Abhandlung

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Living on the edge(s). Settlement revival in the Sacharewo microregion (Białowieża Forest, E Poland) during the Iron Age and Roman Period (1st c. BC/1st c. AD – 5th/6th c. AD)

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Zusammenfassung: In diesem Artikel werden die Ergebnisse von Untersuchungen vorgestellt, die im westlichen Teil des Białowieża-Waldes (Ostpolen) durchgeführt wurden. Sie begannen mit Ausgrabungen in einem Hügelgräberfeld aus der römischen Kaiserzeit. Es folgten Ausgrabungen in einer nahegelegenen Siedlung, bei denen Funde aus der frühen Bronzezeit, der Eisenzeit, der römische Kaiserzeit und den frühen Neuzeit gemacht wurden. Die Aufmerksamkeit wurde auf die sehr große Menge an Material aus der Eisenzeit und der römischen Kaiserzeit gelenkt, die wiederum mit der Strichkeramik-Kultur und der Wielbark-Kultur in Verbindung gebracht wurde. Dies könnte auf eine gewisse Wiederbelebung der Besiedlung hinweisen, die in der Zeit von der Zeitenwende bis zum 5./6. Jahrhundert n. Chr. in diesem Gebiet stattfand. Dank der Auswertung von Lidar Daten konnte auch ein Komplex alter Feldgrenzen identifiziert werden, der sich über Hunderte von Metern um das Hügelgräberfeld herum erstreckt. Die Ausgrabungen wurden fortgesetzt, während gleichzeitig Proben für geoarchäologische und archäobotanische Analysen entnommen wurden. Es wurde auch eine große Anzahl von ^{14}C-Daten gesammelt. Die Untersuchungen ermöglichten die Abgrenzung einer Mikro-Siedlungsregion, die die Überreste einer stabilen und kontinuierlichen, wenn auch nicht sehr intensiven Siedlung darstellt. Sie war bereits in den ersten Jahrhunderten nach Christus in Betrieb, obwohl einige ^{14}C Daten sogar auf das frühe Mittelalter hinweisen. Zum jetzigen Zeitpunkt ist es jedoch nicht möglich, ihre Kontinuität mit Funden aus der römischen Kaiserzeit zu bestimmen. Die Funde geben auch Aufschluss über die äußeren kulturellen Einflüsse auf das Gebiet während der römischen Kaiserzeit. Die durchgeführten Untersuchungen passen sehr gut zu anderen neueren Entdeckungen im Białowieża-Wald, der angesichts seiner Ursprünglichkeit und der begrenzten menschlichen Aktivitäten in der Vergangenheit einen ausgezeichneten Ausgangspunkt für die weitere Identifizierung von Siedlungen und Wirtschaft aus verschiedenen Epochen in diesem Gebiet darstellt.

Schlüsselworte: Białowieża-Urwald, Siedlung, Eisenzeit, römische Kaiserzeit, Strichkeramik-Kultur, Wielbark-Kultur, mikroregionale Untersuchungen, Geoarchäologie, Archäobotanik, Chronologie ^{14}C, Lidar

Abstract: The article presents the results of research carried out at Sacharewo in the Białowieża Forest, involving excavations of a barrow cemetery associated with the Roman Period and the nearby settlement, which delivered finds from the Early Bronze Age, the Iron Age, the Roman Period and the Modern Period. Noteworthy was a signifi-

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cant amount of material from the Iron Age and the Roman Period, linked with the Hatched Pottery and Wielbark cultures, possibly indicating a certain revival of settlement in that area between the turn of the eras and the 5th/6th century AD. Thanks to the analysis of airborne laser scanning data, it was also possible to identify a complex of ancient arable fields in the surroundings of the barrow cemetery. The excavations were conducted along with sampling for geoarchaeological and archaeobotanical analyses. A significant pool of ^{14}C dates was also collected.

The studies idientified the remains of a stable and continuous (though not very developed and intensive) settlement on the left side of the Leśna River, a barrow cemetery and a field system, possibly used at the same time. This microregion functioned in the first centuries AD, although materials linked to the early Middle Ages were also found. At this stage, however, it is not possible to determine their continuity with finds from the Roman Period. The discoveries also provide an insight into the external cultural influences on the area during the Roman Period.

The conducted research complements other recent findings from the Białowieża Forest, which, given its primeval nature and the limited role of human activity during past centuries, is an excellent area for further investigations of settlement and economy patterns from different periods.

Keywords: Białowieża Forest, settlement, Iron Age, Roman Period, Hatched Pottery culture (known also as Brushed Pottery culture), Wielbark Culture, microregional study, geoarchaeology, archaeobotany, ^{14}C chronology, Airborne Laser Scanning

Streszczenie: Artykuł przedstawia wyniki badań przeprowadzonych w zachodniej części Puszczy Białowieskiej (wschodnia Polska). Zaczęły się one od wykopalisk przeprowadzonych na cmentarzysku kurhanowym łączonym z okresem wpływów rzymskich. Kolejnym etapem były wykopaliska na pobliskiej osadzie, które przyniosły znaleziska łączone z wczesną epoką brązu, epoką żelaza, okresem wpływów rzymskich oraz nowożytnością. Uwagę zwróciła bardzo duża ilość materiałów z epoki żelaza oraz okresu wpływów rzymskich, które łączone były kolejno z kulturą ceramiki sztrychowanej oraz kulturą wielbarską. Wskazywać to mogło na pewne ożywienie osadnicze jakie miało miejsce na tym terenie począwszy od przełomu er, a na 5/6 wieku naszej ery skończywszy. Dzięki analizie danych lotniczego skaningu laserowego udało się również zidentyfikować kompleks zarysów dawnych pól rozciągających się wokół cmentarzyska kurhanowego na przestrzeni setek metrów. Wykopaliska kontynuowano, równocześnie pobierając próby do analiz geoarcheologicznych i archeobotanicznych. Pozyskano również znaczną pulę dat ^{14}C.

Przeprowadzone badania pozwoliły wyróżnić mikroregion osadniczy stanowiący pozostałość po stabilnym i ciągłym, choć niezbyt intensywnym osadnictwie. Funkcjonowało ono w pierwszych wiekach naszej ery, choć niektóre daty ^{14}C wskazują nawet na wczesne średniowiecze. Na obecnym etapie nie można jednak przesądzać o ich ciągłości ze znaleziskami z okresu wpływów rzymskich. Na podstawie pozyskanego materiału zabytkowego przyjrzano się także zewnętrznym oddziaływaniom kulturowym jakie docierały na ten teren w okresie rzymskim.

Przeprowadzone badania bardzo dobrze wpisują się w inne najnowsze odkrycia z Puszczy Białowieskiej, co z uwagi na jej pierwotny charakter i ograniczoną aktywność człowieka w przeszłości stanowi doskonały punkt wyjścia do dalszego rozpoznawania osadnictwa i gospodarki z różnych okresów na tym terenie.

Słowa kluczowe: Puszcza Białowieska, osadnictwo, epoka żelaza, okres wpływów rzymskich, kultura ceramiki sztrychowanej, kultura wielbarska, badania mikroregionalne, geoarcheologia, archeobotanika, chronologia ^{14}C, lotniczy skaning laserowy

Introduction

The Białowieża Forest located on the border of Poland and Belarus, covers an area of approximately 1,500 km^2 (Fig. 1). The Polish part occupies ca. 635 km^2, of which over 100 km^2 belongs to the strictly protected Białowieża National Park, whereas the rest remains mostly under the management of the state-owned company Lasy Państwowe (State Forests)[1]. This area is now considered to be one of the best preserved natural forests in the temperate zone of the European Lowlands bearing features of a primeval forest[2]. Therefore, the Białowieża Forest was put on the UNESCO World Heritage List in 1979, being there the only natural area in Poland[3].

Its unique character resulted from the establishment of hunting grounds for Polish kings in the 15th c. AD, used subsequently by Russian tsars from 19th c. AD. Royal protection limited forestry and agricultural activity[4], which radically reduced human impact as demonstrated by palaeoenvironmental studies[5]. For this reason, the Białowieża Forest is

1 Samojlik *et al.* 2013, 578–579.
2 Faliński 1986; Jaroszewicz *et al.* 2019, 2.
3 World Heritage List, http://whc.unesco.org/en/list/33.
4 Faliński 1986.
5 Latałowa *et al.* 2015; 2016; Zimny *et al.* 2017.

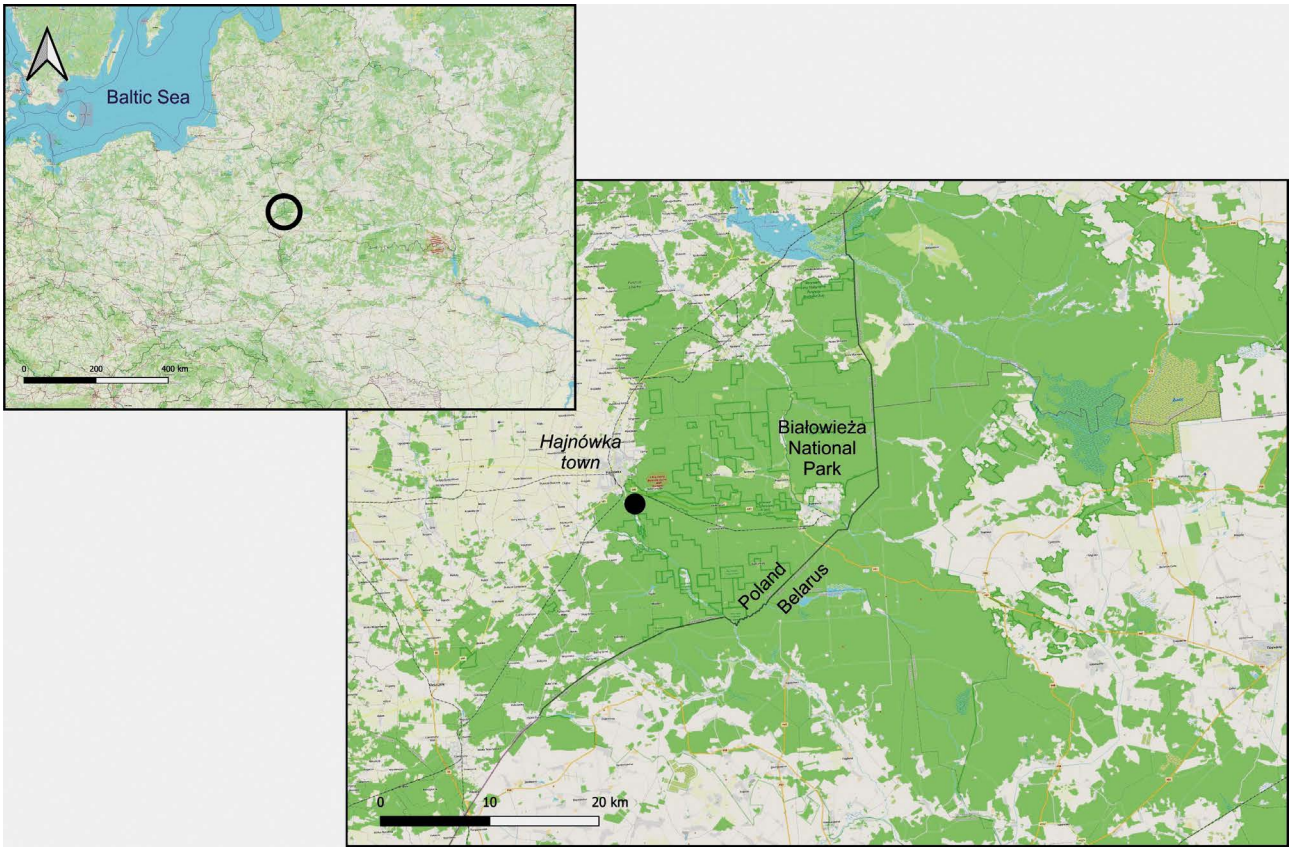

Fig. 1: Location of the Białowieża Forest. The Sacharewo microregion is marked with a black dot (basemap source: OpenStreetMap).

particularly interesting not only for naturalists, but also for researchers dealing with past human activity, especially for environmental archaeologists.

Archaeological research in the Białowieża Forest began in 1917–1918 with the arrival of a German archaeologist Alfred Götze[6]. He registered 328 earthen mounds interpreted as barrows and excavated 35 of them. Only in the late 1960s and early 1970s Irena Górska from the Institute of Material Culture History (present-day Institute of Archaeology and Ethnology of the Polish Academy of Sciences, IAE PAS) continued fieldwork in the Białowieża National Park, which included both surveying and excavations of several barrows[7]. In 2003, research in the Białowieża Forest was resumed by a joint expedition of the IAE PAS and the Mammal Research Institute PAS in Białowieża[8]. In 2014, the IAE PAS included this area in the project *The beginnings of Christianity on the Mazovian-Rus' frontier*, aimed at obtaining early medieval human bones for aDNA analyses.[9] In 2016 IAE PAS participated in the *Cultural Heritage Inventory*, commissioned by the General Directorate of the State Forests[10].

