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ARTICLES

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Opinions of Polish Roman Catholic Clergy on Archaeological Research Conducted on Church Premises: A Pilot Study

Abstract

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The aim of the article is to present and discuss the opinions of Polish Roman Catholic clergy on archaeological research carried out in areas under the church's management. The article provides the research context of the said archaeological research within the framework of public archaeology. The study used the method of individual in-depth interviews (IDIs) conducted between February 20 and May 29, 2024 in selected Roman Catholic parishes and rectories in Poland. The interviews (IDIs) were conducted with parish priests and rectors of parishes and churches where archaeological research had previously taken place. Six categories were considered in the study: opinions of the clergy, opinions of the congregation as perceived by the clergy, reasons for conducting archaeological research, preservation of monuments, recommendations of the clergy to archaeologists, and future cooperation with archaeologists. The research was interdisciplinary, involving scientists from the humanities and social sciences. The results of the study led to the emergence of different research perspectives.

Keywords: opinions on archaeological research, Polish Roman-Catholic clergy, church premises, qualitative research (IDIs), public archaeology

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Introduction

The aim of this article is to discuss the opinions of Polish Roman Catholic clergy regarding archaeological research carried out in areas under church administration. The study was interdisciplinary, involving the humanities and social sciences at the stages of concept development, research tool selection, fieldwork implementation, and interpretation of results. It combined approaches from archaeology, history, cultural anthropology, and sociology at each stage of the research process – from conceptual design and tool development to fieldwork and interpretation. Archaeology and history provided the material and chronological context for analyzing artefacts and archaeological sites; sociology enables the creation of a research tool and presented a method for collecting research material; while cultural anthropology offered insights into the social meanings, values, and practices surrounding heritage in contemporary religious settings.

The uniqueness of the research is due to at least three factors. First, the study focused on clergy who had not previously been surveyed for their opinions on archaeological research in areas under church administration. Second, the study focused on the opinions of clergy on archaeological research conducted exclusively in the areas administered by the clergy surveyed. Third, the research aimed to expand the scope of public archaeology.

Research context

The research on the opinions of Polish Roman Catholic clergy regarding archaeological research on church premises can be interpreted in the context of several factors. These include the historical nature of many properties under the management of churches and religious organizations in Poland, the research experience and institutions of the Roman Catholic Church, clergy with archaeological education, the activities of experts and expert groups of the Roman Catholic Church in Poland, studies at universities subordinate or dependent to the Holy See, and the specialized literature which employs social science methods (e.g., computer-assisted self-interviews, face-to-face interviews, individual in-depth interviews) to collect and analyze opinions related to archaeology.

First of all, archaeological research in Poland is often carried out in areas under the management of persons representing churches and religious organizations, which are the second largest owners of listed properties and monuments in Poland (Purchla (ed.) 2008, 85, 96). In this context, clergymen managing church property are obliged to commission archaeological research when carrying out construction works, ground works or changes to existing operations in the area under their responsibility (*Ustawa o ochronie zabytków* 2003, Art. 31). This raises the question of the extent to which cooperation between clergy and archaeologists contributes to the effectiveness of archaeological research.

Second, the Roman Catholic Church also has its own experience in conducting archaeological research on different continents, for example, in the Shepherds' Field in Beit Sahour (Bethlehem – Palestine) (see https://www.piac.it/scavi-attivi#campo-dei-pastori-a-beit-sahour, access: 11.12.2025), Adulis in Eritrea (see https://www.piac.it/scavi-chiusi#adulis, access: 11.12.2025), and in Rome (the Papal Basilica of St. Paul Outside the Walls) (see https://www.piac.it/scavi-chiusi#roma-san-paolo, access: 11.12.2025). The Roman Catholic Church also operates dedicated research institutions within the Vatican City State, such as the Pontifical Commission for Sacred Archaeology (cf. Iwaszkiewicz-Wronikowska 2002, 516; see Pio XI 1925a; 1925c; https://www.vatican.va/roman_curia/pontifical_commissions/archeo/index.htm, access: 11.12.2025), the Pontifical Roman Academy of Archaeology (see https://www.vatican.va/content/romancuria/en/pontificie-accademie/pontificia-accademia-archeologia.html, access: 11.12.2025, http://www.pont-ara.org/, access: 11.12.2025), and the Pontifical Institute of Christian Archaeology (see Pio XI 1925a; 1925b; https://www.piac.it/, access: 11.12.2025). In addition, archaeological research is also carried out by clerics who have a background in archaeology and combine their ministry with scientific activities (see Urban 1984; Bottini 2008; Heid 2018).

In Poland, under the auspices of the Polish Bishops' Conference, there is the Council for Culture and Cultural Heritage, which includes working with a consultant for the protection of religious buildings. Among its responsibilities, the Council deals with issues related to the protection of monuments (see https://episkopat.pl/Gremia, https://opoka.org.pl/biblioteka/W/WE/kep/kkbids/sztuka1_16041966.html, access: 11.12.2025). Meanwhile, at the level of individual dioceses, there are experts or expert groups established to deal with issues related to archaeological research, such as the Archdiocesan Conservator of Monuments of the Archdiocese of Warsaw, the Bishop of Elbląg's Delegates for the Preservation of Church Monuments, or the Archdiocesan Commission for the Preservation of Church Monuments and Sacred Architecture and Art of the Archdiocese of Krakow (see Czernik 2016, 25–29). In addition, studies in Christian and biblical archaeology are conducted at Polish universities that are subordinate to or operate under the relevant regulations of the Holy See, such as the Catholic University of Lublin and the faculties of ecclesiastical sciences at the Cardinal Stefan Wyszyński University in Warsaw (cf. *Statut KUL* 2019, § 3(1); *Statut UKSW* 2019, § 2(2); see Gołgowski 1999; Iwaszkiewicz-Wronikowska 1999; Chrostowski 2013; https://usosweb.uksw.edu.pl/kontroler.php?_action=katalog2/przedmioty/pokazPrzedmiot&prz_kod=WT-CTR-A&callback=g_be28977e,https://www.kul.pl/program-studiow-w-inb-kul,art_434.html, https://www.kul.pl/ziemia-przymierza-geografia-i-archeologia-biblijna-w-zarysie,art_103173.html, access: 11.12.2025).

Third, the literature on this topic includes publications reporting the results of studies on the public's opinion on archaeology (e.g., Katsamudanga 2015; Kajda *et al*. 2018; Gürsu *et al*. 2019), including specific social groups such as university students (e.g., Onițiu and Balaci 2024). In addition, the image of archaeology created by the mass media has been studied (e.g., Kobiałka 2011), as well as the role of archaeological reserves in educating and popularizing archaeology among visitors and local residents (e.g., Przepiórka 2022). The opinions of scientists working at archaeological sites on the application of science communication in their work were also analyzed (e.g., Conforti

and Legaria 2022). Moreover, ethnographic methods are also used in the studies of opinions about archaeology (e.g., Maliński 2011; Conforti and Legaria 2022). These studies are part of public archaeology (see McGimsey 1972; Moshenska (ed.) 2017; Vannini 2020; Pawleta 2022), which increasingly uses social science methods (e.g., computer-assisted self-interviews, face-to-face interviews, individual in-depth interviews) as research tools.

Methods

Individual in-depth interviews (IDIs) (see Kvale 2007; Silvermann 2017; Hennink *et al.* 2020) were used to collect research material. The study was conducted from February 20 to May 29, 2024, in selected Roman Catholic parishes and rectories in Poland. The interviewees were clergy who manage church premises; eight were parish priests, and two were church rectors. The interviews were scripted so that each respondent was asked the same questions. Before the interview began, each respondent was informed of the anonymity of the survey, which apparently influenced their openness in responding and, in turn, resulted in a more realistic representation of the issues under study. The chosen ten respondents came from different provinces of Poland (Lower Silesia, Lesser Poland, Masovia, Subcarpathia and Podlasie), seven from urban and three from rural areas (see Drewicz 2025).

The research process consisted of the following stages: development of the research concept, consultations regarding the implemented initiative, preparation of research tool (scripted IDI), selection of respondents, conducting interviews, transcription of recorded interviews, codification, categorization, analysis, synthesis, consultations on the research findings, and final preparation of the manuscript. Consultations were held with Cezary Smuniewski and Ewa M. Marciniak, who were selected on the basis of their academic background and experience in social research using individual in-depth interviews – IDIs (cf. Marciniak 2013a; 2013b; 2021; Smuniewski 2019; 2020; 2024). The research tool was developed using the knowledge of specialists in sociological research (Kvale 2007; Silvermann 2017), as well as the rules for codification and categorization (Kvale 2007, 33–66, 104–106). The process of selecting respondents consisted of two steps: 1) an Internet search to identify parishes and rectories in different provinces where archaeological research had been carried out; 2) telephone calls to parish and rectory offices to inform them about the study and to ask them to participate (the calls also included establishing contacts with other clergy who could participate in the survey). The interviews were conducted in parishes and rectories where archaeological research had previously taken place. This arrangement of the research process proved to be efficient and optimal, and the collected material was used as the basis for this article.

Categories of opinions of Polish Roman Catholic clergy regarding archaeological research carried out in the areas under church management

The codification and categorization of the collected data made it possible to distinguish six categories, which were then subjected to content analysis (Kvale 2007, 104–106): 1) opinions of the clergy; 2) opinions of the congregation as perceived by the clergy; 3) reasons for conducting archaeological research; 4) preservation of monuments; 5) recommendations of the clergy to archaeologists; and 6) future cooperation with archaeologists.

