their limited scope, have provided important data regarding the object discovered at site no. 23 in Wietrzno. Firstly, the anthropogenic nature of the visible embankments at the terrain surface has been confirmed. The remains of an earthen rampart consisting of a dark brown layer was discovered in two trial excavations, with a preserved thickness of 0.2–0.3 m and a width of ~8.5 m and ~7 m in excavations 2 and 1, respectively; only its bottom level was captured. The anthropogenic origin of this layer is indicated by the slope of its base, which has a similar inclination to the terrain outside the embankment and to the road cut (~6%). Furthermore, the high organic matter content, about twice as high as in the natural subsoil, also suggests that the embankment was formed from a humus layer taken from inside the hillfort (the so-called *majdan*). This may also be indicated by the absence of calcium carbonate throughout the embankment, although it should be noted that no calcium carbonate was detected in the natural subsoil either. It is very probable that the rampart was built using soil from inside the hillfort, meaning that the primary soil was removed. The builders did not dig ditches, which were usually the source of material for embankments. The function of ditches was played by the V-shaped valleys of two small, un-



Depth [cm]	Grain size parameters (Falk and Ward. 1957) [phi]				OM [%]	C_{org} [%]
	Mz	δ_1	Sk_1	K_G		
30	5.976	1.954	0.096	0.867	1.75	1.02
40	6.052	1.992	0.042	0.847	1.44	0.84
50	6.052	1.964	0.031	0.854	1.53	0.89
60	6.060	1.892	0.054	0.917	1.80	1.04
70	6.134	1.906	0.034	0.915	1.62	0.94
80	6.131	1.933	0.039	0.897	1.20	0.69
90	5.953	1.940	0.081	0.886	0.77	0.45
100	5.932	1.906	0.104	0.888	0.86	0.50
110	5.928	1.921	0.103	0.886	0.76	0.44

Fig. 10. Lithological profile of the earthen rampart of the hillfort in excavation 2 with grain size indices according to Folk and Ward (1957) and organic carbon content and organic matter

named streams from the eastern and western sides of the settlement, as well as by the Albinowski Stream. Based on available data, it is difficult to reconstruct the original height of the rampart and to judge if any additional defensive structures were present. During the studies, no evident traces of residential or economic features associated with the period of the rampart were found. It may be assumed that these were located inside the ring of fortifications, similarly to other such prehistoric and medieval strongholds (e.g., Bukowski, 1960; Gancarski, 2009; Poleski, 2019a). In both excavation units, no materials that could date the formation of the embankments were found. At the top of the natural subsoil in excavation no. 1, as well as in the interior of the dark brown layer in excavation no. 2, small clusters of charcoal were found; but, the dates they yielded cannot be related to the functioning of the fortified settlement, but rather document changes in the natural environment during the glacial period, and the modern stage of land use around the object.

Charcoal from thermophilic trees (linden, hazel) dated to the Late Glacial (Allerřd) does not represent vegetation growing *in situ* in the area of the site, but was probably redeposited by wind from areas located south of the Low Beskid Mountains, e.g. Slovakia, where thermophilic tree refuges have survived. The first appearance of hazel (*Corylus*) in the Jasło-Sanok Depression (Tarnowiec profile) is dated to the Preboreal period, and in the Low Beskids (Jasiel profile) to the Boreal period. The first changes in vegetation that can be associated with farming activity in the Jasło-Sanok Depression are dated to the Middle Neolithic at 3700/3400 BC-2800/2500 BC. At that time, the area was deforested, with an increase in light-loving vegetation and direct evidence of cereal cultivation (Wacnik et al., 2001). Another increase in anthropogenic indicators is recorded around 3000 BP, related to the use of the areas by Bronze Age/early Iron Age communities (profile at Cergowa, ~8 km south-east of Wietrzno; Więckowski and Szczepanek, 1963; Szczepanek, 2001). The greatest changes in vegetation take place in the Middle Ages, in the 7th/8th century, and especially in the 14th/15th century. At that time, large-scale decreases in the frequency of trees, mainly beech and fir, and corresponding increases in synanthropic and cultivated indicators, occur. Available maps and historical data show that from the Middle Ages to the modern period, a stable settlement network was developing, which reflected the socio-economic and cultural development of the region (Parczewski, 1991; Historical-Geographical Dictionary of Polish lands in the Middle Ages; Żaki, 1963).

The nature, shape, and size of the rampart suggest that we are most likely not dealing with an Early Medieval object here (e.g., Parczewski, 1991; Poleski, 1996; 2019a, b). Based on general indications, connection with the Bronze Age or the Early Iron Age can be proposed. The regular, circular layout is similar to the arrangement of embankments known from sites such as Chotyniec near Radymno on the Tarnogród Plateau (Czopek et al., 2023). During previous surface surveys around the Wietrzno hillfort, settlement complexes from the Bronze Age period were identified (Janowski, 1966; Gedl, 1998). During research preceding the construction of the S19 expressway, further settlements were discovered, dated (based on pottery sherds) to the Bronze Age and the Early Iron Age, which can probably be associated with the hillfort (unpublished research results). The current excavation research does not allow us to pronounce on the existence of ditches at the foot of the rampart. This function may have been taken by the V-shaped stream valleys east and west of the object. Access from the south was generally well protected by the parallel section of the Albinowski Stream.

A complete understanding of the nature of the object discovered at site no. 23 in Wietrzno-Wola Albinowska will not be possible without conducting comprehensive archaeological and geophysical studies, warranted due to the destruction of the site's surface by agricultural activities and geomorphological processes.

CONCLUSIONS

Geomorphological and archaeological studies have demonstrated the anthropogenic origin of the earthen rampart of the hillfort in Wietrzno-Wola Albinowska, Krosno district. Currently, the object is partly levelled due to agricultural activities and natural geomorphological processes. Despite poor visibility in the terrain, the range of the hillfort can be precisely reconstructed based on archival maps (from the partition period) and laser scanning (LIDAR). The recorded remains of the fortifications comprise the bottom layer of the earthen rampart, with a width of up to 8 m and a thickness of 0.2 to 0.3 m. Grain size analysis and organic content indicate that earth collected from inside the hillfort, from the *majdan*, was used to make the embankments. The sediments of the embankment are sandy silt, characterized by a a relatively high content of organic matter compared to the layer below. Charcoal fragments document only the late glacial history of the lithological substrate and the modern stage of land cultivation. The earthen ramparts are associated with a large (16 ha) hillfort, likely dated approximately to the late Bronze Age/early Iron Age.

Acknowledgements. The authors would like to thank Dr. hab. Magdalena Moskal-del Hoyo for identifying the charcoal found in the Wietrzno research. We sincerely thank Wojciech Granoszewski, the journal's Editor, and the reviewers for their insightful comments, which have significantly improved the article. We would also like to thank Professor Jan Zalasiewicz for language correction.

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