The project *Cultural and natural heritage of the Białowieża Forest*[11] launched in 2017 by the Institute of Archaeology at the Cardinal Stefan Wyszyński University in Warsaw in cooperation with the IAE PAS was a decisive turning point, resulting from the introduction of systematic multi-disciplinary studies, concentrated on the application of non-invasive and earth-science methods[12]. Identification of archaeological sites included archival queries and detailed analysis of open-access Airborne Laser Scanning (ALS) data offered by the ISOK (Informatic System for Country Protection against extreme hazards)[13], which covers the whole territory of Poland. Some fragments of the Forest were additionally scanned with precision much greater than the ISOK data. The ALS methodology, crucial for studying forested areas[14], led to the identification of over 1800 archaeological

6 Götze 1929.
7 Górska 1976.
8 Krasnodębski/Olczak 2012.
9 Krasnodębski/Olczak 2019a; 2019b.
10 Krasnodębski/Olczak 2018; Olczak/Krasnodębski 2022.
11 This project was funded by the Polish National Science Centre.
12 Wawrzeniuk/Urbańczyk 2021, 10; Krupski *et al.* 2022.
13 Goniewicz/Burkle Jr. 2019.
14 Doneus/Briese 2011.

features with distinct terrain forms. These were mapped following field verification and limited excavations[15].

Special attention was given to the Sacharewo Forestry in the western part of the Forest (Fig. 1). This microregion includes at least one barrow cemetery (Sacharewo, site 3)[16], several individual mounds (alleged burials), possible remains of a field system and modern-era charcoal piles (Fig 2A, B). In 2019, a prehistoric and early modern settlement was additionally discovered in the centre of this area (Sacharewo Clearing), located on terrain slightly sloping towards the Leśna River valley floor.

Excavations in 2019 and 2020 produced archaeological material which was surprisingly rich in comparison to other sites in the Białowieża Forest. At least five different phases of human occupation were identified, spanning from the early Bronze Age to the Modern Period[17], indicating that the Sacharewo microregion was inhabited for a very long time or, what is more probable, people returned there many times in the past. However, the collected artefacts were mostly dated to the Iron Age (IA) and the Roman Period (RP), i. e. the turn of the eras and the turn of the 5th and 6th centuries AD.

Our research concentrated particularly on the development of the settlement during this period, which is unique in the Białowieża Forest and in the whole Podlasie (Eng. Podlachia) region (Eastern Poland), where the transitional phase between the Hatched Pottery Culture (known also as Brushed Pottery Culture) to the Wielbark Culture[18] is poorly represented. Until recently the Hatched Pottery Culture dated from the 7th c. BC up to the 5th c. AD was known from northern and central Belarus and eastern Lithuania only. Recent studies show, however, that its western range reached the region between the upper Narew River and middle Bug River[19]. With this in mind, the following research questions related to the Sacharewo microregion were addressed in this study: what is the chronology of settlement at Sacharewo Clearing (was it continuous in the IA and RP and how does it fit in the regional cultural picture?) and the barrow cemetery at Sacharewo site 3? Did the settlement, barrow cemetery and field system functioned simultaneously, as elements of one microregion? Besides the analysis of archaeological finds, an integrated geo- and archaeobotanical study was conducted to briefly assess the conditions of human occupation during the period of interest and its impact on the natural background (soils and vegetation).

Materials and methods

Study area

Sacharewo is situated on the Bielsk Plain (Pol. Równina Bielska) which belongs to the mesoregion of the North Podlasie Lowland, a part of the East Baltic-Belarusian Lowlands[20]. The Plain is an undulating moraine plateau with numerous kame hills[21] formed by the Warta Stadial Ice Sheet[22] and the following deglaciation, which produced numerous kemes, crevasse fills, kettle holes, terminal depressions, and terminal moraine hills[23]. Later, the land relief was significantly remodelled under periglacial Weichselian (Vistulian) conditions.

The surficial geology of the area was formed by the basal till attributed to the Wartanian Stage of the Odranian glaciation. This till is covered with a rather thin coat of ablative sands, gravels and boulders. In result a vast undulating moraine plateau, with a thin (up to 1.0 m) cover of eluvial-deluvial sediments was formed. In places, the surface of the moraine plateau is diversified by low keme hills, built of sands and gravel with silts and clays. The vast ice-dammed lake plain, located about 0.5 km south of the site, is formed with Weichselian sands and fluvial-lacustrine silt covered with peats. Fine-grained aeolian sands of low dunes and plains of aeolian coversands were accumulated mostly in the late Weichselian. They are located in the northern part of Sacharewo and to the south at a distance of about 2.5 km[24]. The wide Leśna River valley floor in the immediate vicinity of the site is filled with sands with organic admixtures, gyttjas, peats and organic mud up to 1.5 m of thickness.

The climatic conditions of the Białowieża Forest are classified as Cool Temperate Continental with advections of Atlantic air masses. A mean year temperature for the period 1950–2015 was 6.9 °C and mean annual precipitation measured for 1950–2003 reached 627.5 mm[25]. The large area of

15 Wawrzeniuk/Urbańczyk (eds) 2021a; 2021b.

16 Krasnodębski *et al.* 2018.

17 Three phases related with the very beginning and the early Bronze Age, one with the Early Iron Age and the Roman Period. The latest phase of occupation is connected with early modern times (18th c. AD).

18 This transformation took place between 2nd/3th and 5th c. AD, Olczak *et al.* 2018, 167–171.

19 Olczak *et al.* 2018, 149–150.

20 Kondracki 2002; Solon *et al.* 2018.

21 Kondracki 1994; 2002.

22 Marks 2011; Marks *et al.* 2018.

23 Mojski 1967, 1969.

24 Kwiatkowski/Bałuk/Stepaniuk 2011; 2012.

25 Boczoń *et al.* 2018; Jaroszewicz *et al.* 2019.

the Białowieża Forest creates potentially fertile and very fertile habitats for mixed forests, alder and alder-ash forests (with dominant species as: alder *Alnus glutinosa*, ash *Fraxinus excelsior*, oak *Quercus robur* and birch *Betula pendula*) and medium-fertile habitats for coniferous forests with pine *Pinus sylvestris* and spruce *Picea abies* as the dominant species[26].

Study sites and findings

The Sacharewo settlement site itself (Sacharewo Clearing) is not detectable on ALS maps, while the barrow cemetery (Sacharewo, site 3) located about 400 m to the east, within the alleged ancient field system (Fig. 2A, B) is clearly visible. Within the radius of 1 km there are other mounds, situated in groups, in pairs or individually. However, unlike site no. 3, their chronology remains unclear.

During the 2019 and 2020 summer seasons 10 trenches ranging from 6 to 25 m^2 were excavated. Their locations were selected based on results of a geophysical survey (magnetometry, Fig. 3). They revealed a number of archaeological features and produced abundant material dominated by pottery (3271 potsherds). Due to modern-day ploughing, most of the artefacts were found in the topsoil, and thus devoid of original stratigraphic contexts. Nevertheless, an analysis of the pottery allowed for distinguishing five phases of settlement (Tab. 1; Fig. 15). Ceramics dated to the IA and RP accounted for over 80 % of the total number of pottery. Additionally, in 2020 and 2022 limited excavations were also conducted at Sacharewo site 3 (the burial mound cemetery): one trench was located between burial mounds 2 and 5 and one trench covered the NE quarter of burial mound 3 (Fig. 2B).

The limited size of the excavated area at Sacharewo Clearing (10 trenches, 184,5 m^2 in total) restricted the scope of possible spatial analyses of revealed features, despite the fact that the geophysical magnetic survey indicated a significant number of anomalies.

After the delimitation of the features they were explored according to standard archaeological methodology based on half-cutting in order to document their cross-sections. The first half was explored using the mechanical layers method, while the second one was excavated according to the stratigraphic units. In some cases it was possible to explore both halves with the latter method.

Of the 54 excavated features (Tab. Suppl. 1), only 28 contained material associated with the IA and RP. However, some of the pits should actually be dated to the 17th–18th c. AD (such as feature 1 in trench 4 and features 1 and 2 in trench 10), with IA and RP pottery occurring there as a secondary deposits. There were also 24 features devoid of artefacts, thus it was impossible to establish their chronology (besides a few exceptions, due to their relation to other features).

Tab. 1: Sacharewo Clearing site, quantitative and percentage division of pottery from different periods.

Pottery from Sacharewo Clearing		
archaeological chronology	**number of potsherds**	**percentage**
Neman Cultural Circle	13	0,40 %
Mierzanowice Culture	4	0,12 %
Trzciniec Culture	16	0,49 %
Early Iron Age and Roman Period (Hatched Pottery Culture and Wielbark Culture)	2705	82,70 %
Late Modern Period (18th c. AD)	544	16,29 %

Most of 2705 potsherds from the Sacharewo Clearing identified with the IA and RP were found in secondary contexts (topsoil and secondary deposits in some of the modern features), while culturally homogeneous features contained only 198 fragments. The latter were relatively uncommon and not very distinctive, which limited possible interpretation. The size of an average piece is below 2 cm, with only a few dozen sherds larger than 5 cm. Therefore, only 1655 pottery fragments were properly analysed. Pottery found in 2020 at Sacharewo site 3 (the burial mound cemetery, trench located between burial mound no. 2 and np. 5) was incomparably less numerous (24 fragments).

The surface finish (slightly smoothed or rough; hatched; roughened and polished) was analyzed in reference to the existing classification standards[27]. For each of the basic technological groups observations were made including correlation with the thickness of the vessel walls[28] (Fig. 6), granulometry (Fig. 8), colour of the tempering admixtures (Fig. 7), and the structure of fractures which reflect the quality of the ceramic mass (Fig. 9). This analysis referred to standards developed for Late Neolithic and Early Bronze Age ceramics from Cuyavia (Pol. Kujawy)[29]. The pottery analyses included also the description of types of rims and bases, as applied for Late Neolithic and Early Bronze Age

26 Sokołowski 2004; Matuszkiewicz/Solon 2007.

27 Olczak 2009.

28 Ibid.

29 Czebreszuk 1996.

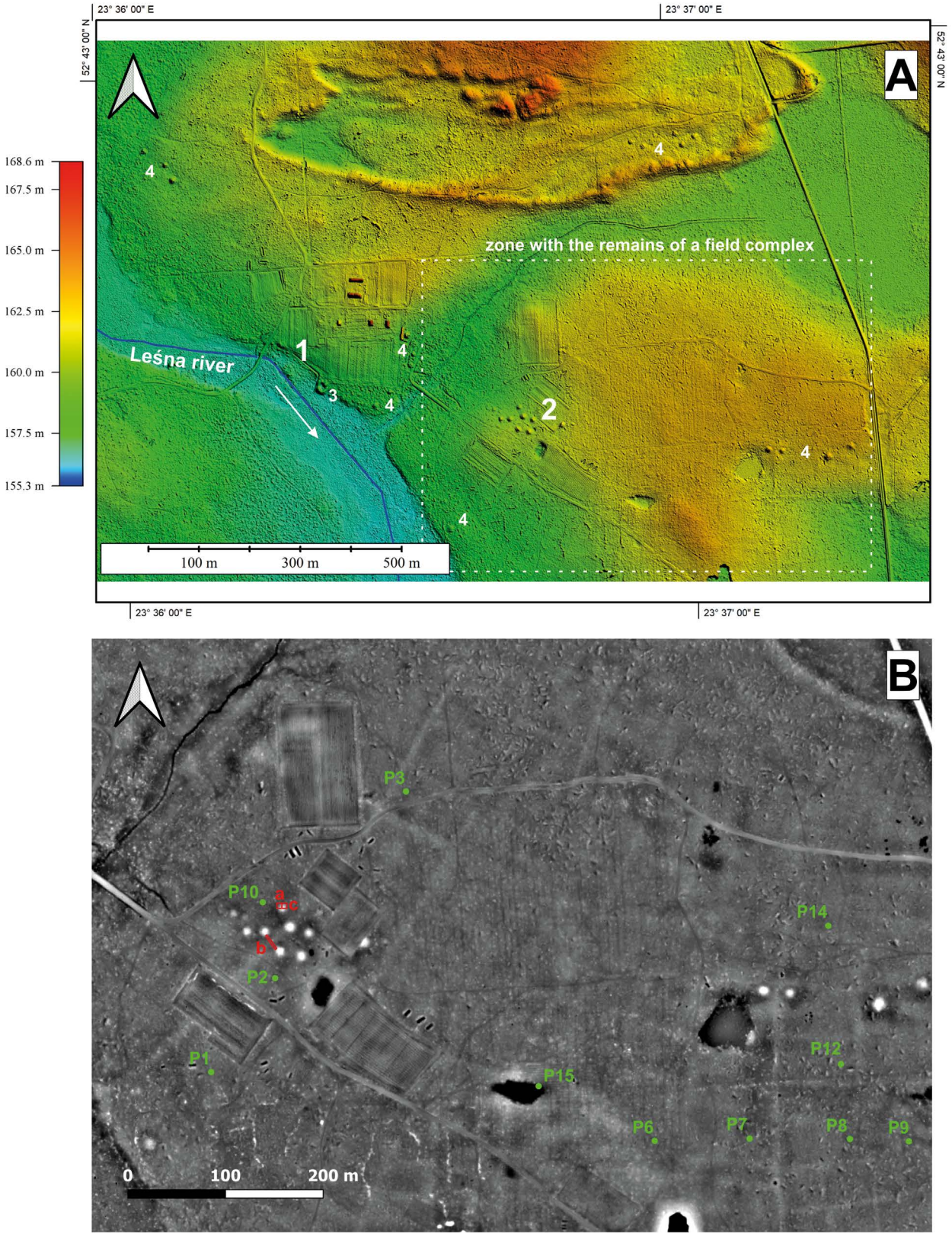

Fig. 2: A: Digital terrain model (based on ALS data) showing the area of Sacharewo Clearing and Sacharewo 3 sites (1 – Sacharewo Clearing, 2 – Sacharewo, site 3, 3 – charcoal piles, 17th–18th c. AD, 4 – unidentified mounds), B – ALS data imagery (simple local relief model) with visible rectangular plots separated by embankments (the field system at Sacharewo site 3 and its surroundings): a – trench 1, b – trench 2, c – trench 3; P1, P2 … – the studied and sampled soil profiles in test pits; the soil profile of trench 2 (b) was also studied and sampled (basemap source: ISOK project).