1. Opinions of the clergy

The first step was to examine the attitudes of the Roman Catholic clergy themselves toward archaeological research on church premises. During the interviews (IDIs) with the clergy, the following question was asked: *In your opinion, what is the clergy's attitude toward archaeological research in parishes/rectories?* The aim was to gather information not only about the personal attitudes of individual priests, but also about their opinions as representatives of the Roman Catholic clergy. In response to the question, six respondents clearly described their approach to archaeological research as positive, two did not take a clear position, while two had a clearly negative opinion.

Let us consider the clearly positive statements about the clergy's attitude to archaeological research on church premises. The respondents did not state their personal position, but expressed their opinion on behalf of the entire clergy community. According to their statements, the attitude is positive (2), results from the responsibility imposed on them (2), is open to the issue (1), and results from the understanding of such matters (1). This is illustrated by the following statements: *I think it's positive* (IDI 1), *It seems to me that everywhere the priests are the ones with a positive attitude* (IDI 4), *We are obliged, it's not much to say, one would have to use a stronger word here, that*

the archaeologists are some kind of supervisors over us, because without their cooperation we can't do anything (IDI 9), *I think there is a great openness* (IDI 3), *Everyone understands this. It just has to be done* (IDI 7).

In the case of the statements of the respondents who did not take a clear position, their answers indicated a diversity of attitudes and the lack of a conclusive opinion when talking about the attitude of the clergy towards archaeological research on church premises, e.g., *The approach of the priests is very different* (IDI 6) or *I have a different view on this* (IDI 8). These types of comments suggest that clerics' attitudes toward archaeological research can be both positive and negative, depending on individual beliefs, the local context, and interpretations of the Roman Catholic Church's role in cultural heritage preservation.

With regard to statements indicating the clergy's negative attitude toward archaeological research on church property, one interviewee addressed his concerns arising from changes in the planned schedule of such work. He believed that the clergy were wary of prolonging archaeological research and thus increasing costs: *I am very worried that the investment will be stopped. It also costs money* (IDI 2). The other respondent who described the clergy's approach to archaeological research as negative tried to convey an explicitly critical position in a sensitive way: *Basically, it is a bit like a dispensation of providence* (IDI 5). It should be noted that the phrase "dispensation of providence" used by the interviewee was intended to show that the legal requirements for conducting archaeological research in a parish are sometimes like evil from which God is able to derive good. The interviewee believes that the clergy agree to archaeological research because some good will come of it. The negative attitude of the clergy towards archaeological research may be due to the fact that they equate the archaeological research with restoration or construction works. This suggests that they view archaeological research as an additional, formal requirement to be met, e.g., *Because these surveys are mainly done in the context of some renovation or construction works* (IDI 5).

The Polish Roman Catholic clergy has a mostly positive attitude towards archaeological research carried out on church premises. Some of the clergy are unable to take a clear position or have negative approach to the conduct of such works. The negative attitude is mainly due to the peculiarities of archaeological research conducted on church premises. The clergy may perceive archaeological research as an additional legal requirement that prolongs the main conservation or renovation work, and this contributes to their negative attitude. This will be discussed further in the section on the reasons for undertaking archaeological research.

2. Opinions of the congregation as perceived by the clergy

The opinions of the Roman Catholic clergy regarding the conduct of archaeological research on church property were then examined in terms of how the congregation approaches this issue, as perceived by the clergy. During the interviews (IDIs), respondents were asked the question: *What was the attitude of the congregation towards the archaeological research carried out on the church premises?* The aim was to obtain information on the attitude of the congregation towards the archaeological research as expressed by their parish priest/rector. In their answers to the question, eight respondents described the attitude of the congregation as positive, while two described it as indifferent.

Let us consider the positive opinions regarding the attitude of the congregation towards archaeological research, as expressed by the parish priests/rectors. The respondents used the following words and phrases to express their positions "curiosity" (4), "understanding" (4), "interest" (3), "positive" (2), "involvement" (2), and "local patriotism" (1). The statements of the clergy, which show the attitude of the congregation towards archaeological research, include: *Certainly, curiosity* (IDI 5), *Simple curiosity, so to speak, and local patriotism* (IDI 6), *Others with an understanding* (IDI 6), *Fully understood* (IDI 7), *Our parishioners are very sympathetic to the work being done in the Cathedral* (IDI 8), *They take it so positively* (IDI 8), *There were also people who got involved in the work themselves* (IDI 9), and *They got involved* (IDI 10).

Regarding the statements made by the parish priests/rectors expressing an indifferent attitude of the congregation towards the archaeological research, one respondent declared that they were "unaware", indicating a lack of knowledge and interest among the members of the congregation, while another noted that the issue of archaeological research had not been raised at all by the members of the congregation, further emphasizing their indifference: *Unawareness. They were not aware of it at all* (IDI 2). Another interviewee pointed out factors that could contribute to a more positive attitude of the congregation towards archaeological research. He stressed the importance of informing the congregation in advance about the purpose and schedule of such works: *Honestly, I think*

this is also a fruit of this collaboration. I think that certain things, information, have been communicated to them very clearly, in the right way. They know what it's for, why it's there. We have constant interaction here, we talk to our parishioners. They are not surprised when they suddenly find out that the cathedral will be closed tomorrow (IDI 8).

It can be concluded that the attitude of the congregation towards the archaeological research carried out in their parish/rectory, as perceived by the parish priests/rectors, is mostly positive. Only a few congregation expressed indifference towards such works, which is due to the specifics of the Christian ministry and the lack of interest of the churchgoers. On the other hand, according to the clergy, a factor that contributes to the positive attitude of the congregation towards archaeological research on church premises is adequate information about the goals and schedule of such works.

3. Reasons for conducting archaeological research

As for the opinions of the Polish Roman Catholic clergy regarding the reasons for carrying out archaeological research on church premises, the interviews (IDIs) included a three-part question: *Who was the initiator of the archaeological research? Why did they take place? What were the reasons for them?* The aim was to obtain information about the clergy's motivations for undertaking archaeological research. In their answers, ten respondents indicated that the main reason was legal requirements, while three respondents noted that the archaeological research were aimed at broadening knowledge (some of the parish priests/rectors carried out archaeological research in their parishes/rectories several times, so their opinions with the reasons behind them do not add up to ten).

Let us consider the statements of the respondents who identified the reasons for carrying out archaeological research on the church property under their management as legal requirements. The respondents indicated that the legal requirements were related to renovation works (5), pre-investment surveys (5), and conservation works (1) (ibid.). In their opinions: *The church was a bit neglected inside, and it was necessary* (IDI 4), *There was a renovation of the cathedral, and as part of this renovation it was also necessary to carry out archaeological research, because at the moment crypts are being built for the future burial of diocesan bishops* (IDI 8), *In the case of our church, we installed new water, sewerage and gas connections* (IDI 2), *It was necessary to excavate in order to install technical equipment in the area under the supervision of the conservator. And the conservator simply ordered that the archaeological research be completed before any other work was done* (IDI 5), *The archaeological research began, so to speak, before the broader efforts to revitalize the hill* (...) *and the church itself, which had undergone various modifications over the centuries* (IDI 6), *Archaeological research or archaeological supervision are required by law for the conservation works that we carry out on our site* (IDI 3).

In their answers, which indicate a willingness to expand knowledge as a reason for undertaking archaeological research, the respondents pointed out that the purpose of the archaeological research was to explore the space under the floor of the sacristy; to learn what the church looked like when one of the clergymen buried there was alive; and to search for the remains of a person buried there in order to verify the existing historical sources: *The sacristy was of interest to us, so we surveyed it in a non-invasive way. It was not an expensive survey. However, we more or less knew what the floor of the sacristy looked like, what could be hidden there* (IDI 1), *To learn about the church that was one of the first outposts founded by Father* (...), *where he lived, worked, and where his mortal remains rested* (IDI 6), *There is a plaque that says he was buried in this church. Everything seemed to indicate that this was not true. That he was not buried here. Based on an interview from a few years ago, we got clues as to where his remains might be. And we did an archaeological search to find those remains* (IDI 7).

In addition, one respondent who did archaeological research to expand his own knowledge also recognized its promotional potential. He noted: *Well, it is also a bit of a church promotion. The church gave the impression that it was always closed, in bad condition, basically in ruins. We also wanted to make people aware* (...) *that this church exists at all, that it is there. So with Mr.* (...) *we did these works. And the goal was also to be on the front page of the newspapers, that we were looking for something there. And we actually succeeded. We were able to publicize our church* (IDI 2).

Each of the respondents who carried out archaeological research in their parishes/rectories did so in at least one case for legal reasons. These archaeological research were mostly related to the realization of investments, restorations and renovations. Few clergy undertake them to broaden their knowledge. In addition, archaeological research can have promotional potential, which one respondent successfully exploited.

4. Preservation of monuments

Next, the opinions of the clergy regarding the conduct of archaeological research on church premises were examined in terms of the preservation of the artefacts discovered. During the interviews (IDIs), the following question was asked: *What happened to the objects found during the archaeological research?* The aim was to obtain information on where the artefacts found during archaeological research at church premises were stored. Five respondents indicated that the artefacts were donated to museums, four kept them in the parish/rectory, and one respondent indicated that no artefacts were found during the archaeological research. In addition, six respondents reported that human remains were found and reburied during the survey, and in two cases some of the remains were submitted for anthropological analysis. Furthermore, four respondents expressed the opinion that artefacts should remain at the site where they were found, although the issue was not directly addressed in the interview.

The following opinions were expressed by the clergy who donated the found archaeological artefacts to museums: *There is an archdiocesan museum. And there are artefacts from different sites that have been studied by archaeologists* (IDI 1), *They have been described and either given to the diocesan museum* (IDI 3), *Everything that was found was donated to the archaeological museum* (IDI 5) and *Of course everything goes to the museum* (IDI 9). One respondent noted that *there was absolutely nothing in that crypt* (IDI 7).

The statements of respondents who intended to keep the artefacts found were somewhat different, e.g., *After they were described, they were placed in our storerooms, in the archives* (IDI 3); *We plan to exhibit them and are organizing a memorial room dedicated to the bishop* (...), *it is still being designed* (IDI 6); *These artefacts remain in our parish* (IDI 8).

In their responses to the question about the preservation of archaeological artefacts, four respondents – although the subject was not directly addressed by the interviewer – expressed the opinion that they should remain in the place where they were discovered (in addition, seven respondents supported the establishment of museums/memorial rooms in parishes/rectories. In this group, four respondents could give examples of parishes/rectories that have museums/memorial rooms, two have them in their own parishes/rectories, and two are planning to create them in their parishes/rectories): *In my opinion, certain artefacts found in a particular place should remain in that place* (IDI 8), and *I even sometimes wonder a little whether they should be displayed in our church* (IDI 9). Two clerics noted that keeping artefacts in the parish/rectory could have educational value, emphasizing: *That it would be kept somewhere so that the parishioners would know about it. It was a one-time thing, the story was told and then it disappeared somewhere in the depths of the museum* (IDI 5), *Those artefacts that were successfully excavated would then have a place here for public display and education* (IDI 6).

However, some respondents emphasized that the artefacts should not always be left in the parish for security reasons (2) and because of the nature of antiques themselves (2). As one respondent noted: *There is the advantage that they are taken care of there, so they are safe* (IDI 9). Another respondent added: *If the object has a real historical value that can be placed in the museum, it would be worth donating it in order to preserve it* (IDI 5). Another respondent emphasized: *Unless they are already extremely valuable relics that have such a national or international value and, let's say, the parish does not have the ability to safely store or exhibit them* (IDI 9).

It can be concluded that archaeological artefacts found on church premises are mostly sent to museums, although they sometimes remain in their respective parishes/rectories. Sometimes archaeological research do not result in the discovery of artefacts. Human remains found during surveys are reburied and in some cases sent for anthropological analysis. In addition, almost half of the respondents, although this issue was not directly addressed in the interviews, expressed the opinion that artefacts should remain at the site where they were found. The majority of respondents also support the establishment of museums/memorial rooms in parishes/rectories. Roman Catholic clergy recognize the educational value of artefacts that they would like to keep in their parishes/rectories. At the same time, respondents are aware of the value of artefacts and are not always in favor of keeping them in the parish/rectory, which they attribute to security issues and the nature of the artefacts.

5. Recommendations of the clergy to archaeologists

The fifth category of opinions was the clergy's recommendations to archaeologists regarding the conduct of archaeological research at church premises. During the interviews (IDIs) the following question was asked: *What advice would you give to archaeologists who want to work with parishes/rectories/priests?* The aim was to obtain information on the clergy's advice for archae-

ologists who want to conduct archaeological research on church premises, which results from the experiences of clergy who conducted such work.

Five respondents advised archaeologists to increase their communication with the parish priest/rector on whose premises they are working. Four recommended respecting the sacred character of the building. Three respondents stressed the need to establish a precise work plan before beginning the archaeological research. Three others noted the need for a verbal approach to survey-related agreements. Two advocated adhering to the original deadlines, and two others advocated a realistic approach to the ongoing work. Two other respondents expressed a preference for not giving in to emotions on the part of both archaeologists and clergy. In addition, one respondent recommended that the research area be secured in an enclosed space to prevent contamination of the rest of the facility. Another advised not to give in to curiosity or professional aspirations, but to adhere to norms and regulations. Another stressed the importance of clearly defining the purpose of the research. The last piece of advice was to approach research planning with understanding and responsibility for the scope of your responsibilities.

Let us consider the statements that offer advice to archaeologists on increasing mutual communication with the parish priest/rector. The respondents understood "two-way communication" to mean talking to each other before, during, and after the archaeological research and keeping each other informed about the progress of the work. They also stressed the importance of being cooperative rather than insisting on their own assumptions: *First of all, cooperate. Do not treat each other as adversaries* (IDI 2), *I think there has to be a very close cooperation with the parish priest. Because otherwise there will be misunderstandings, disagreements, or there will always be something missing, something wrong* (IDI 4), *You have to listen to each other. Communication is a relationship* (IDI 6), *You have to talk to the parish priest, who is the host there. Just talk to him* (IDI 7).

In turn, when it comes to respondents who advised archaeologists to respect the sacred character of the building, one of them said: *First of all, you have to keep this aspect in mind. Because the first question you have to ask about a sacred monument is the purpose for which it was built. What was it built for? Who were the people who built it?* (IDI 1). Another respondent added: [*This is*] *such advice. I think every archaeologist is also aware of the fact that a church is a certain sacred place* (IDI 9).

In the context of planning the work before the start of archaeological research, one respondent suggested: *I think it would be a good thing to have good preparation of the work, including planning. To make it more predictable* (IDI 5), *Let the archaeologists say how they see it and what is needed. Let the parish priest say what he can* (IDI 7). Respondents emphasized the importance of keeping one's word: *On the other hand, it's also about keeping one's word* (IDI 2), *Well, definitely about keeping one's word* (IDI 5). In addition, respondents noted the need for a realistic approach to research: *That they should have a realistic approach* (...). *That, for example, when they have to do research, they should just be realistic. What can be done and what can't be done* (IDI 1), *Let them do it well, honestly, responsibly, reckoning with reality* (IDI 7).

With regard to meeting work deadlines, one respondent noted: *Meeting deadlines. That is the priority. If we start conservation work on a certain day, we do it, and if we want to finish it, we finish it. Once it's agreed, we don't expand the scope of the work because I'm only interested in it, we just stick to the deadline* (IDI 3), *That when deadlines are agreed. That way we don't respect the parish and the parish priest* (IDI 5) (authors' note: this strong emphasis on adhering strictly to the agreed scope and schedule may reflect a pragmatic approach, but it also raises questions about the flexibility of conservation strategies. Expanding the scope of archaeological research can sometimes be necessary due to new research findings or the emergence of historically or artistically significant contexts; however, it may also be resisted for reasons unrelated to the scientific or conservation value of the object, such as logistical, institutional, or interpersonal concerns).

Respondents also emphasized that emotions should not influence decisions related to research: *There are no emotions at work or an emotional approach to work. Of course there are emotions because we have discovered something, seen something new. But you can't be driven by emotions and decide on the course of further research on the basis of emotions. You cannot do that* (IDI 1), *Don't get emotionally involved so much* (IDI 2).

Respondents also offered some additional advice to archaeologists. They highlighted the need to secure the research area to avoid contaminating the rest of the facility, especially during archaeological research in enclosed spaces. They emphasized that archaeologists should avoid succumbing to curiosity and professional ambition, and instead adhere to standards and regulations. It is also important to clearly define the purpose of the research and to approach the plan-

ning of the work with a good understanding of their responsibilities: *Good security of the research area. Especially if it's an enclosed space, properly securing everything around it and, if possible, even sealing the excavation to avoid pollution or dust all over the site* (IDI 3), *You have to look first and foremost at the value of the facility, not at my curiosity or the fact that I'm going to make a name for myself in the archaeological or scientific community because I discovered something new, because I was just interested in something. Someone has me digging 50 centimeters into the ground, and suddenly I find an artifact at 80 centimeters. There is always this temptation for an archaeologist to want to dig deeper and wider. That is unacceptable. You have to follow the norms, the regulations* (IDI 3), *In this case it's worth asking ourselves why we are doing archaeological research and what we want to achieve* (IDI 6), *These are things that can be agreed upon if both sides simply approach it with understanding, with responsibility. These are things that can be agreed upon* (IDI 7).

It can be argued that clergy advise archaeologists to establish a precise work plan prior to the start of the archaeological research, with a clear understanding of the responsibilities of both parties, and to adhere to it consistently. During the course of the research, they recommend avoiding emotions, curiosity, and professional aspirations, and maintaining regular communication with the parish priest/rector about the work in progress. This promotes a realistic approach, allows for timely completion of the work, and minimizes the risk of damage to the premise. In addition, the clergy advise respect for the sacred character of the building, which will certainly have a positive impact on the clergy's perception of the archaeologists and ensure proper respect for the context of their ministry.

6. Future cooperation with archaeologists

Finally, the opinions of the Roman Catholic clergy centered on the possibility of future cooperation between clergy and archaeologists, understood as further archaeological research on the premises of the parishes/rectories where they serve as parish priests/rectors. During the interviews (IDIs) the following question was asked: *Would you decide to carry out further archaeological research in this parish/rectory?* The answers were intended to provide information on the future prospects of conducting archaeological research on church premises that had already been dealt with by the managing clergy. All respondents expressed the desire to continue archaeological research. Seven respondents made the decision about future research dependent on legal requirements, two on the general validity of such work, while one respondent did not make it dependent on any conditions. Only one respondent foresaw the possibility of conducting archaeological research to expand knowledge.