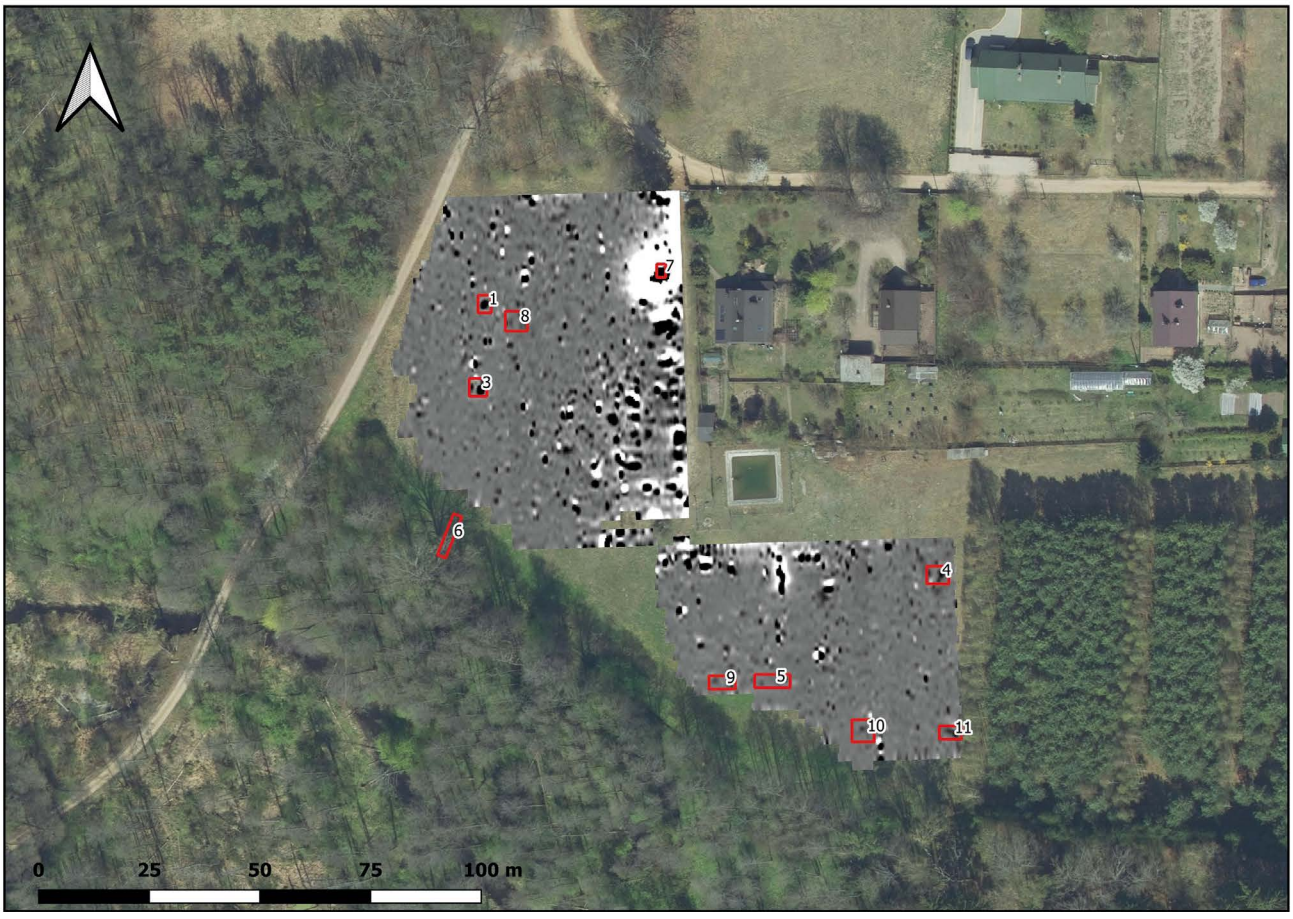

Fig. 3: Sacharewo Clearing site, locations of archaeological trenches against the background of geomagnetic prospection results (geophysics: P. Wroniecki, basemap source: geoportal.pl).

pottery in Kujawy[30] which proved its intercultural value[31]. The study included also an analysis of ornamentation.

Other artefacts discovered at the Sacharewo Clearing site included three spindle whorls (Fig. 10B: 5–7), a glass bead (Fig. 10B: 8), an unidentified bronze item (Fig. 10B: 9), and a silver coin (Fig. 11).

Soil analysis

Due to the location of the Sacharewo sites on terrain culminations and in the Leśna River valley, (i.e. in different geological settings), as well as known past human activity in the area, a variability of the soil cover could be expected. [32] In order to characterize the soils and elucidate possible human impact, the profiles of trenches 4, 5, 6, 9 and 11 (at Sacharewo Clearing, Fig. 16), as well as trench 2 and test pits P1–P3, P6–P10, P12 and P14 (at Sacharewo site 3 and its surroundings, Fig. 2B) were selected for closer study. The test pits were located within individual plots of the former field system visible in ALS visualisations and in different terrain positions (upslope and downslope), to assess potential soil erosion and enable archaeobotanical sampling. A wall of a nearby sand extraction pit served as a deep reference profile (P15). The soils were described using the FAO standards[33], classified according to the WRB[34] and 92 bulk samples for physico-chemical analyses were collected from mineral genetic horizons. After standard preparation, selected basic properties were determined in soil samples: pH (potentiometrically in suspension with water at a soil:water (w/v) ratio of 1:2.5 (Elmetron CPC-401)) and the content of total organic carbon (TOC) and total nitrogen (TN) using the CHNS analyser (Elementar Vario Macro-Cube). Additionally, the C/N ratio was calculated.

30 Kośko 1981; Czebreszuk 1996.
31 Rusin/Wawrusiewicz 2010, 127.
32 Kabała et al. 2021.
33 FAO 2006.
34 IUSS Working Group WRB, 2015.

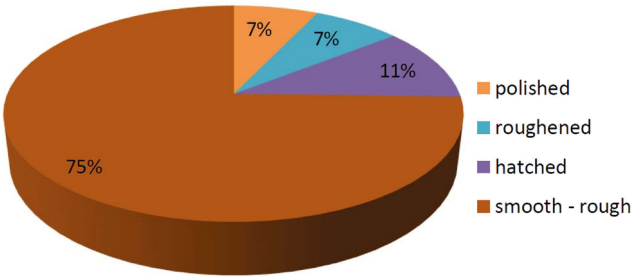

Fig. 4: Sacharewo Clearing site, general frequency of basic technological types of pottery from the IA and RP.

Plant macro-remains analysis

The archaeobotanical analysis was conducted to identify specimens (species) related to human presence and to select material for radiocarbon dating. 137 soil samples (each ca. 2 dm^3) collected at Sacharewo Clearing (from the infills of selected settlement features and from the trench profiles sampled every 5 cm) and Sacharewo site 3 (from the barrow layers and test pits, sampled every 10 cm) underwent flotation on sieves with a 0.3–2.5 mm mesh gradient. During the study only charred remains were selected and the remaining ones (uncharred) were treated as contemporary contamination, because at dry sites on light and highly permeable soils, only plant remains preserved in the process of incomplete combustion may survive[35]. A stereomicroscope (Olympus SZ30, ×9–80 magnification range) and a metallographic microscope (Olympus BH2, ×50–500 magnification range) were used for the analysis.

Taxonomic determinations of seeds and fruits were made by reference to published keys[36], while for the identification of charcoal F. Schweingruber's anatomical key was used[37]. A reference collection of seeds, fruits and modern wood was used for verification of taxonomic determination. Plant names are given according to the Polish botanical nomenclature[38].

Radiocarbon dating

The basis for determining the absolute chronology of the Sacharewo sites was a pool of 13 ^{14}C dates (S1–S13, Tab. 2), acquired from selected charred plant macroremains. Six radiocarbon dates (S8–S13) were obtained for the Sacharewo Clearing site, from botanical material recorded in the infills of 5 settlement features: pit 2 (S8, charcoal, 50 cm – all depths given as below the ground surface), pit 6 (S9, charcoal, 45 cm and S12, unidentified cereal grain Cerealia caryopsis, 65 cm), pit 1 (S10, barley *Hordeum vulgare* caryopsis, 60–70 cm), pit 7 (S11, spotted lady's *Polygonum persicaria* thumb achene, 60 cm), pit 10 (S13, rye *Secale cereale* caryopsis, 80 cm).

Another six radiocarbon dates were obtained for Sacharewo site 3, from charred plant macrofossils recovered from the mounds of barrow 5 (S4, charcoal, 40 cm and S5 black-bindweed *Fallopia convolvulus* achene, 30–40 cm– all depths given as below the top of the barrows) and barrow 3 (S1–S3, charcoals 40–50 cm and S7, raspberry *Rubus ideaus* seed, 60–70 cm).

One additional date was obtained from a common wheat caryopsis (*Triticum aestivum*) identified in the Bt horizon (20–30 cm below surface) in test pit P6, located ca 450 m SE from Sacharewo site 3, within one of the plots of the ancient field system.

12 samples were AMS dated in the Poznań Radiocarbon Laboratory[39], whereas one sample (S3) was sent to the Absolute Dating Laboratory in Skała also for AMS dating. All dates were calibrated using the IntCal20 dataset[40] and the OxCal 4.4.4 calibration software (https://c14.arch.ox.ac.uk/oxcal.html)[41]. Intervals of calibrated radiocarbon ages (cal yr BC/AD) were given with probabilities of ca. 68.2 % (68,3 %) and ca. 95.4 %.

Results

Pottery and other artefacts from Sacharewo Clearing site and Sacharewo site 3

Poor state of preservation of the pottery significantly limited the possibility of a precise determination of the forms and metric features of vessels. Therefore, the conclusions are of a rather general nature. The structure of the entire collection, and distribution of finds in trenches is presented in the graphs (Fig. 4–9).

The vast majority of pots had a rather sharp and distinct bend of the main part of the body (Fig. 13B: 4; 13C: 1, 5). There are also gently s-profiled specimens (Fig. 12B: 13). The necks were quite short, most often tilted slightly out-

35 Greig 1989, 15; Lityńska-Zając/Wasylikowa 2005, 42; 50–51.
36 Marek, 1954; 1958; Kulpa 1984; Körber-Grohne 1991; Cappers/Bekker/Jans 2006.
37 Schweingruber 2011.
38 Mirek *et al.* 2002.
39 Goslar/Czernik/Goslar 2004.
40 Reimer *et al.* 2020.
41 Bronk Ramsey 2009.