Statements by respondents who made the conduct of archaeological research dependent on legal requirements included opinions such as: *Yes. Because, as I said, we don't have any options, if we want to have funding, a conservation program, we have to decide on archaeological research and archaeological supervision* (IDI 3), *If the archaeological works were required in subsequent investments, we would do them* (IDI 5), *If I have to do it, I will do it* (IDI 6). Statements by respondents who made the conduct of archaeological research conditional on their unspecified validity were: *If necessary, by all means* (IDI 2), *If legitimate, by all means* (IDI 8). Another respondent who did not place any conditions on the conduct of future archaeological research stated: *Yes. I would decide* (IDI 4). A respondent who would decide to conduct archaeological research to increase knowledge said: *Well, if we know that something is unexplored and needs to be explored, then by all means. However, if there is something that has been explored, or we know what it is, what the history of the place is, it doesn't need to be explored, we just don't explore it. Because we already know the history. Unless we want to find something new, or some new circumstances arise. Then, absolutely, by all means necessary* (IDI 1).

Furthermore, one respondent stated that archaeological research is not an obstacle for him to make future investments in areas under the protection and care of the Provincial Monument Conservator: *Of course I have no concerns about archaeological research. If they were necessary for future investments, we would carry them out. They would not be an obstacle to deciding on some additional works or intending to do something* (IDI 5).

The following conclusions can be drawn from the data presented. All of the parish priests/rectors who had carried out archaeological research on church premises expressed their willingness to continue them in their parishes/rectories. Most of them would decide to carry out archaeological research only if it was required by law. Only a few made their decision to undertake research dependent on the general validity of such work, and some did not specify any conditions to be met. There were sporadic cases of undertaking future archaeological research to expand knowledge. In addition, the clergy are not afraid of archaeological

research that may be related to the realization of future investments, conservation, or renovation works in parishes/rectories, and they intend to continue working with archaeologists in this regard.

Conclusions

The study showed that the Polish Roman Catholic clergy mostly have a positive attitude towards archaeological research carried out on areas under church administration. The clergymen note that the congregation also have a positive attitude toward these research, which, according to some of them, is due to the proper information provided to the congregation about the goals and schedule of the archaeological research. This attitude of the clergy, which sometimes influences the opinions of the congregation, and the clergy's knowledge of the local communities make the clergy a suitable group to work with archaeologists in conducting community archaeology activities. Every clergyman interviewed had decided to conduct archaeological research for legal reasons, such as renovation, pre-investment surveys, or conservation works at least once. Only a small number of respondents decided to conduct archaeological research simply to expand their knowledge.

The study also revealed that parish priests and rectors donate archaeological artefacts to museums or keep them in parishes and rectories. Human remains are usually reburied and in some cases submitted for anthropological analysis. The clergy are also in favor of simply leaving the artefacts where they were found. This attitude of the respondents, coupled with their attitude toward parish and rectory museums and memorial rooms, indicates the potential of parishes and rectories to preserve and educate about the archaeological heritage. Respondents also made numerous recommendations for improving cooperation between clergy and archaeologists when conducting archaeological research on church property. All respondents expressed a desire to continue archaeological research in the future, which indicates that the clergy are not afraid to undertake such work. For most of them, it would be related to legal obligations, while only one respondent would consider it in order to expand his knowledge.

The results of the study have revealed several distinct research perspectives that enrich the understanding of archaeological practices in church-administered spaces. These include a heritage management perspective, which highlights the challenges of balancing professional conservation standards with the interests and involvement of local religious communities; a social-cultural perspective, focusing on how clergy and other stakeholders perceive the symbolic, spiritual, and practical meanings of artefacts within sacred contexts; and a public archaeology perspective, which emphasizes the importance of interaction, dialogue, accessibility, and negotiation between archaeologists and religious authorities. Together, these perspectives demonstrate the complex, interdisciplinary nature of archaeological research in religious settings and suggest directions for future studies that integrate material, social, and institutional dimensions.

The pilot study has provided valuable initial insights. There is a need to explore the potential of clergy as partners with archaeologists in the field of archaeological research, and to assess the role of parish and rectory museums and memorial rooms in protecting and educating about the archaeological heritage. Quantitative methods, such as structured surveys distributed to a larger and more diverse sample of clergy and local community members, might allow for statistical analysis of attitudes toward archaeological research and heritage management. At the same time, qualitative methods – like individual in-depth interviews (IDIs) – could deepen the understanding of nuanced perspectives and foster ongoing dialogue. Importantly, future research could seek to position clergy not only as respondents but as active partners in the archaeological process. This collaborative approach might enhance mutual trust, ensure that research addresses community concerns, and improve the integration of archaeological findings with local religious and cultural values, potentially serving as a model for similar studies elsewhere. In addition, it is worth expanding the research to include the clergy of other denominations and to focus on clergy councils that manage church property for archaeologists. Such an approach will contribute to the creation of a directory of best practices for forging relationships between archaeologists and the clergy who manage church property.

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Assessment of the Archaeological Potential of Prehistoric Settlement Areas along the Lake Shores and Wetlands of Carinthia, Southern Austria

Abstract

Ries M.-C. 2025. Assessment of the Archaeological Potential of Prehistoric Settlement Areas along the Lake Shores and Wetlands of Carinthia, Southern Austria. *Analecta Archaeologica Ressoviensia* 20, 19–42

The lake district of Carinthia's Klagenfurt Basin in southern Austria offers remarkable potential for advancing interdisciplinary research on prehistoric settlement landscapes. Although Austria's first pile-dwelling site was discovered in 1864 at Lake Keutschacher See today part of the UNESCO World Heritage property "Prehistoric Pile Dwellings around the Alps" – systematic archaeological surveys of Carinthia's more than 1,000 lakes and wetlands have remained scarce. This paper presents a pilot project addressing this long-standing research gap by developing a new anchor point for the identification, documentation, and evaluation of submerged lakeside archaeological heritage and their general archaeological setting.

Combining archival and literature studies with underwater field surveys, sediment coring, and laboratory analyses, the project provides an updated inventory of archaeological structures belonging to the chronological frame of the 5th to 3rd millennia BC. Activities conducted between 2021 and 2024 in collaboration with local museums, municipalities, students, and volunteers have provided new insights into settlement dynamics, technological innovation, and human–environment interactions during the Neolithic and Copper Age. The Kapuzinerinsel pile-dwelling site in Lake Wörthersee serves as an example of a new discovery demonstrating how targeted potential assessments can bridge persistent gaps in Austria's archaeological record and contribute to improved local heritage protection as well as reinforce connections to neighbouring regions.

Beyond generating new data, the study underscores the broader significance of the Alpe-Adria lakescapes as an important inner-Alpine corridor linking the Italian Peninsula, Southeastern Europe (the Balkans), and the northwestern circum-Alpine lake-dwelling regions. By integrating cultural and natural data, this research promotes sustainable and interdisciplinary approaches that position southern Austria within the wider European archaeological discourse and establish a foundation for future research and management strategies. The project additionally provides new absolute radiocarbon dates that contribute to a better understanding of Carinthia's prehistory.

Keywords: prehistoric pile-dwellings, Eneolithic, Copper Age, Austrian archaeology, underwater archaeology

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Introduction: background and project setting

The central aim of this study is to disseminate fundamental knowledge about the largely unexplored prehistoric sites situated within the lakescapes of Carinthia. Results are presented of a recent pilot project conducted mainly between autumn 2023 and spring 2024, funded by the Tyrolean Science Fund and further activities starting from 2021 onwards, which lead to continuing research directly linked to follow-up underwater archaeological excavation projects. The project was carried out at the Microarchaeological Laboratory at the Department of Archaeologies at the University of Innsbruck. Entitled *Archaeological Potential Assessment of Prehistoric Settlement Areas along the Lake Shores and Wetlands of Carinthia, Austria* (German: *Archäologische Potenzialerfassung an Seeufern und Feuchtgebieten Kärntens* – F.45181/10-2022), it constitutes the first systematic

modern attempt to evaluate the archaeological potential of selected lakeshore and wetland areas in this southeastern Austrian region by integrating multiple scales of evidence. Although wetland archaeology has long played a key role in shaping the understanding of European prehistory, Carinthia remains markedly underexplored. Despite the discovery of Austria's first pile-dwelling site at Lake Keutschacher See in 1864 – today part of the UNESCO World Heritage property "Prehistoric Pile Dwellings around the Alps" – systematic archaeological surveys and potential assessments of Carinthia's more than 1,000 lakes and wetlands have never been undertaken (Ruttkay *et al*. 2004). Consequently, significant gaps persist in both archaeological knowledge and modern heritage management, particularly regarding GIS-based mapping, site inventories, and the integration of environmental and archaeological data and the contextualisation to neighbouring regions. Within the limited financial and temporal scope of this pilot project – a five-month study supported by modest funding – the research focused on establishing a framework and collecting baseline data. Despite these constraints, the project demonstrates how focused, small-scale research can yield valuable insights and serve as valuable impetus for future investigations. An interdisciplinary approach was adopted, combining elements of environmental- and field archaeology with microarchaeological techniques to develop a more coherent and modernised picture of prehistoric settlement activity. Methods included archival research, non-invasive field surveys including drone-based imaging and scientific diving, coring transects, semi-quantitative screening of sediment samples for macrobotanical remains, and ceramic analysis. The main objectives were to identify and locate wetland sites, evaluate their state of preservation, and assess their research potential, including vulnerability to environmental and anthropogenic impacts. By contextualising Carinthian wetland sites within a broader European framework, this project aims to contribute to the understanding of prehistoric lakeshore settlements in the Austrian Alpe-Adria region. Carinthia's geographic position – linking southeastern Europe and the southeastern Alpine arc – makes it a crucial yet previously neglected area for studying Neolithic and Copper Age lifeways. The project addresses key research questions concerning the spread and local development of Neolithic to Eneolithic/Copper Age settlement traditions, the emergence of sedentism, and the early exploitation of natural and metallurgical resources.

Topographical setting and study area

The study area is located on the southeastern fringe of the central Alpine ridge, within Austria's Alpe-Adria region. The primary focus is the Klagenfurt Basin (area of 1,750 km²), a prominent inner-alpine valley that encompasses several large, glacially formed lakes. This region features a diverse topography dominated by aquatic landscapes, including lakes, wetlands, peat bogs, and rivers framed by the Karawanks Mountain Range, part of the Southern Limestone Alps, with peaks reaching up to 2,238 metres and the mountain chain forming the border to Slovenia. The Klagenfurt Basin serves as a central geographic entity and resource hub, offering access to significant natural resources, such as lithic raw materials, copper ore deposits, and lead, which have historically shaped human economic activities and the ecology in the area as well as lowlands and fertile soils suited for arable farming and animal husbandry. Carinthia is geographically significant, situated near the tri-border area of Austria, Slovenia, and Italy. This location establishes the region as a critical inner-alpine corridor for prehistoric cultural interaction and exchange, facilitated by fluvial networks such as the southward-flowing main axis of the Drava River. The Drava, flowing eastward through Austria, Slovenia, continental Croatia to Hungary, served as a vital transportation and communication axis linking the Alps to the Carpathian Basin and the Balkans. Originating on the southern foothills of the Karawanks and flowing eastwards along their base, the Sava River constitutes another key communication and trade corridor. Its course further highlights the study area's strategic role within pan-European prehistoric exchange networks linking Carinthia with regions to the southeast of Europe. Furthermore, several mountain passes have evidently been in use since (pre) historical times, including the Wurzen Pass (Korensko Sedlo), Loibl Pass (Loiblpass), Železna Kapla Pass (Hafner Pass/Seeberg Sattel). Those allowed the crossing from southern regions into the northern area of Klagenfurt basin. To the north, the Klagenfurt Basin is bordered by the Hohe Tauern and Gurktaler Alps. Archaeological evidence further suggests frequent transalpine interactions, particularly between Styria and Carinthia, separated by the Packalpe and Koralpe mountain ranges (Bertha 2021). Recent discoveries have revealed that the valleys of Görtschitztal and Lavanttal very likely played equally important roles in the north-south exchange networks of past societies between Styria, across Carinthia, and interlinked to Slovenia. Connections to pile-dwelling regions in the northern Alpine foothills, such as the Salzkammergut area with Lake Attersee,

Lake Traunsee, and Lake Mondsee, are also significant (Kowarik *et al.* 2017; 2020).

Additionally, recent discoveries of Neolithic finds dating to the 6th millennium BC suggest that the inner-Alpine salt mines of the Hallstatt Lake region – long known for their prehistoric salt production – were likely already in use before their booming-phases during the Bronze Age (Fíguls *et al.* 2023; Grömer *et al.* 2025). The early exploitation of mineral resources further emphasizes the significance of Carinthia's geographical position as an inner-Alpine corridor playing a key role in transalpine mobility, exchange and resource circulation. Carinthia's karstic landscape, with its numerous caves, springs, and geothermal sources – such as those at Warmbad-Villach near Lake Faaker See – have likely played a key role within a broader prehistoric ritual landscape, further highlighting the region's transalpine archaeological significance. The case of Warmbad-Villach, with its long continuity of settlement, early ritual and economic use of thermal springs, and strategically elevated location, demonstrates the centrality of water-related landscapes in shaping human activity and communication across millennia – an aspect directly relevant to the interpretation of prehistoric sites. Within this context, the Klagenfurt Basin, particularly its lake district, holds a unique position. Lake Wörthersee, the region's largest lake, exemplifies this environment, extending from Klagenfurt in the east to the city of Velden in the west (Schlamberger 2011). Historical water regulation since the 17th century has significantly altered its littoral zones, with currently approximately 77% of the shoreline is now artificially modified and in intense human use (Schulz *et al.* 2008; Daxer *et al.* 2022). These transformations, driven by tourism, leisure activities, and shoreline construction, have had clear and lasting impacts on the archaeological record. Despite these challenges, Carinthia's lakescapes provide analogous potential to well-studied European wetland sites, such as those in the Lake Constance or Lake Zurich regions and very obviously close links to well-investigated regions such as the Ljubljana marshes region, where important well-investigated pile-dwelling sites are located. These similarities underscore the area's potential to contribute valuable insights into prehistoric settlement patterns, resource use, and cross-regional interactions, filling a crucial gap in the understanding of European wetland archaeology.

This study focuses on three distinct research areas (Fig. 1):

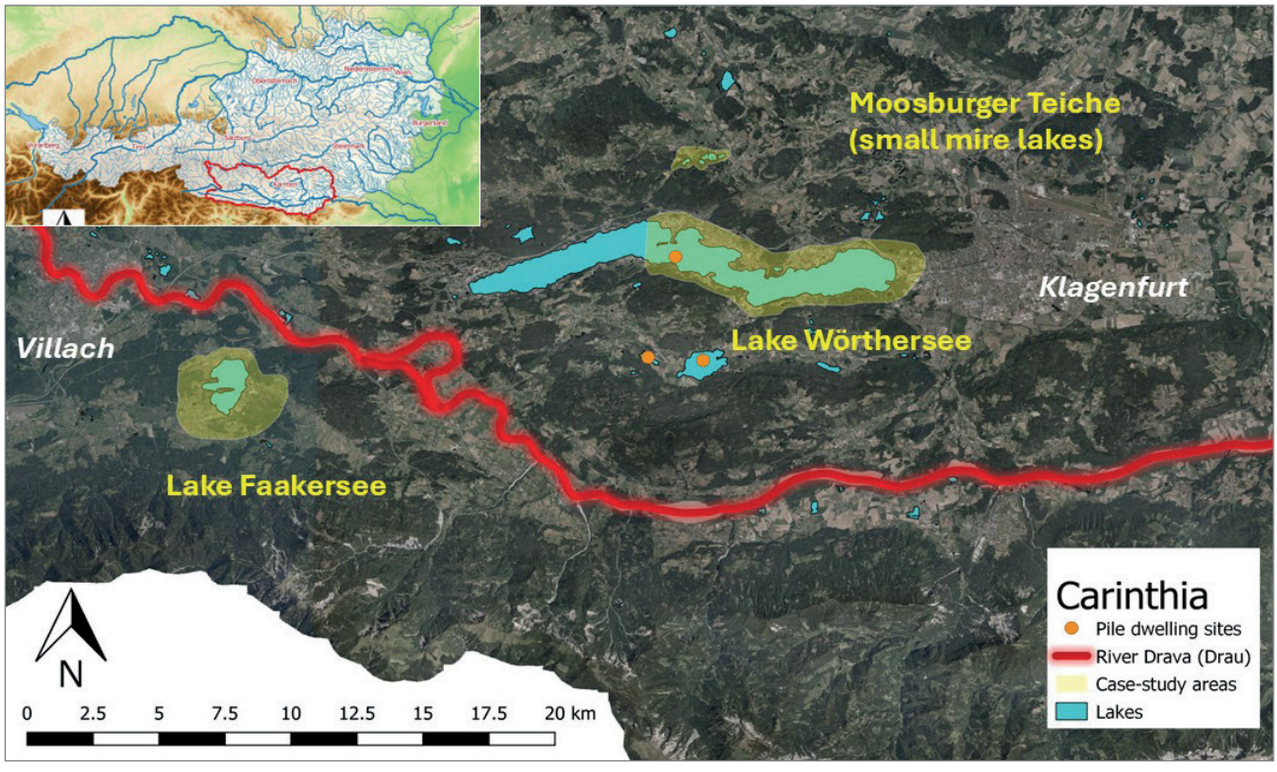

Fig. 1. The study area, located in Carinthia, southern Austria, within the Alpe-Adria region, comprises three defined potential zones for the study's investigation of pile-dwelling settlements dating from the 5th to the 3rd millennium BC along the Carinthian lake district (map by M.-C. Ries).

1. **Northeastern Shallow Shoreline Areas of Lake Wörthersee (Eastern Bay, Krumpendorf Area)** – Extending westwards towards the city of Klagenfurt, this main lake basin, with its multiple peninsulas and extensive shallow-water zones, provides a well-defined context for investigating prehistoric lakeside settlements. A particular focus is placed on Kapuzinerinsel, located in the central part of the lake, which occupies a strategic constriction within the basin, forming a natural bottleneck.
2. **Small Mire lakes Moosburger Teiche** – Located approximately 3 km north of Lake Wörthersee, these small mire lakes offer considerable hinterland potential and are analogous to well-studied lacustrine environments comparable to such as Lake Schreckensee (Germany) and Lobsigensee (Switzerland).
3. **Lake Faakersee** – Situated south of the Drava River and only 9 km from the present-day Slovenian border, this smaller lake occupied a strategically important position during prehistoric times within the transalpine research framework, lying between known and partially excavated Eneolithic hilltop settlements (Kanzianiberg and Wauberg). The lake features two prominent peninsulas aligned along key visibility axes between hilltops, further emphasizing its potential role in settlement placement and landscape use. Direct archaeological fieldwork at this site, however, was precluded due to access restrictions imposed by the landowners during the permit application process.