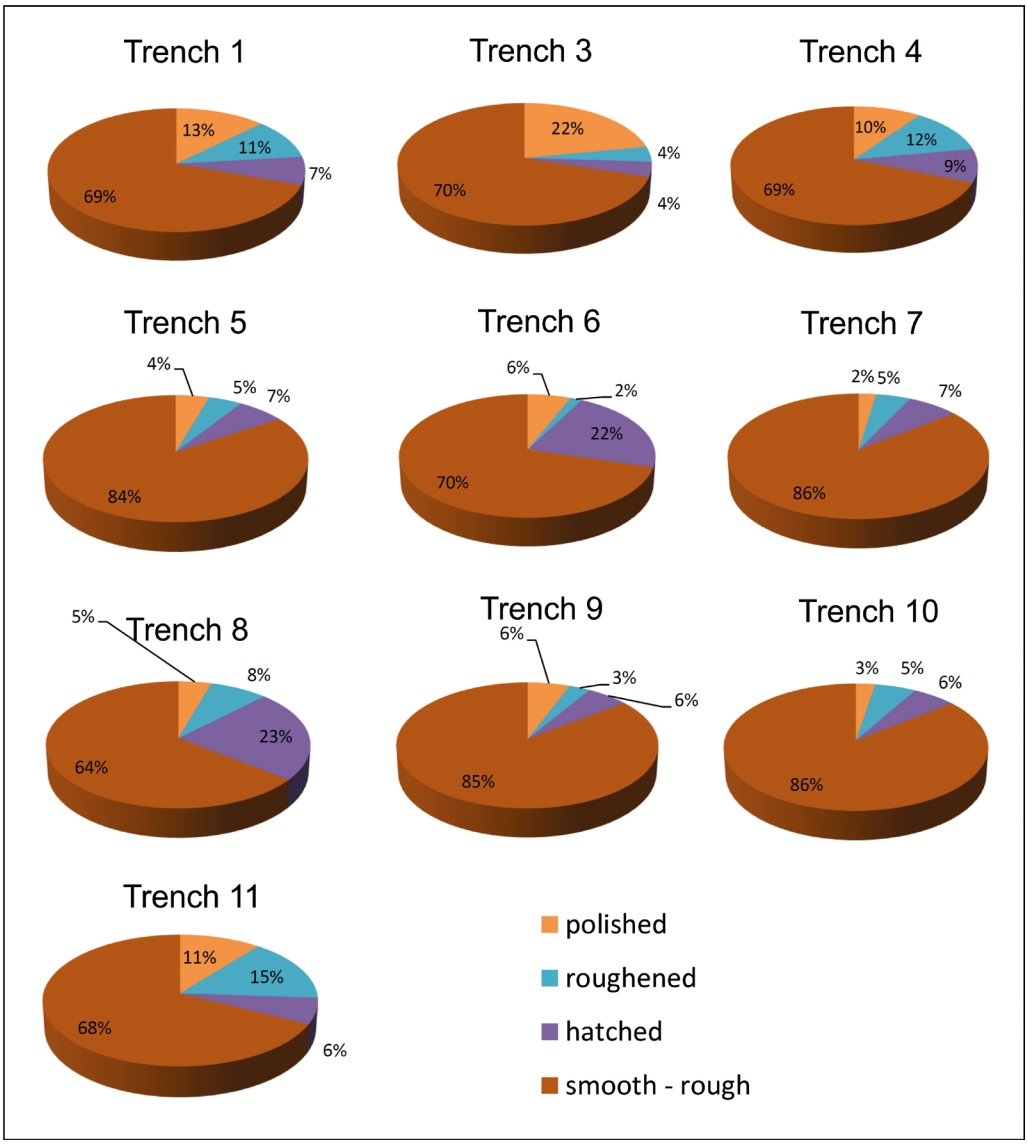

Fig. 5: Sacharewo Clearing site, general frequency of basic technological types of pottery from the IA and RP in relation to individual trenches.

wards (Fig. 12A: 4; 12B: 6; 13B: 4; 13C: 1, 5; 13D: 5, 8; 10A: 1, 7, 9). There are also forms with well-defined cylindrical necks (Fig. 10B: 7; 10D: 11, 12; 11A: 1, 3; 11B: 7; 12A: 13). Sharply profiled vases could have been equally common, which is indicated by proportions of the upper parts of some pots, where a short, outward-tilted neck and a main part are preserved, along with its widest part and a fragment of the lower part's profile (Fig. 12C: 17; 12D: 3). At least one of these vessels had a band-shaped ear, the lower part of which was attached to the sharply profiled, widest part of the body (Fig. 12D: 5).

The analysis revealed, that 25 out of 26 fragments of bases represent rather undifferentiated types, with no distinctive transitions between the bottoms and the lower parts of the vessels.

Decoration was found on only 35 pieces, which makes for slightly more than 1 % of the total collection. Motifs and ornamental techniques are rather limited. In 12 cases there are various compositions of horizontal or diagonal grooves. The following variants were distinguished: a single, horizontal groove (Fig. 12B: 7; 13B: 2, 3); bands composed of diagonal or vertical lines (Fig. 10A: 15; 12A: 3; 12D: 7; 13B: 4); zone layouts (Fig. 12B: 1; 13A: 10, 11; 13C: 6) and irregular hatches (Fig. 11A: 6). Fingerprints or pinching is quite common (Fig. 10A: 11; 12B: 8; 12D: 5; 13A: 7, 9, 11, 13; 13C: 2). Horizontal strips probably hooked on the upper part of the main parts of vessels are less common (Fig. 12C: 4). Incised rims are similarly rare. In one case, a considerable strip was additionally decorated with a band of diagonal imprints/

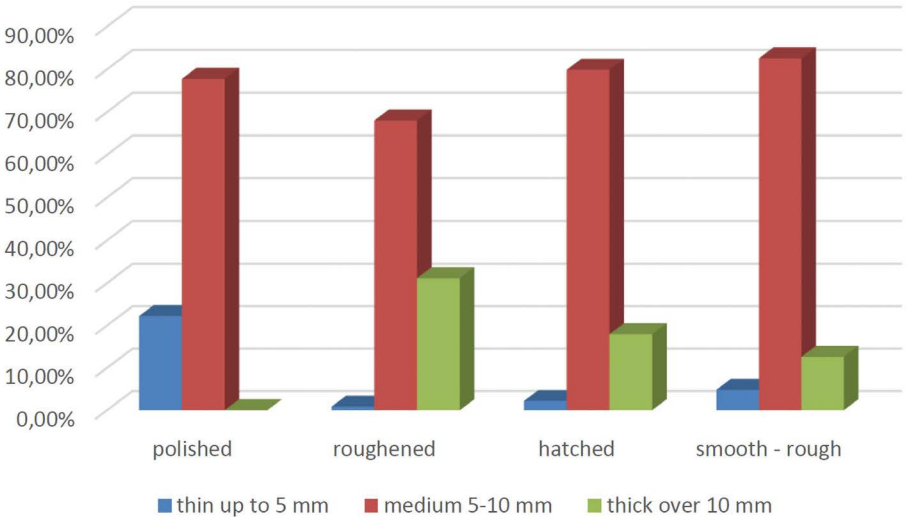

Fig. 6: Sacharewo Clearing site, frequency of vessel wall thickness determined for particular technological groups of pottery from the IA and RP.

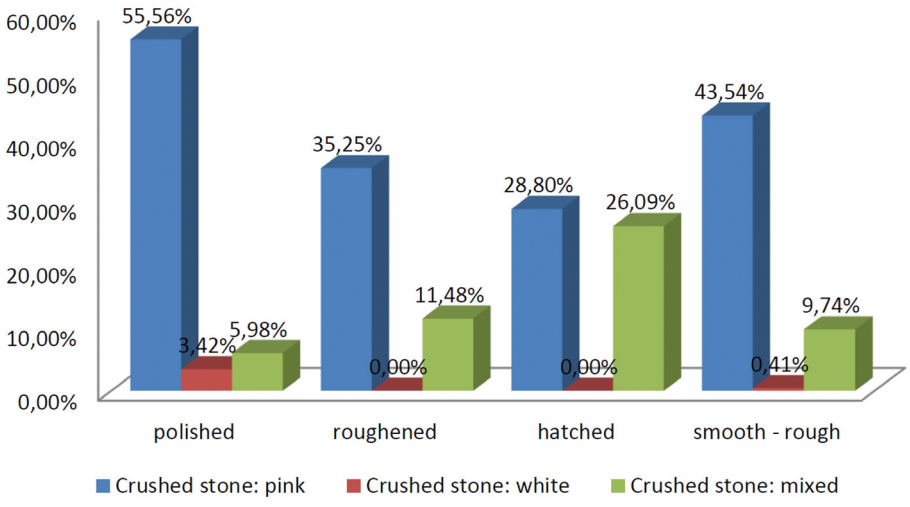

Fig. 7: Sacharewo Clearing site, frequency of colour of the applied mineral admixture determined for particular technological groups of pottery from the IA and RP.

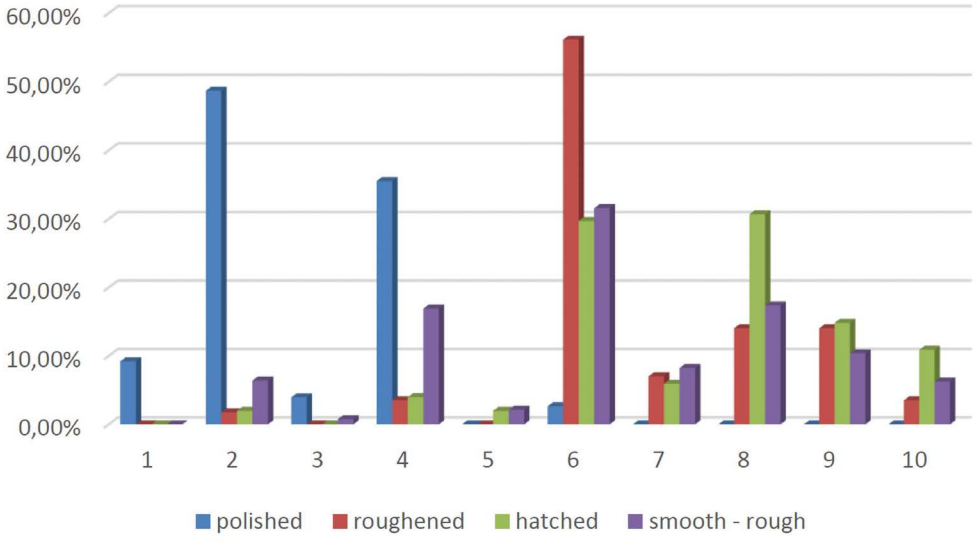

Fig. 8: Sacharewo Clearing site, frequency of granulometry of applied mineral admixtures determined for individual technological groups of pottery from the IA and RP.

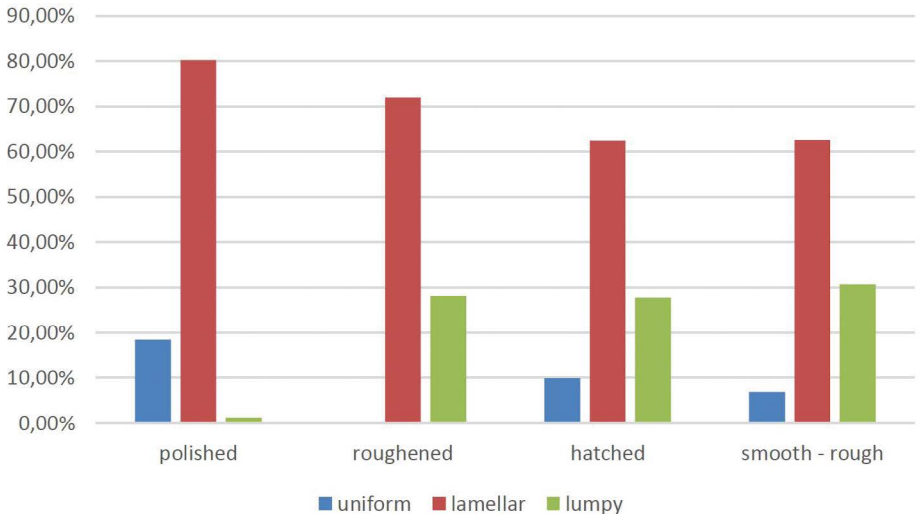

Fig. 9: Sacharewo Clearing site, the general frequency of pottery fractures determined for individual technological groups of pottery from the IA and RP.

engraved lines (Fig. 12A: 11). There is also a nodule superimposed on the outer surface of a thin-walled container (Fig. 13D: 3).

Pottery found at Sacharewo site 3, in the trench located between burial mounds 2 and 5 was associated with the Bronze Age Trzciniec Culture (4 potsherds), and with IA/RP (20 potsherds). The latter are consistent with the pottery acquired during the 2017 and 2022 excavation of barrow 3[42].

Very few non-ceramic artefacts have been discovered during the excavations at the Sacharewo Clearing site. These were three spindle whorls with biconical forms (Fig. 10B: 5–7), a bead made of black glass (Fig. 10B: 8), and an unidentified bronze item (probably ornament; Fig. 10B: 9). By far the most interesting artefact in this group is a silver coin which, however, was found a few years earlier in the garden directly adjacent to the excavated area. The coin is a popular Mark Aurelius denarius minted in Rome between December 162 AD and December 163 AD (Fig. 11). Unfortunately, the lack of the discovery context makes a connection of this coin to other finds rather speculative.

Plant macroremains

The results are described only briefly for the purpose of this text. Their detailed presentation and discussion will be given in a separate article.

Out of all 137 samples collected, only 22 (3 samples from the barrow cemetery – Sacharewo site 3 and 19 samples from the settlement – Sacharewo Clearing) contained charred plant macroremains and 202 remnants of plants were obtained in total. What is noteworthy, 96 % of them came from the settlement site. 192 remains were taxonomically identified, which proves a relatively good state of preservation of plant materials.

Of the identified remains, 24 were classified as species, other 5 to genus rank and 2 remaining to family rank. Large grains of grasses (*Poaceae* family), which were devoid of morphological features enabling their taxonomic identification, were classified to the synthetic *Cerealia* group – cereals.

Most of the identified plant diasporas represent weed and ruderal plant species. Inter alia, spotted lady's thumb *Polygonum persicaria* and black-bindweed *Fallopia convolvulus*, which were selected for AMS dating are included in this group.

The second largest group of plants found at the Sacharewo sites were cereals. Traces of common wheat *Triticum aestivum* and unspecified wheat *Triticum* sp., rye *Secale cereale*, barley *Hordeum vulgare* and millet *Panicum miliaceum* were found there. It is possible that the found fruits of oat *Avena* sp. are also remains of a cultivated taxon, however, a definitive confirmation of this is not possible due to the morphological similarity between the grains of common oat *A. sativa* and wild oat *A. fatua* (cereal weed). Rests of large caryopses included in the *Cerealia* group should also be interpreted as cereal remains. There were also 4 representatives of meadow and pasture plants.

Soil characteristics

Soils observed in profiles of trenches 5, 6 and 9 (at Sacharewo Clearing) located closest to the Leśna River (Fig. 16),

42 Krasnodębski *et al.* 2018.

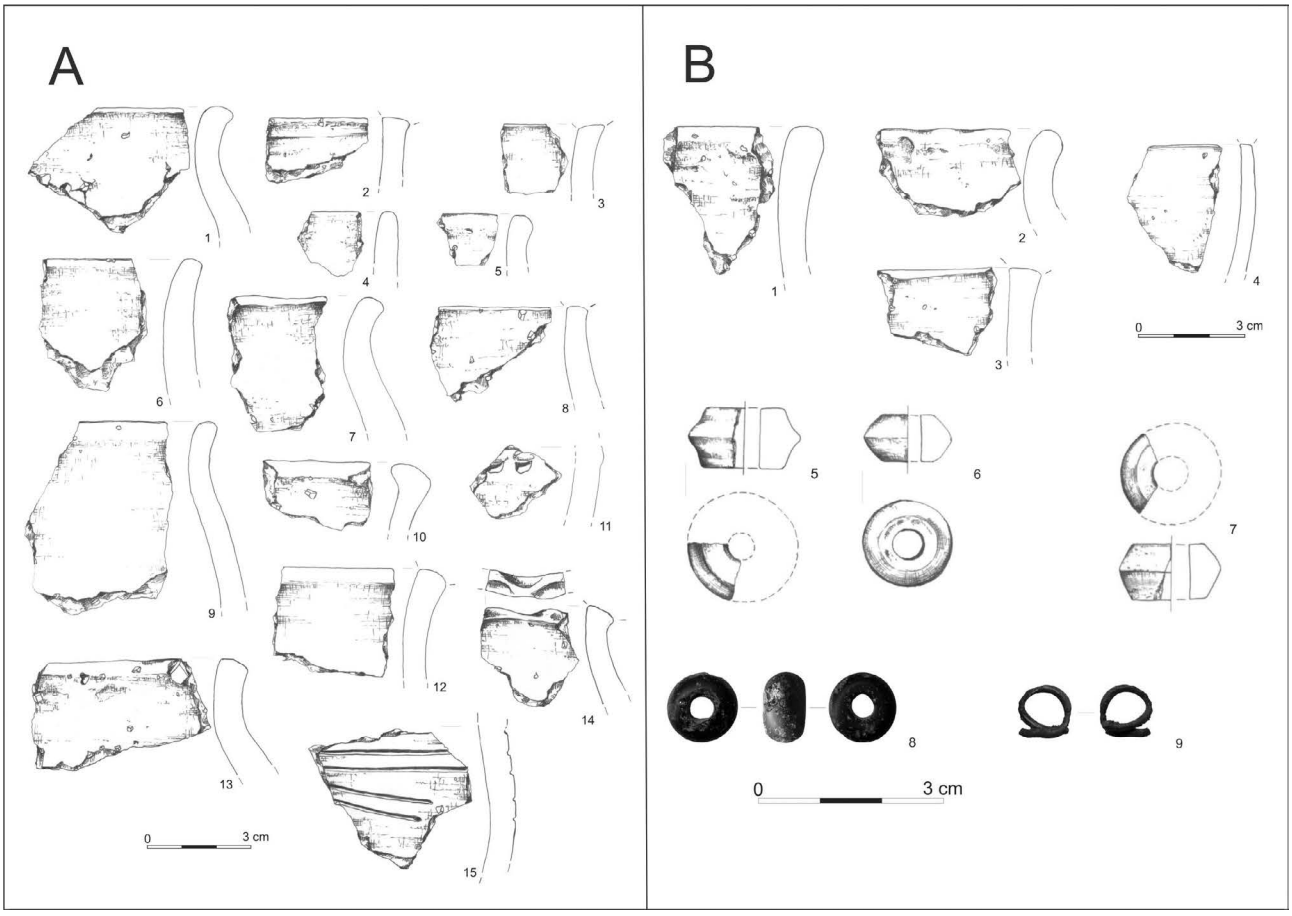

Fig. 10: Sacharewo Clearing site, a selection of pottery and other artefacts.

Fig. 11: Sacharewo Clearing site, silver coin – Marcus Aurelius denarius; Av.: head of the emperor in a laurel wreath is facing right, surrounded by MANTONINVSAVG; Providentia is facing left, surrounded by PROVDEORTRPXVIICOSIII.

had relatively thick humus horizons (39–52 cm) with granular/sub angular structures and discernible stratification – their lower parts (A2 horizon) showed slightly darker colours. Redoximorphic mottling was visible both in the A1 and A2 (in profiles of trenches 5 and 9) and gleying was noted below the topsoils (in the AC and C). Possible signs of modern ploughing may be seen in profiles of trenches 5 and 9 (the Ap horizon). These soils were classified as Gleyic Umbrisols and Haplic Umbrisols. The profiles of trenches 4 and 11 (at Sacharewo Clearing) located higher in the terrain, displayed relatively thick humus horizons (40–42 cm), no signs of redoximorphic features and sharp boundaries with identifiable B horizons underneath. Animal (mammal) burrowing was well pronounced and modern-era ploughing was marked in the profiles. These soils were classified as Brunic Umbrisols. The soils at Sacharewo Clearing were characterized by relatively high TOC content in surface humus horizons – between 10.08 and 82 g kg^{-1} and soil reaction from strongly acidic to neutral. The content of TN ranged from 0.93 to 8.00 g kg^{-1}. The values of TOC/TN ratio were within the range of 10–16.

Trench 2 at Sacharewo site 3 (Fig. 2B: b) exposed sections of two barrows (no 2 and 5, although not in their culminations), as well as two former field plots separated by a slightly raised boundary balk – almost imperceptible in the terrain and recognized only in ALS visualisations. The profiles of the barrows and the field embankment were similar

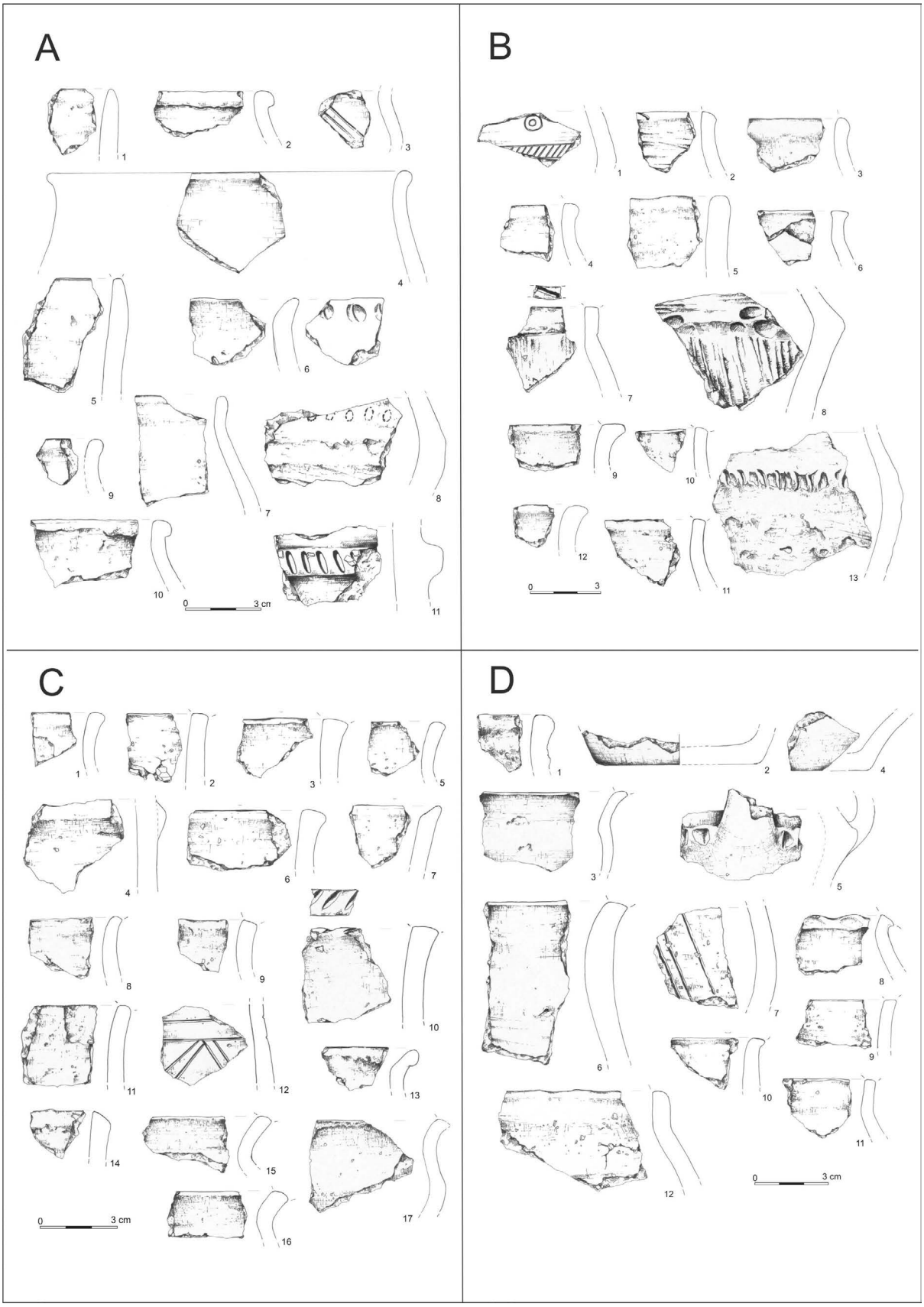

Fig. 12: Sacharewo Clearing site, a selection of pottery from the IA and RP.