Materials and methods

The investigation of prehistoric settlement potential along the lakeshores and wetlands of Carinthia employed a multidisciplinary and minimally invasive approach, focusing on creating basic inventories of prehistoric wetland sites – particularly lakeshore settlements dating from the 5th to the 3rd millennium BC. Archival research in regional museums, including the Kärnten Museum, combined with the collection and evaluation of literature and unpublished records, as well as stray finds and single artefacts, provided essential data for establishing preliminary site inventories and guiding fieldwork strategies. Field investigations, conducted between 2021 and 2024, integrated several complementary methods. SCUBA-assisted scientific diving enabled underwater surveys of the lakebed, identification of submerged structural features. Minimally invasive coring transects were deployed across littoral and wetland zones, often in collaboration with local citizen scientists and students, to sample sediment sequences targeting potential prehistoric occupation layers. Surface surveys complemented these efforts, and selected excavation units were opened in areas of high archaeological potential, following best-practice approaches for waterlogged sites (Bleicher *et al*. 2024; Reich *et al*. 2025). Aerial drone photography and photogrammetry documented shoreline morphology, submerged features, and site topography. High-resolution orthophotos produced from drone imaging were used for GIS-based mapping via QGIS, supporting spatial analysis and planning of subsequent investigations.

Sediment samples from hand-operated corings were processed at the Microarchaeological Laboratory of the University of Innsbruck using a semi-quantitative microscopic screening technique. Samples, typically less than 200 ml in volume, were fractionated via a "wash-over" procedure using laboratory sieves with mesh sizes of 1 mm and 250 µm. Fine sediments were washed away under a constant water flow, leaving the retained fraction for analysis. Residues were examined under a stereomicroscope at magnifications ranging from 6× to 40× to identify anthropogenic indicators, including charcoal fragments, cultivated plant remains, and other macro-botanical evidence of human activity.

This integrated methodological framework – combining archival research, literature and unpublished records, minimal-invasive coring, targeted excavation, underwater survey, drone photogrammetry, GIS mapping via QGIS, and microarchaeological screening – enabled the creation of reliable data for further collaborative research projects. It allowed a first assessment of site preservation, archaeological potential, and human–environment interactions in selected lakes and wetlands of Carinthia.

Research history: prehistoric pile-dwellings of Carinthia – a reality check 2024

A current general assessment of the state of archaeological research in Carinthia highlights a clear need for action. To date, a comprehensive baseline inventory of archaeological sites – commonly referred to as the "Archäologische Landesaufnahme" – has not yet been undertaken. As a result, Carinthia remains in a peripheral position compared to many other European regions with long-standing and systematic heritage recording programmes which result in monitoring, supervision and prevention of undocumented destruction of sites during construction activities. The study of prehistoric pile-dwelling settlements in

Carinthia began in the mid-19th century during the so-called period of "pile-dwelling fever". In 1864, the first evidence of prehistoric occupation was recorded on a submerged island plateau in Lake Keutschacher See, inspired by Ferdinand Keller's discoveries in Switzerland. Subsequent investigations – including the first diving surveys in the 1950s and targeted excavations in the 1990s – produced substantial artefact corpora and led to Austria's first dendrochronologically dated pile-dwelling settlement, with felling dates of 3947 BCE and 3871 BCE, providing a crucial chronological anchor for Neolithic to Copper Age research in southeastern Austria (Cichocki 2000; 2003; Ruttkay *et al.* 2004). Complementary studies on local material culture by Samonig or Ruttkay established foundational typological references for Carinthian pile-dwelling ceramics (Ruttkay 1996; 1997; Samonig 2003; Ruttkay *et al.* 2004), though these frameworks require methodological revision and integration with new absolute dates from stratified contexts (Ries 2026, in print).

Limited underwater surveys in Lake Wörthersee in the late 1990s and early 2000s identified sites such as Kapuzinerinsel, reported to the Federal Monuments Office Austria (Cichocki and Dworsky 2006). These initiatives were limited in scope and funding, focusing primarily on ad-hoc artefact recovery, including logboats, which highlighted the region's shortage of expert knowledge and archaeological infrastructure which hindered proper conservation. Furthermore, the lack of definition of archaeological protection zones resulted in significant oversights, leaving large portions of the Wörthersee basin and surrounding paludified wetland areas unassessed and vulnerable to undocumented damage. Similarly, small-scale diving activities in Lake Hafnersee and Lake Faaker See recovered artefacts, but systematic pile-field sampling for dendrohronological dating or Radiocarbon dation was not performed (Hofer 2016; Kowarik *et al.* 2017). Consequently, the designation of the structures in Lake Hafnersee as a "pile-dwelling site" is currently unsupported by clear evidence, lacking both absolute dates and detailed maps, while at Lake Faaker See, recovered objects are no longer traceable and documentation is incomplete, leaving the exact chronological classification, and archaeological definition of these sites uncertain (Hofer 2016).

Since the 2011 UNESCO inscription of the "Prehistoric Pile Dwellings around the Alps", Austrian research has largely prioritized preservation, erosion monitoring, and public outreach, particularly at Lake Keutschacher See (Pohl *et al.* 2020; Seidl da Fonseca *et al.* 2024). The Kuratorium Pfahlbauten was established as the national entity responsible for the supervision, protection, and management of Austria's UNESCO pile-dwelling sites. In Carinthia, however, active field-based research has remained notably limited, focusing mainly on annual monitoring, experimental conservation measures, and educational programmes, often directed as child-friendly engagement. As a result, critical scientific questions – including fine-scale chronology, settlement duration and phasing, architectural layout, and integration into the broader circum-Alpine network – have not been systematically addressed, leaving Carinthia's pile-dwelling archaeology behind both national and international standards of scientific research. Recent initiatives, such as the excavations at Kapuzinerinsel aim to address this imbalance by establishing well-resolved stratigraphies, generating chronological datasets, and complementing traditional fieldwork with interdisciplinary analyses. Such integrated approaches are essential for reconstructing settlement structures, occupation phases, and human–environment interactions, and crucial for contextualizing Carinthia's prehistoric lake settlements within regional and supraregional frameworks. Only through these systematic investigations can the full research potential of Carinthia's wetlands be realized, ensuring both the preservation and scholarly utilization of this highly vulnerable and internationally significant cultural heritage.

Settlement landscapes of Eneolithic Carinthia: cultural context and archaeological insights

Understanding the prehistoric pile-dwelling phenomenon in Carinthia requires contextualization within the broader framework of Neolithic to Eneolithic/Copper Age settlement dynamics across southern Austria. Despite decades of research, the regional development remains poorly understood, with significant chronological and spatial gaps indicating an urgent need for modern archaeological reassessment (Ries 2026, in print). The lakeshore settlements of Carinthia cannot be interpreted in isolation; rather, they must be seen as integral components of a wider network of contemporaneous terrestrial sites that collectively shaped the landscape between the 5th and 3rd millennia BC. Without such contextual integration, interpretations of lakeside habitation patterns remain fragmentary and one-dimensional. A comprehensive reassessment of known Neolithic and Eneolithic sites in Carinthia is therefore essential. The last systematic

attempt to visualize regional settlement distributions was undertaken by Guido Vahlkampf (1995). Since then, numerous excavations and surveys – such as those at Knappenberg and Wauberg – have enriched the archaeological record, highlighting the need to update existing models, including the chronological framework based on radiocarbon dating (Gleirscher 2006; 2008; Ebner-Baur 2017; Bertha and Tiefengraber 2020).

Of the 22 known sites, only two have been radiocarbon dated, while the remaining sites are classified solely based on traditional typochronological frameworks focused on the study of pottery (Fig. 2). These classifications rely on partly outdated typochronological frameworks. To date, only two datasets of radiocarbon dates have been published – one for Lake Keutschacher See and one for the Kapuzinerinsel site, the latter of which is presented in this contribution (Fig. 2, 3).

Preliminary observations suggest that settlement locations in Carinthia follow a distinct spatial logic. All identified sites are situated on elevated, hilltop points, offering strategic advantages for defence, visibility, and control over surrounding areas (Fig. 4). Moreover, the distances between individual sites are relatively short – often less than 10 km, and in some cases below 5 km – implying possible contemporaneity and suggesting the existence of close communication and exchange networks between settlement sites. Notably, all settlements are located near fluvial systems or waterways, indicating a deliberate choice of locations that allowed for both terrestrial and/or aquatic connectivity (Fig. 3, 5).

The conspicuous absence of lowland settlements may reflect specific environmental or cultural preferences, but it is more likely linked to preservation issues and large gaps within the current archaeological record. This gap underscores a methodological shortcoming in Austrian research and highlights the need for comprehensive reassessments of existing site inventories and the application of large-scale, non-invasive prospection to reconstruct prehistoric settlement networks and integrate lakeshore and inland sites into a holistic understanding of habitation dynamics in southern Austria.