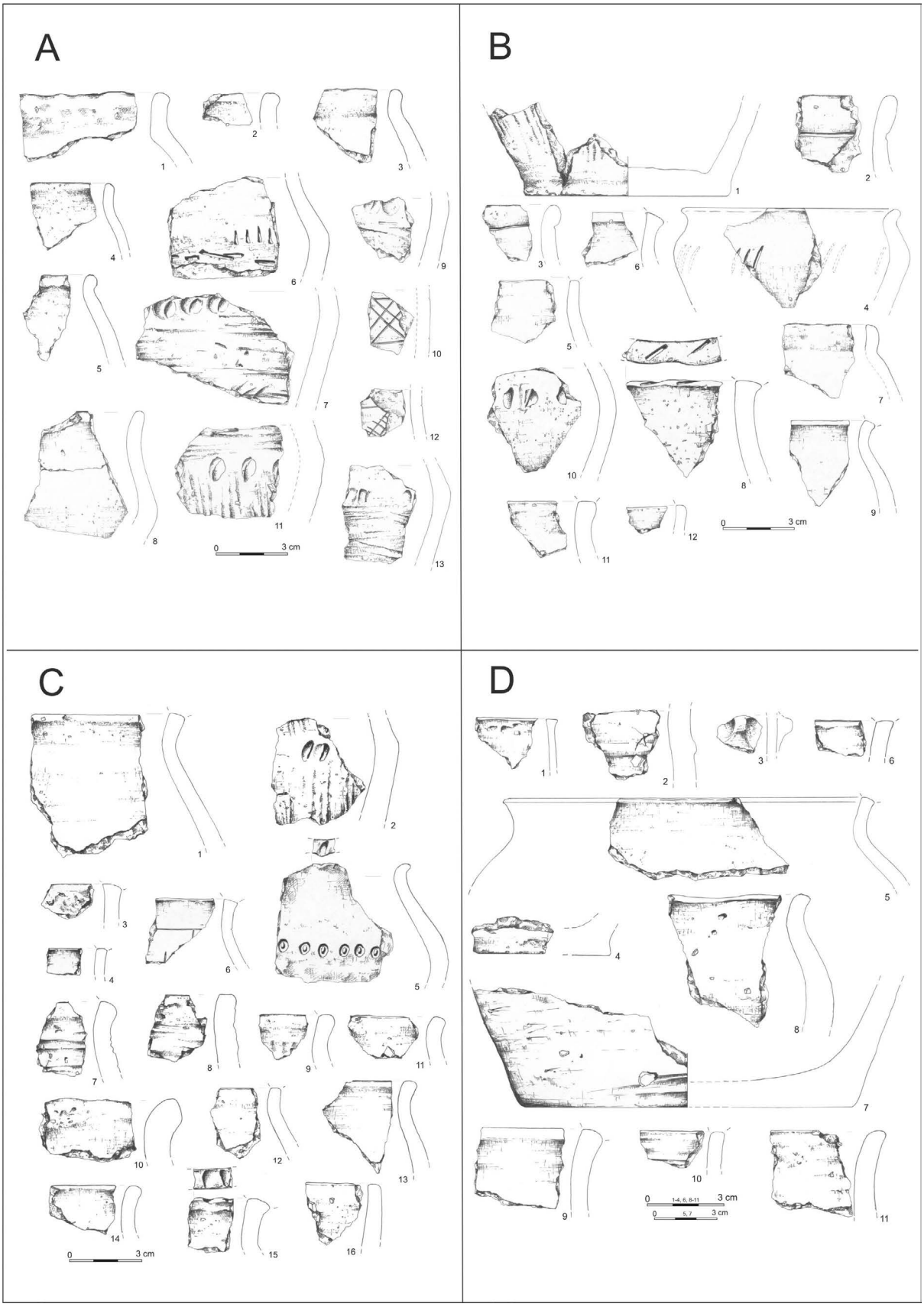

Fig. 13: Sacharewo Clearing site, a selection of pottery from the IA and RP.

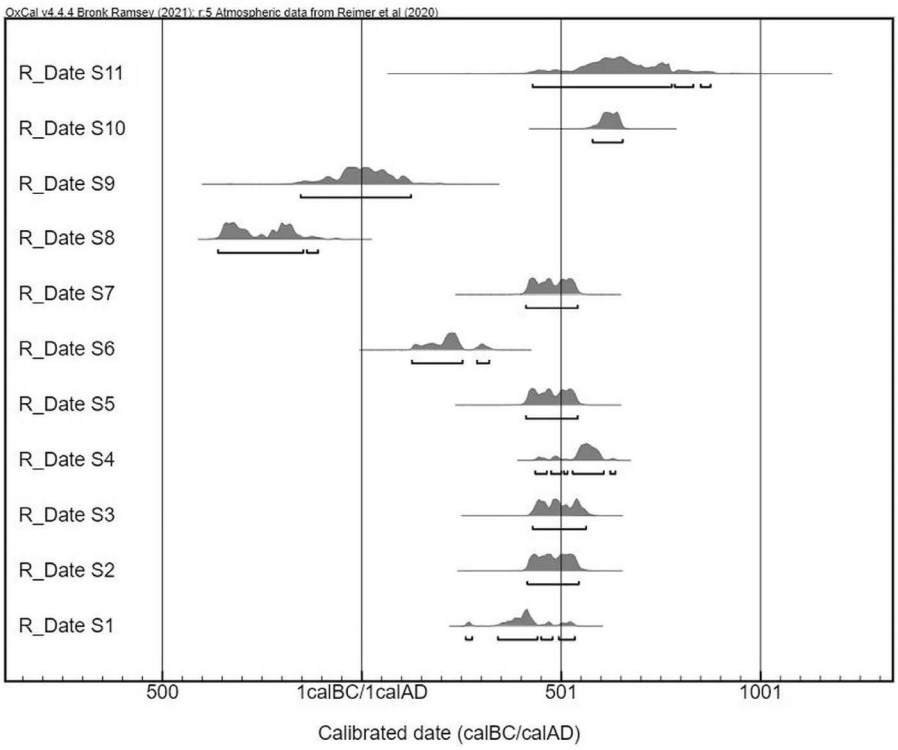

Fig. 14: Chronological distribution of ^{14}C dates discussed in the paper.

to the "natural" soil observed in the upper part of the P2 test pit (Brunic Arenosol, ca 40 m southwards, see below), with the exception of slightly thickened A2 and ABv horizons. No distinct interfaces with buried soils could be recognized. Thin iron-rich laminae were noted in the C horizons. TOC content in humus horizons of these profiles ranged from 12.74 g kg^{-1} to 34.87 g kg^{-1}, TN content – 1.12–2.35 g kg^{-1}, and TOC/TN ratio – 11–15.

Test pits P1–P3 and P10 demonstrated a differentiated soil cover in the area of Sacharewo site 3 and the adjacent part of the supposed field system (Fig. 2B). Profiles located on higher ground (P2 and P3) showed truncated Haplic Luvisols in their lower parts overlain by Brunic Arenosols. Profiles located on the slope and towards the foot-slope (P10 and P1, respectively) had profiles characteristic for Brunic Arenosols, but with relatively thick ABv horizons (up to 50 cm), what suggests input of colluvium. Noteworthy is the reasonably low TOC content in these (P1–P3 and P10) soils. No macroscopic features suggesting ploughing were identified. Additional profiles located at the former arable fields (P6–P9, P12, P14 and the P15 reference profile) also showed different soil types and were classified as Haplic Luvisols (P6, P8, P14), Dystric Gleysols (P7, P9), and Dystric Cambisols (P12). Their morphology did not show changes associated with slope processes. There were also no clear macroscopic features indicating former agricultural use. All soils were characterized by mainly acidic soil reaction. The content of TOC and TN in surface humus horizons ranged between 13.35 g kg^{-1} and 68.79 g kg^{-1} and from 1.03 g kg^{-1} to 5.90 g kg^{-1} respectively. TOC/TN values in the humus horizons ranged from 10 to 14. The reference profile (P15) was classified as a Haplic Luvisol. Its humus horizon was characterized by relatively low TOC (8.14 g kg^{-1}) and TN (0.69 g kg^{-1}) content compared to neighbouring soils. Soil reaction in topsoil was acidic and neutral and alkaline at the soil bottom due to the content of $CaCO_3$.

Absolute chronology

The radiocarbon determinations revealed a relatively wide timespan (Fig. 14, tab. 2) with most of the dates concentrated between the 4th and 6th c. AD (S1-S5, from Sacharewo site 3; S9 from Sacharewo Clearing), in the late RP and the Migration Period. However, the earliest date (S10 from Sacharewo Clearing) falls between the 1st half of the 4th c. BC and the 1st half of the 2nd c. BC, clearly standing out from the rest and indicating IA chronology, similarly to the second earliest date (S11 from Sacharewo Clearing: 1st c. BC/1st c. AD). S8 from the Sacharewo Clearing gave also a relatively early date, pointing towards the turn of the IA and RP (1st half of the 2nd c. AD to the 1st half of the 3rd c. AD). S12 from the Sacharewo Clearing is noteworthy due to late chronology, that could be related with the very beginning of the Early Medieval Period (1st half of the 7th c. AD). The youngest date (S6 from test pit P6) with the timespan between the 2nd half

Tab. 2: list of ^{14}C dates from the Sacharewo Clearing, Sacharewo site 3 and test pit P6.

Sample	^{14}C age (PB)	Calibrated age (68.2 %)	Calibrated age (95.4 %)	Lab. code	Description of sample
S1	1655±30	AD 352 (13.1 %) AD 367 AD 380 (55.1 %) AD 421	AD 262 (2.0 %) AD 277 AD 328 (87.9 %) AD 431 AD 492 (5.6 %) AD 530	Poz-96964	Sacharewo site no. 3 – charcoal from barrow no. 3
S2	1600±30	AD 411 (18.4 %) AD 435 AD 452 (11.6 %) AD 471 AD 487 (38.2 %) AD 534	AD 399 (95.4 %) AD 539	Poz-99169	Sacharewo site no. 3 – charcoal from barrow no. 3
S3	1567±25	AD 430 (55.3 %) AD 493 AD 511 (5.7 %) AD 518 AD 529 (7.2 %) AD 537	AD 421 (95.4 %) AD 550	MKL-A3872	Sacharewo site no. 3 – charcoal from barrow no. 3
S4	1520±30	542AD (68.3 %) 596AD	436AD (6.5 %) 465AD 475AD (7.3 %) 501AD 508AD (1.1 %) 517AD 530AD (78.5 %) 608AD 624AD (2.0 %) 637AD	Poz-128930	Sacharewo site no. 3 – charcoal from barrow no. 5
S5	1610±30	419AD (17.9 %) 440AD 454AD (19.0 %) 478AD 496AD (31.3 %) 534AD	413AD (95.4 %) 542AD	Poz-134443	Sacharewo site no. 3 – plant macro-remain (achene, *Fallopia convolvulus*) from barrow no. 5
		Calibrated age (68.3 %)			
S6	1180 ± 30	775AD (12.1 %) 791AD 821AD (56.2 %) 891AD	771AD (82.7 %) 900AD 917AD (12.8 %) 973AD	Poz-157228	Location ca. 450 m SE from Sacharewo site no. 3 – plant macro-remain (caryopsis, *Triticum aestivum*) from pedological test pit no. 6
S7	1460 ± 100	439AD (5.5 %) 461AD 477AD (5.2 %) 497AD 533AD (57.5 %) 665AD	383AD (95.4 %) 775AD	Poz-158007	Sacharewo site no. 3 – plant macro-remain (compound fruit, *Rubus ideaus*) from barrow no. 3
		Calibrated age (68.2 %)			
S8	1830±30	137AD (68.2 %) 220AD	86AD (3.5 %) 109AD 117AD (91.5 %) 252AD 307AD (0.5 %) 311AD	Poz-120753	Sacharewo Clearing – charcoal from feature no. 2, trench no. 1
S9	1610±30	400AD (29.5 %) 433AD 461AD (3.2 %) 466AD 489AD (35.5 %) 532AD	392AD (95.4 %) 538AD	Poz-120754	Sacharewo Clearing – charcoal from feature no. 6, trench no. 5
		Calibrated age (68.3 %)			
S10	2175±30	351BC (41.6 %) 290BC 209BC (26.7 %) 171BC	361BC (92.0 %) 147BC 138BC (3.5 %) 110BC	Poz-129475	Sacharewo Clearing – plant macro-remain (caryopsis, *Hordeum vulgare*) from feature no. 1, trench no. 3
S11	2010±50	51BC (68.3 %) 76AD	154BC (95.4 %) 124AD	Poz-129532	Sacharewo Clearing – plant macro-remain (achene, *Polygonum persicaria*) from feature no. 7, trench no. 3
S12	1435±30	605AD (68.3 %) 645AD	580AD (95.4 %) 655AD	Poz-129533	Sacharewo Clearing – plant macro-remain (caryopsis, *Cerealia*) from feature no. 6, trench no. 5
S13	1400±100	555AD (58.1 %) 705AD 738AD (10.2 %) 772AD	429AD (89.2 %) 778AD 786AD (4.5 %) 832AD 851AD (1.7 %) 875AD	Poz-129534	Sacharewo Clearing – plant macro-remain (caryopsis, *Secale cereale*) from feature no. 10, trench no. 5

of the 8th c. AD and the 2nd half of the 9th c. AD falls within the Early Medieval Period. Two dates (S7 from Sacharewo site 3 and S13 from Sacharewo Clearing) contained a low amount of carbon (0.05 mg), resulting in a high uncertainty of the age determination. However, chronologically they do not diverge from the other dates, indicating a wide timespan between the 1st half of 5th c. AD and the 2nd half of the 7th c. AD (S7) as well as between the 2nd half of the 6th c. AD and the 2nd half of the 8th c. AD (S13) a period from the late RP until the Early Middle Ages.

Considering all the available dates it is visible that the radiocarbon determinations acquired from Sacharewo site 3 are chronologically "concentrated" (between the 4th and 6th c. AD), unlike the ^{14}C ages from the Sacharewo Clearing, which cover a wider time interval (4th c. BC – 7th c. AD).

Discussion

Chronology of Sacharewo Clearing and Sacharewo site 3

The chronology of occupation at the Sacharewo Clearing and Sacharewo site 3 can be established based on pottery and radiocarbon dates. The ornamentation of the pottery from Sacharewo Clearing (e. g. horizontal plastic strips, diagonal grooves) has parallels in the Wielbark Culture and East Baltic cultures cemeteries from the B2/C1–C1, C1b–C2 and C3–D phases, i. e. late RP until the Migration Period. These parallels can be linked with a timespan from the beginning of the 2nd to the mid-5th c. AD. Another chronological clue is given by the specific ornamentation (finger prints and pinching on the widest part of the vessels) and morphology (sharp profiling of the vessels with hatches on their surfaces). These features correspond to the late stage of the Hatched Pottery Culture in NW Belarus (Poniemnie region), NE Poland and central Belarus[43]. This points towards the period from the end of the 1st millennium BC until the decline of these cultures, which in some areas of Belarus lasted until the mid-5th c. AD[44], while in Podlasie they functioned at least until the 2nd half of the 3rd c. AD – 1st half 4th c. AD, as confirmed by the ^{14}C-dated Hatched Pottery Culture settlement from Białystok, site 1 (2nd half of 3rd c. AD – 1st half of 4th c. AD)[45]. Such a timeframe corresponds with the broad chronology of biconical spindle whorls found at the Cecele cemetery (ca. 60 km W from Sacharewo) in graves dated from the C1b phase until the end of the use of the necropolis (i. e. phase C3–D)[46].

These parallels match the radiocarbon dating of the Sacharewo settlement (Tab. 2; Fig. 14). Charcoal from feature 2 (sample S8) indicates 137–220 AD (68.2 % probability). A later date 400–532 AD (68.2 % prob.) was obtained for charcoal from feature 6 (sample S9). There are also some earlier dates, e. g. one acquired for the *Hordeum vulgare* caryopsis discovered in feature 1 (S10) revealed a time range 351–171 BC (68.3 % prob.). However, such an early date does not coincide with the pottery discovered at Sacharewo Clearing. Therefore, this macro remain could be a secondary deposit within that feature. Another plant macrofossil from feature 7 (S11) gave the time range 51 BC – 76 AD (68.3 % prob.). This date is more reliable and may suggest that the chronology of the analysed settlement began not earlier than at the turn of the BC and AD, and probably terminated at the turn of the 5th and 6th centuries AD, which holds both with the dating of pottery and with absolute dates[47].

Chronology of the barrow cemetery (Sacharewo site 3, samples S1–S5, S7) seems more straightforward, because all dates indicate the 4th–6th centuries AD[48], which corresponds with the dating of the pottery from this site[49], although these finds were very rare and uncharacteristic. However, it is possible that these ^{14}C dates offer in fact a *terminus post quem* for the construction of the burial mounds. The latter were built using local soil material, amassed from the immediate vicinity, as suggested by the similarity of the barrow profiles and the nearby reference test pit (P2, Brunic Arenosol). Before becoming elements of the mound layers, the charred macrofossils could have been residues in the original soil cover – the presence of charcoal, *Fallopia convolvulus* and *Rubus ideaus* remains should not be surprising, considering the existence of a field system in the area[50] (see also below).

43 Rusin 1998; Krasnodębski/Olczak 2002; Karczewska 2009; Olczak 2009; Medvedev 1996, 18–20; Egarèjčanka 1999, 119–122; 2006, 16–20; 60–72; Medvedev 2011, 28–34; Krasnodębski, Olczak 2002, 219–220; Belâvec 2004, 239–243; Karczewska 2009, 231–234; Olczak/Krasnodębski 2022.

44 Medvedev 1996.

45 Kryński 2010, 58–59.

46 Jaskanis 1996.

47 It should be noted, however, that two other dates point to an even later period, i. e. 7th (S12) and 8th c. AD (S13), although in the case of the latter date the margin of error was about 100 years, which undermines its credibility.

48 Only S7 extends beyond this period, but the dating accuracy of this sample is lower (+/–100 years).

49 Krasnodębski *et al.* 2018.

50 cf. Krupski *et al.* 2022.

Settlement activities at Sacharewo Clearing

The majority of features dated to the IA and RP (Fig. 16; Tab. Suppl. 1) were pits used for purposes, which are hard to identify. Feature 6 (Fig. 17A) deserves special attention because archaeobotanical analysis revealed the presence of undetermined species of cereals (*Cerealia*) and weeds (*Chenopodium album, Galium aparine*) in its infill. The size and shape of this feature may suggest that it was a storage pit. Equally interesting at this site are the fireplaces, some of which had stone settings – e. g. feature 2 (Fig. 17B, C) and feature 1 (Fig. 17D). The latter produced rich archaeobotanical evidence (unidentified cereal, barley, common wheat, millet and weed – spotted lady's thumb *Polygonum persicaria*). The presence of stones (i.a. a quern) and clay indicates that this might have been a damaged furnace. Other features common in present-day Polish lands during the RP (e. g. sunken huts)[51] were not recorded at Sacharewo Clearing, however the occurrence of numerous post-holes suggests that some aboveground structures had existed. At least some of the post-holes could be the remnants of pillars supporting roofs over the alleged furnaces.

Macro remains of cultivated plant species (e. g. barley and rye) from contexts chronologically related with the IA and RP indicate agricultural activity in the Sacharewo area. Its impact on the local plant cover is confirmed by pollen diagrams available for the Białowieża Forest[52]. On the other hand, artefacts like spindle-whorls, ornaments (a glass bead and part of a bronze wire) and a Roman silver coin[53] testify to a wider range of activities during the RP. However, so far there is no evidence of any specific craft-specialization, such as iron production at the Berezowo Clearing site[54].

At present it may be concluded that the excavated area was a settlement during the IA and RP (a single homestead, which over time occupied different locations?), or most probably, the edge of a settlement. Its spatial organisation was most likely influenced by the terrain. The close proximity of the watercourse was a major factor in the development of soils in the lower-lying area of the Sacharewo Clearing site. Prolonged water saturation is well recorded in the bottom parts of profiles 5, 6 and 9, while the accumulation of organic matter in moist conditions (periodical waterlogging), led to the formation of thickened topsoils. Their uppermost (ca 30 cm-thick) horizons became increasingly dry and mineralized (hence lighter in colour) after the water table had lowered, presumably due to artificial drainage improvement of the Leśna River in modern times. Therefore, it seems that the zone closest to the Leśna River might have been unsuitable for more permanent occupation in prehistory, due to waterlogging. This probably explains the lack of archaeological features in the SW part of trench 6 and in trench 9. Soils on higher ground (in trenches 4 and 11) developed in more dry hydrological conditions, perhaps with inputs of slope-wash deposits translocated down the gentle slope. Only modern-era agricultural activity (ploughing) was marked in these profiles.

Stability of the settlement (continuation or discontinuation?)

Considering the broad chronology (IA and RP) of settlement activities at Sacharewo Clearing, it remains a question whether inhabitation of this area was continuous or involved several occupation episodes. Statistical comparisons of the diverse pottery collections from various parts of the site (Fig. 5; 15) did not reveal any cultural and chronological diversity of the settlement (or settlements?), like overlapping of different zones of economic activity at different times – all the basic technological groups were present in all excavated trenches and their shares were similar. In some cases, the number of polished vessels was higher than finds of the hatched pottery (trench no. 3; Fig. 5) or *vice versa* (trench no. 6; Fig. 5), what may indicate functional diversity within the investigated area. The same differentiation in pottery statistics is typical for all sites with hatched pottery in the whole of Podlasie[55]. Therefore, the described archaeological material from Sacharewo Clearing should be interpreted in terms of one, albeit long-lasting settlement period. This is mirrored by the results of palaeoenvironmental analyses, which indicate poorly marked settlement episodes during 1200–650 BC and 50–500 AD. Both these periods are marked by disturbances in deciduous forest habitats[56]. Thus, probable beginning of settlement at Sacharewo Clearing, determined on the basis of the radiocarbon date (S11) and pottery analysis to the turn of the eras, would have taken place when human activity in the forest area was becoming more "visible" in palynological diagrams. This happened after a ca. 700-year long hiatus, when local settlement (if any) had had such a low

51 Kobyliński 1988.

52 Latałowa *et al.* 2016, 32–33; Zimny *et al.* 2017, 47–48.

53 Assuming its homogeneity with the rest of the materials from the discussed site.

54 Olczak *et al.* 2018.

55 Olczak 2009.

56 Latałowa *et al.* 2016, 32–33; it needs to be mentioned here, that between 1800 BC and 1400 AD the frequency of pollen related with plants typical of anthropogenic habitats had increased, although with a negligible share of agricultural indicators.

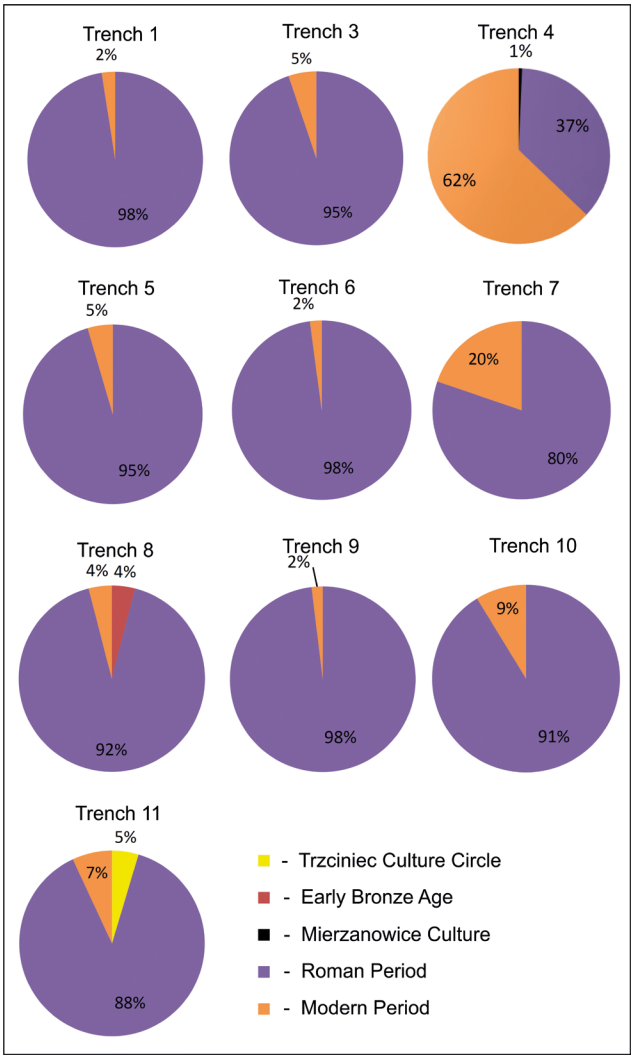

Fig. 15: Sacharewo Clearing site, distribution of pottery from different periods in relation to individual trenches.

impact on the natural surroundings, that it has not left any traces in the currently available pollen data[57]. From the 2nd and 3rd centuries AD onwards, the intensity of settlement in the Sacharewo microregion increased significantly, what is demonstrated by a large amount of archaeological material (pottery), presence of radiocarbon-dated archaeobotanical remains and palaeoecological evidence.

The Sacharewo microregion in the first centuries AD

Three major elements of the Sacharewo microregion have been identified archaeologically so far – the settlement at Sacharewo Clearing, with a peak of activity in the IA and RP (1–5/6th c. AD), the barrow cemetery at site 3 (4th–6th c. AD *terminus post quem*) and the extensive field system in the surroundings of the burial mounds and stretching eastwards (Fig. 2A, 2B). The soils within the former field system (test pits P1–P15) show spatial differentiation, which in two cases can be tentatively linked with past human activity. Profiles P1 and P10 located in lower terrain positions have profiles characteristic for Arenosols, but with relatively thick ABv horizons, which may suggest input of colluvial material. This was not observed in the other profiles, including those belonging to two transects (P6–P9 and P14–P12–P8) in the E-part of the field complex, so possibly the slope processes occurred only locally. Vegetation clearance and agricultural practices are known to trigger erosion and cause translocation of soil surface material down the slope[58]. Recent studies of another field system in the Białowieża Forest, at the site of Postołowo (ca 9 km NE from Sacharewo), revealed episodes of cultivation (including rye) – during the ca 2nd c. AD (related to Wielbark Culture communities) and the ca 10th c. AD (related to Slavic settlement), which led to a slight enrichment of the soil in charcoal and colluviation, that formed thickened A horizons in the lower lying areas of the field system there [59].

At Sacharewo the suspected past agricultural land-use did not significantly alter the chemical properties (TOC and TN) of soils observed in test pits. The latter contained little archaeobotanical evidence pertaining to cultivation: a single caryopsis of common wheat (*Triticum aestivum*) was discovered in P6 and radiocarbon dated to 775–891 AD (68.2 % probability), which may suggest that at least a certain part of the field system was used in the Early Medieval Period. However, assuming that the macroremains (charcoal, *Fallopia convolvulus* and *Rubus ideaus*) recovered from the barrows 3 and 5 (Sacharewo site 3) were originally elements of the local soil, also an earlier agricultural episode in the RP (4th–6th c. AD) cannot be excluded. It is likely that the field complex developed gradually in time, with cultivation shifting from one plot/area to another[60], and that a part of the former arable land (the present-day

57 The pollen profile from Czerlon (i. e. the one which shows phases of limited human impact in the periods 1200–650 BC and 50–500 AD, see: Latałowa *et al.* 2016, Ryc. 1) is located ca. 9,5 km from Sacharewo Clearing. This is a large distance from the viewpoint of comparing palynological and archaeological data. However, this is the single source of high quality palynological data within this part of the Białowieża Forest, as the profiles from the Białowieża National Park are located even further away; moreover, except for one of them, these profiles do not cover the last centuries BC (see: Zimny *et al.* 2017).