The Neolithic to Eneolithic settlement record of Carinthia remains highly fragmentary and has not yet been systematically reassessed using modern day archaeological approaches. Current data provides only isolated, snapshot-like glimpses into early farming communities, while fundamental questions concerning settlement dynamics, site dimensions and layout, architectural traditions, and socio-economic organization remain largely unanswered. Among the few known inland sites, the eponymous site of Kanzianiberg – located a few kilometres north of the Slovenian border near Lake Faaker See – represents a key reference point (Dolenz 1938; Pedrotti 1990; Gleirscher 2006). Finds recovered during early excavations and surface collections in the 1930s, later studied by Pedrotti in the 1990s, indicate strong cultural connections with northern Italy and the Pannonian Basin (Pedrotti 1990). Additional small-scale investigations at nearby hilltop sites, such as Wauberg between Lake Faaker See and the Drava River, have yielded evidence of occupation during Eneolithic times (Bertha and Tiefengraber 2020). Microarchaeological analyses of sediments from this context identified fish remains, providing clear evidence for the economic exploitation of adjacent aquatic environments and the systematic use of waterscapes as subsistence resources (Ries 2022c). The visual and topographic relationships between these hilltop and lakeshore sites underline their integration within a shared settlement and communication network oriented along fluvial and lacustrine landscapes. Another open question concerns the role of certain settlements within early metallurgical networks. Several Carinthian sites, including Fuchsofen/Klein St. Paul, Wauberg, Kanzianiberg, Keutschacher See, and Kapuzinerinsel, have yielded evidence of copper metallurgy, such as casting moulds and copper artefacts. However, the exact function of these sites within regional resource exploitation as hubs for technological innovations and economical exchange remains unclear and has not yet been satisfactorily addressed by archaeological research (Gleirscher 2007; Frank and Pernicka 2012). Access to copper ores and the exploitation of metallurgical resources likely influenced settlement choice and may have been a driving factor in the development of regional settlement systems. Despite these insights, the archaeological record remains incomplete in large parts – particularly concerning absolute chronology and settlement morphology. The absence of lowland sites contrasts sharply with settlement patterns in adjacent regions such as the Carpathian Basin, continental Slovenia and Croatia where large extended sites have been investigated extensively during the last decades (Velušček 2017; Čataj 2020). This discrepancy raises the question of whether it reflects genuinely different settlement preferences in the region or merely results from research bias and the absence of systematic archaeological surveys in Carinthia, which very likely hampers the current understanding of regional settlement patterns in

	Neolithic to Eneolithic settlement sites in Carinthia	Available Absolute (Radiocarbon) Dates	Bibliographic Reference
1	Kanzianiberg, Finkenstein	no	Pedrotti 1990; Dolenz 1938
2	Wauberg	no	Bertha and Tiefengraber 2020
3	Kapuzinerinsel/Wörthersee (pile-dwelling)	yes	Ries 2022a; Ries 2026
4	Keutschach /Keutschacher See (pile-dwelling)	yes	Cichocky 1994; Samonig 2003; Ruttkay *et al.* 2004
5	Hafnersee (pile-dwelling)	no	Pohl 2017; Kowarik *et al.* 2017
6	Moosburg	no	Ries 2026; Vahlkampf 1995; Kohla 1960
7	Knappenberg/Görtschitztal	no	Ebner-Baur 2017
8	Kirchberg bei Klein St. Paul/Görtschitztal	no	Tiefengraber (unpublished)
9	Kulm bei Ettendorf/Lavanttal	no	Vahlkampf 1995
10	Steinkögelen bei Völkermarkt Haimburg	no	Vahlkampf 1995
11	Maria Saaler Berg/Zollfeld	no	Vahlkampf 1995
12	Rabenstein bei St. Paul im Lavanttal	no	Carneiro 2004; Tiefengraber 2004
13	Rabenstein bei Lavamünd	no	Vahlkampf 1995
14	Forst-Strappelkogel bei Wolfsberg	no	Vahlkampf 1995
15	Reisberg Wolfsberg	no	Vahlkampf 1995
16	Villach/Federaun	no	Steinegger pers. communication
17	Villach/Tscheltschnigkogel	no	Gleirscher 2006
18	Kathreinkogel/Schiefling am See	no	Vahlkampf 1995
19	Gradišče/St. Egyden a.d. Drau	no	Vahlkampf 1995
20	Ottilienkogel/Glantschach	no	Vahlkampf 1995
21	Odwinskogel (Otwinskogel)/St. Georgen am Längsee	no	Vahlkampf 1995
22	Weitersdorf/Klein St. Paul, Fuchsofen/Görtschitztal	no	Gleirscher 2008

Fig. 2. Tabular overview of recorded Neolithic/Eneolithic settlements in the Carinthia region, listing site name, location, chronological/dating status and principal literature references (compiled from published and archival sources; the inventory may be incomplete; edited by M.-C. Ries).

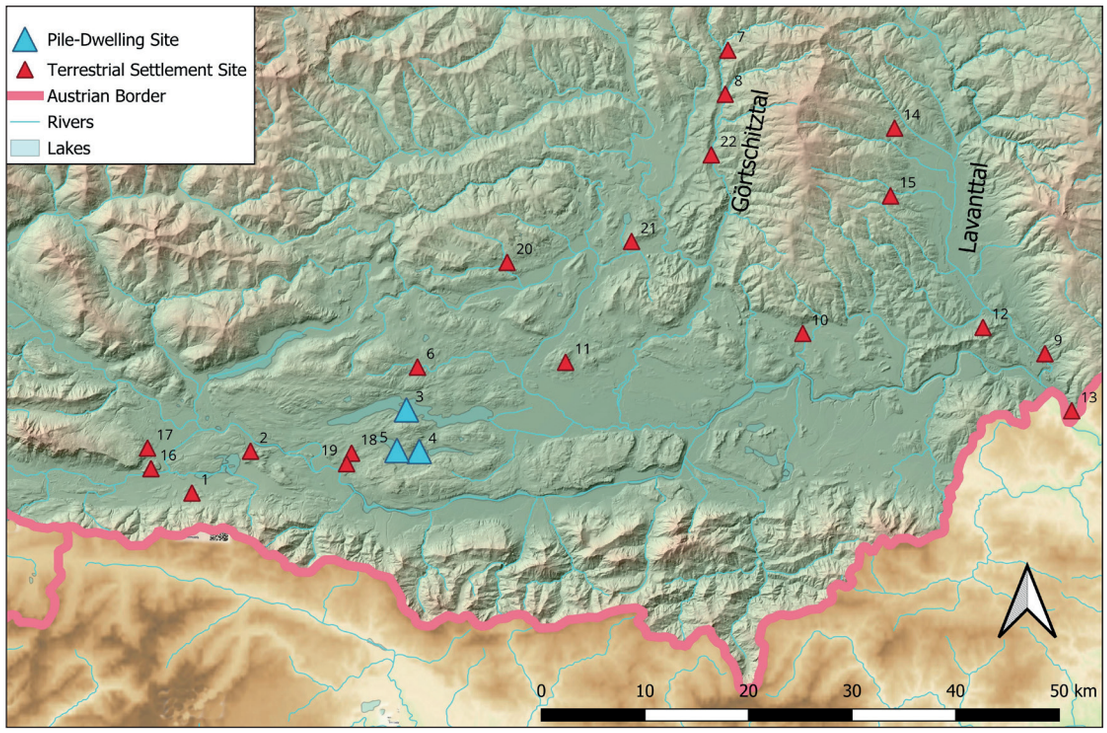

Fig. 3. Map of the current state of settlement distribution in Carinthia 5th to 3rd millennium BC based on Vahlkampf (1995), with subsequent additions and updates.

1. Kanzianiberg, 2. Wauberg, 3. Kapuzinerinsel/Wörthersee, 4. Keutschacher See (UNESCO-site), 5. Hafnersee, 6. Moosburg, 7. Knappenberg, 8. Kirchberg bei Klein St. Paul, 9. Kulm bei Ettendorf, 10. Steinkögelen bei Völkermarkt Haimburg, 11. Maria Saaler Berg/Zollfeld, 12. Rabenstein bei St. Paul im Lavanttal, 13. Rabenstein bei Lavamünd, 14. Forst-Strappelkogel bei Wolfsberg, 15. Reisberg Wolfsberg, 16. Federaun/Villach, 17. Tscheltschnigkogel/Villach, 18. Kathreinkogel/Schiefling, 19. Gradišče/St. Egyden a.d. Drau, 20. Ottilienkogel/Glantschach, 21. Odwinskogel (Otwinskogel)/St. Georgen am Längsee, 22. Weitersdorf/Klein St. Paul Fuchskogel, Fuchsofen/Görtschitztal (map by M.-C. Ries).

Fig. 4. Drone image. Eastward view of the Kanzianiberg, an exemplary Carinthian hilltop-site, showing the steep edge of its western limestone plateaus, the location where archaeological remains were discovered. The Kanzianiberg is a key landmark site that has profoundly influenced our understanding of Carinthian prehistory. Located at the northern foothills of the Karawanks' Mountains, it yielded rich Neolithic to Eneolithic assemblages during excavations in the 1930s (photo by M.-C. Ries).

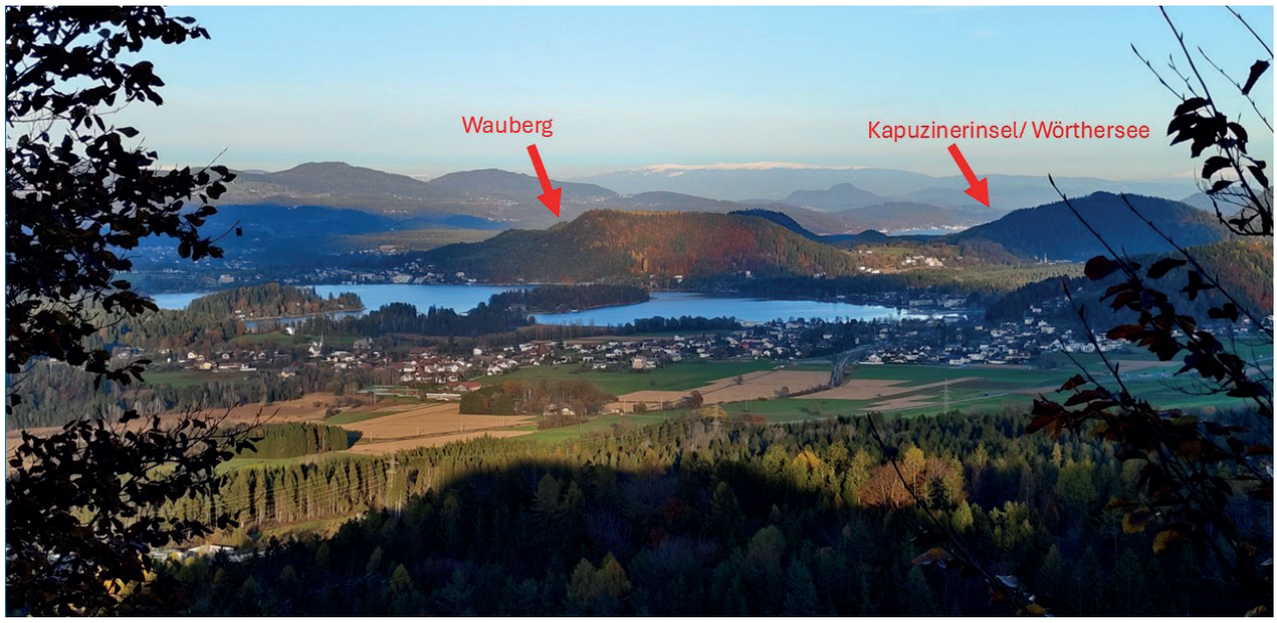

Fig. 5. View from the northern plateau of Kanzianiberg over Lake Faaker See towards the northeast, illustrating the spatial proximity between Kanzianiberg, Wauberg, and potential lowland or lakeshore settlements within the prehistoric settlement landscape of Carinthia (photo by M.-C. Ries).