58 Dreibrodt *et al.* 2010; Kittel 2014; Zádorová/Penížek 2018.

59 Krupski *et al.* 2022.

60 Ibid.

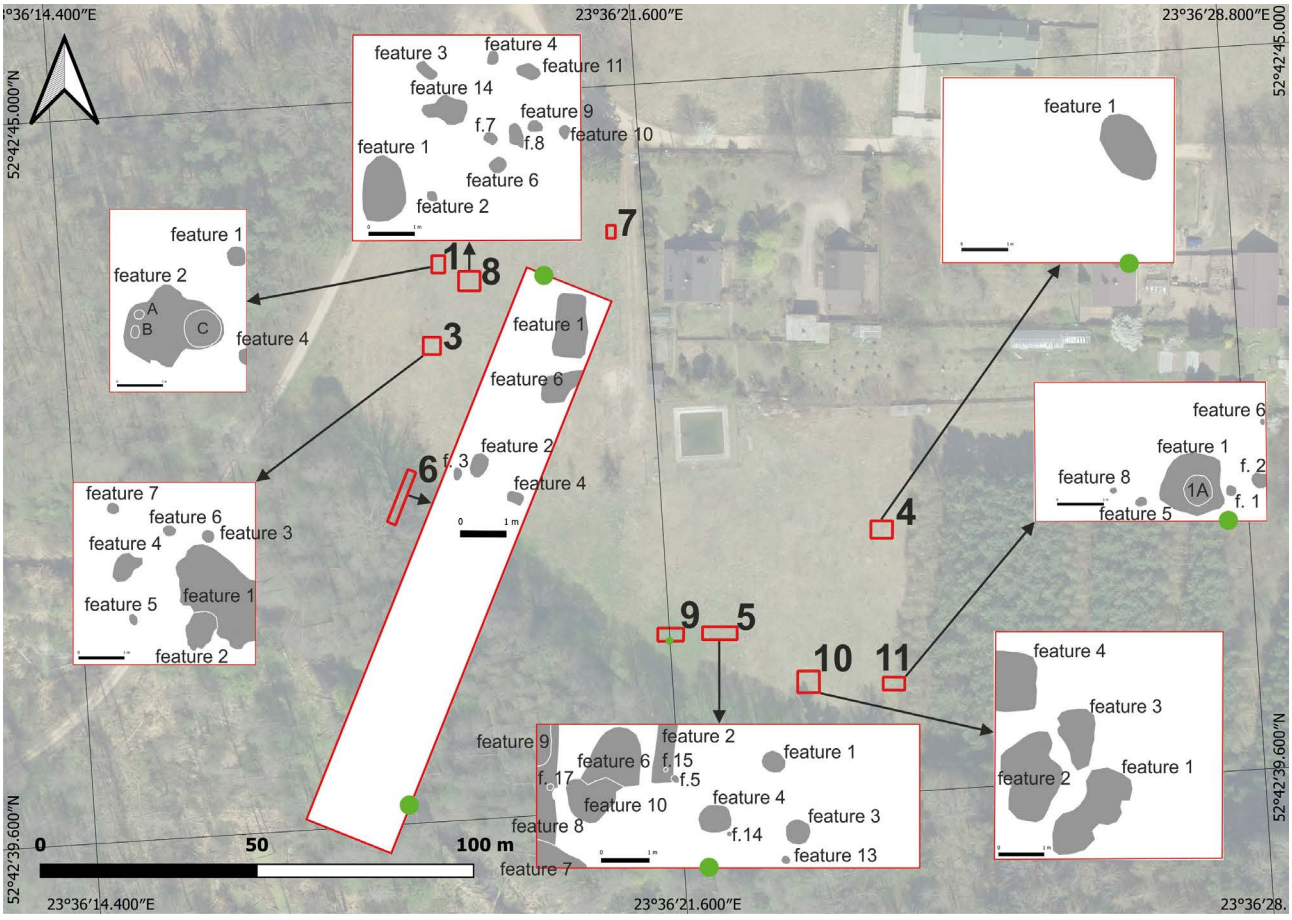

Fig. 16: Sacharewo Clearing site, locations of trenches and archaeological features within the trench limits; green dots – the studied and sampled soil profiles of archaeological trenches; no archaeological features were recorded in trenches 7 and 9 (basemap source: geoportal.pl).

Sacharewo site 3) became a burial ground at some point, with one of the barrows located directly on one of the field balks.[61]

Therefore, it may be cautiously assumed that the settlement, a part of the field system and the burial mounds cemetery could have functioned together as one settlement microregion. In this case the barrow cemetery probably was contemporary with the later stage of the settlement at Sacharewo Clearing, whereas the fields functioned simultaneously with the earlier stage of settlement. Further development of the field complex took place in the Early Medieval Period.

The Sacharewo area in a regional cultural context

The Sacharewo Clearing is a multicultural site with evidence of human presence from the early Bronze Age (i. e. Neman Culture circle, Mierzanowice Culture and Trzciniec Culture circle) untill the 17th–18th c. AD, however especially noteworthy is the relatively rapid increase in settlement activity during the IA and RP. This is an important issue, that applies not only to Sacharewo, but to the entire Białowieża Forest, where settlement revival is visible during that period[62]. It seems that at the time, the area of the Białowieża Forest was a kind of cultural melting pot, where several cultural currents (the Hatched Pottery Culture, the "post-Zarubieniec" and Western Balts circles)[63] met in this peripheral

61 Similar situations are known from other sites in the Białowieża Forest. Some of the burial mounds at Postołowo Forestry ("Szczekotowo" reserve) are located on the relics of a clearly visible field system. In this case, however, the burial mounds are dated to the early Middle Ages (12th c. AD, see Olczak/Szlązak/Wawrzeniuk 2020, while the fields were used agriculturally in the IA and RP (1st–3rd c. AD) and in the early Middle Ages (9th–10th c. AD; see Krupski *et al.* 2022).

62 E.g. Olczak *et al.* 2018, Ryc. 1.

63 Andrzejowski 1999, 41–48; Krasnodębski/Olczak 2002, 218–221; Karczewska 2009; Olczak 2009; Olczak *et al.* 2018; Medvedev 1996, 53–56; Belâvec 2004.

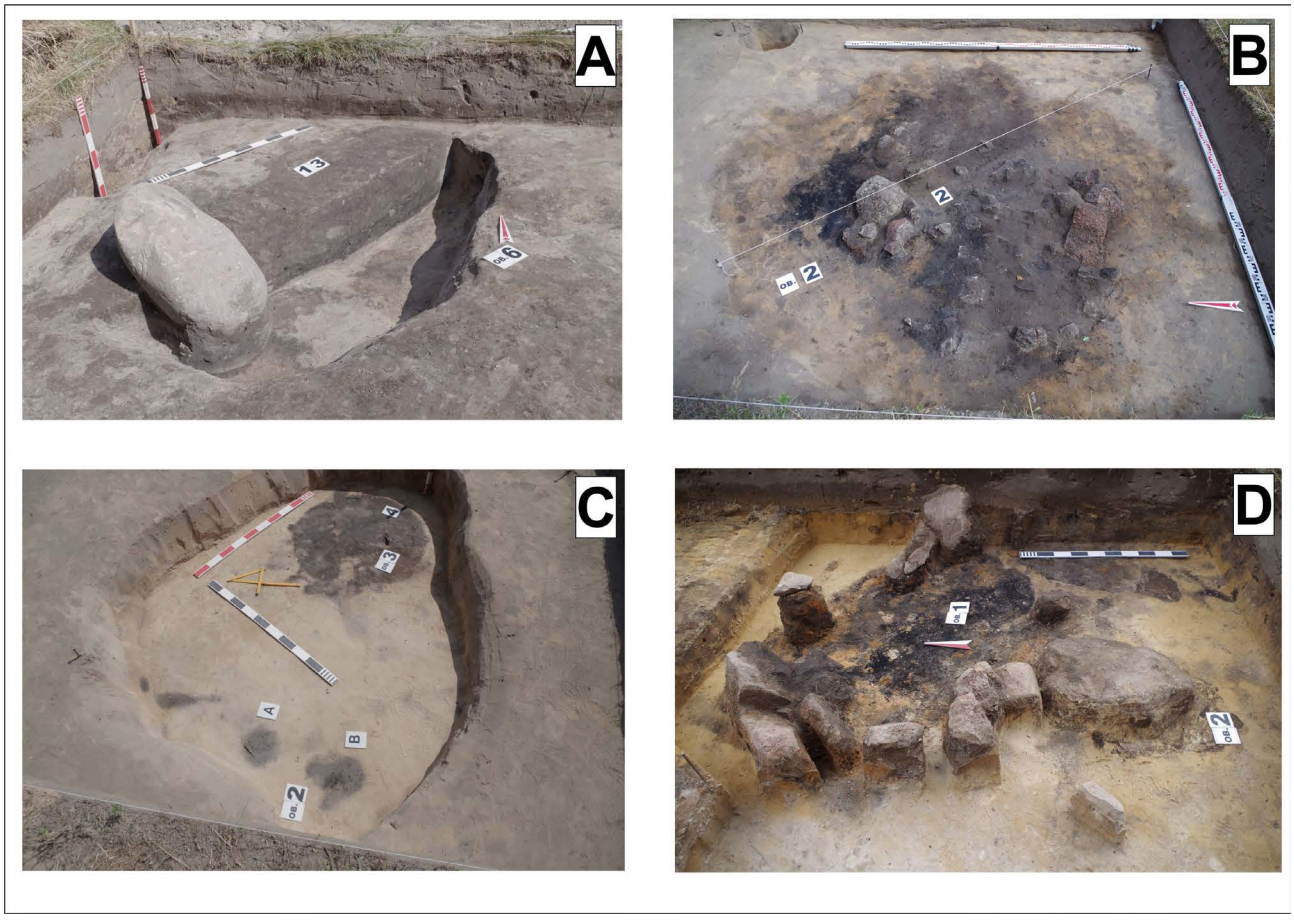

Fig. 17: Sacharewo Clearing site, photographs of selected features: A – feature 6, trench 5; B – feature 2, trench 1; C – feature 2, trench 1; D – feature 1, trench 3.

zone. In fact, the influences of the Hatched Pottery Culture "migrated" here from their original area, i. e. from the territory of today's northern and central Belarus and eastern Lithuania, where fortified settlements associated with this cultural unit were discovered[64]. It seems that the situation could have been similar with the Wielbark Culture, which began to appear in the Białowieża Forest region in the 3rd c. AD. This phenomenon is related to the broader process of population movements, traditionally linked with the historical Goths migrations from the Baltic coast towards the Ukrainian steppes[65]. The diffusion of Wielbark Culture elements into the local culture was probably of a rather limited character.

Conclusions

Investigations in the Sacharewo microregion have revealed a sequence of continuous, but non-intensive activities of local communities, that took place at the turn of the eras and during the first centuries AD. Similarly, to other sites in the Białowieża Forest (e. g. Postołowo, Berezowo Clearing, etc.) the settlement was of an insular character, concentrated in a limited zone of extensive forest and agricultural exploitation. The link between the settlement from the IA/RP (Sacharewo Clearing) and the nearby field system (Sacharewo site 3 and its surroundings), though probable, has yet to be confirmed by further (geo)archaeological and paleoenvironmental research, that should focus on the already investigated area, as well as its neighbourhood (the entire field complex together with chronologically and culturally unrecognized barrows located within this area). Considering the relatively low degree of contemporary human interference in the Białowieża Forest environment, these multidisciplinary studies may bring measurable and important results.

64 Medvedev 1996, 18–20; Egarèjčanka 1999, 119–122; Olczak/Krasnodębski 2018, 168.
65 Cieśliński 2016, 225 Fig. 8.

In a broader cultural perspective, the presented results make it possible to outline, at least in general terms, the process of cultural transformation of local communities. Due to their peripheral location and limited influx of external cultural factors, groups inhabiting the Sacharewo microregion were probably characterized by a high degree of cultural conservatism. More pronounced changes occurred only in result of intensive events like the migration of communities associated with the Wielbark Culture during the RP. However, this process cannot be related with cultural discontinuity – rather with an appearance of new elements within an older settlement background. Based on the collected data, it can be concluded that it was a long-term process, that did not eliminate many of the previous cultural patterns.

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Table (supplementary)

Tab. Suppl. 1: – inventory of archaeological features from Sacharewo Clearing (K. Niedziółka).

Supplemental Material: This article contains supplementary material (https://doi.org/10.1515/pz-2023-2013).