the archaeological record. When viewed at a broader scale, scattered surface finds and excavations suggest a denser and more complex settlement landscape than previously assumed, a hitherto scientifically unexamined period potentially reflecting an early phase of cultural expansion, prosperity and intensified human presence in Austria´s southern Alpine sphere.

Moreover Carinthia – with its numerous lake and wetland archives that remain largely untapped – offers major potential for palaeoecological research. High-resolution pollen analyses can provide detailed insights into past vegetation dynamics and anthropogenic landscape transformations on a broader spatio-temporal scale. Revising existing pollen records and conducting modern, archaeology-focused high-resolution palynological studies could identify the earliest agricultural activities by Neolithic communities, reflected in *Cerealia*-type pollen, *Plantago lanceolata*, or increased microcharcoal records, providing an informative proxy for early farming practices. Some records, such as from Millstättersee or Höfleinmoor at Sattnitz northeast of Lake Wörthersee, might suggest Mesolithic to Neolithic human impact through reduced primary forest and increased light-demanding woodland taxa such as hazel (Fritz 2000; 2007). Although no corresponding archaeological sites have been documented, it is plausible that Mesolithic communities were already influencing Carinthia's environment, as lithic stray finds from Pyramidenkogel or alpine sites suggest (Leitner 1984; 1990; Jernej 2012; Posch *et al.* 2023). Integrating high-resolution palaeoecology with archaeology provides a powerful approach to reconstruct land-use changes, the emergence of sedentary communities, local settlement dynamics, and the onset of farming practices, thereby helping to address major gaps in our understanding of the development and evolution of prehistoric societies in Carinthia. Further research should also target inner-alpine basins and valleys with fluvial axes, such as the Lavanttal and Görtschitztal, which link the Drava valley and Klagenfurt Basin to Slovenia in the south and to large inner-alpine valleys of Styria in the north (Bertha 2021). These corridors served as natural routes of communication, cultural interaction, and exchange, connecting the northeastern Alpine forelands of Styria with the Judenburg Basin (Aichfeld/Mur Valley) and further towards southeastern Europe. Given the close geographical and cultural ties to the Balkans, it is appropriate to contextualize Carinthian assemblages of prehistoric material culture within a Eneolithic/Copper Age periodization framework, as suggested by Wolfram Schier (2014). Existing periodisation models, notably those proposed by Elisabeth Ruttkay and Bertram Samonig, require critical revision in light of new evidence, as parts of their work are outdated (Ruttkay 1994; 1996; 1997; Bertha and Tiefengraber 2020; Bertha 2021; Ries 2026, in print). The so-called Kanzianiberg–Lasinja Group, traditionally assigned to the Late or Final Neolithic, should

be reconsidered within a broader supra-regional Copper Age framework. The presence of imported copper artefacts, comparable to examples from the Balkans, points to Carinthia's integration into extensive exchange networks of raw materials, technological innovations, and cultural traditions during the 5th to 3rd millennia BC.

Comparable evidence from neighbouring Styria and Slovenia provides important reference points. Sites such as Wildoner Schlossberg in Styria demonstrate the existence of sedentary farming communities from the Middle Neolithic onwards, while scattered Starčevo and LBK sherds from eastern Styria and the Ljubljansko barje region possibly attest even much earlier cultural interactions across the Alpe-Adria corridor (Tiefengraber 2015a; 2015b; 2015c; 2018; Velušček 2017). Achieving a comparable state of research for Carinthia – through systematic palaeoecological sampling, targeted excavation, and absolute dating – remains essential for understanding the regional trajectory of Neolithisation, the transition to the Eneolithic, and its cultural and environmental context, including the crucial role of waterways in facilitating the expansion and movement of prehistoric communities.

Case study: northeastern shallow shoreline areas of Lake Wörthersee (Eastern Bay, Krumpendorf Area)

In winter 2023, a multi-day diving survey was conducted in the shallow littoral zone of Lake Wörthersee near Krumpendorf to identify potential prehistoric pile-dwelling sites (Ries 2024b). Fieldwork was supported by local collaborators, "Wasserrettung Krumpendorf", who provided infrastructure and equipment. The survey documented numerous anthropogenic features in the shallow-water zone (Fig. 7, 8).

Most were of historical and modern origin, associated primarily with past fishing practices (Fig. 8). Dense pile fields, often combined with underwater stone mounds, correspond to historical fishery installations documented in Carinthian and other circumalpine lakes (Jernej 2023). Stone mound structures are prominently discernible in aerial photographs. Aerial drone images clearly show the underwater stone mounds of Lake Wörthersee such as in investigation zone D additionally revealed underwater mounds (Fig. 7).

Coring and sediment analyses showed that the uppermost layers consisted mainly of minerogenic lake marl and glacially formed clay, with occasional

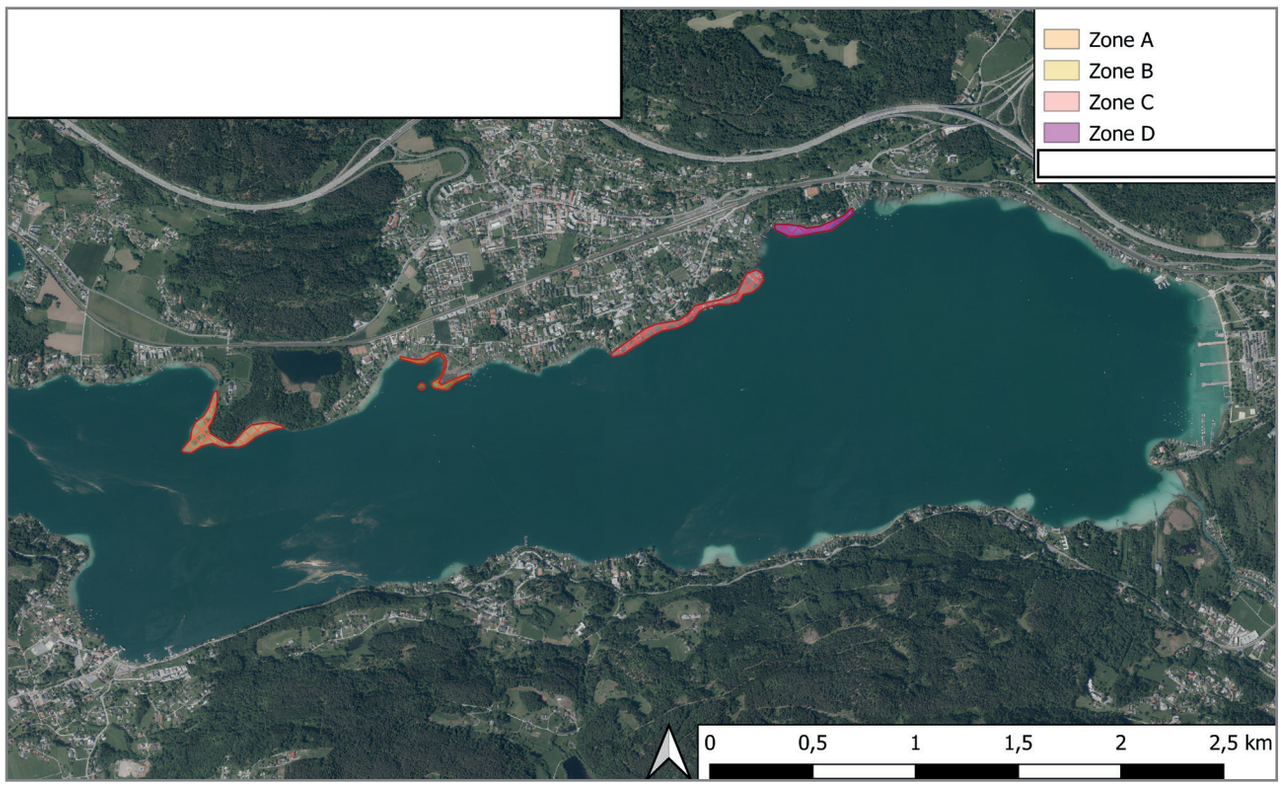

Fig. 6. Map of the littoral zones surveyed at Krumpendorf. Four survey areas (Zones A–D) were defined, with investigations carried out in the shallow-water zone to assess archaeological potential (map by M.-C. Ries).

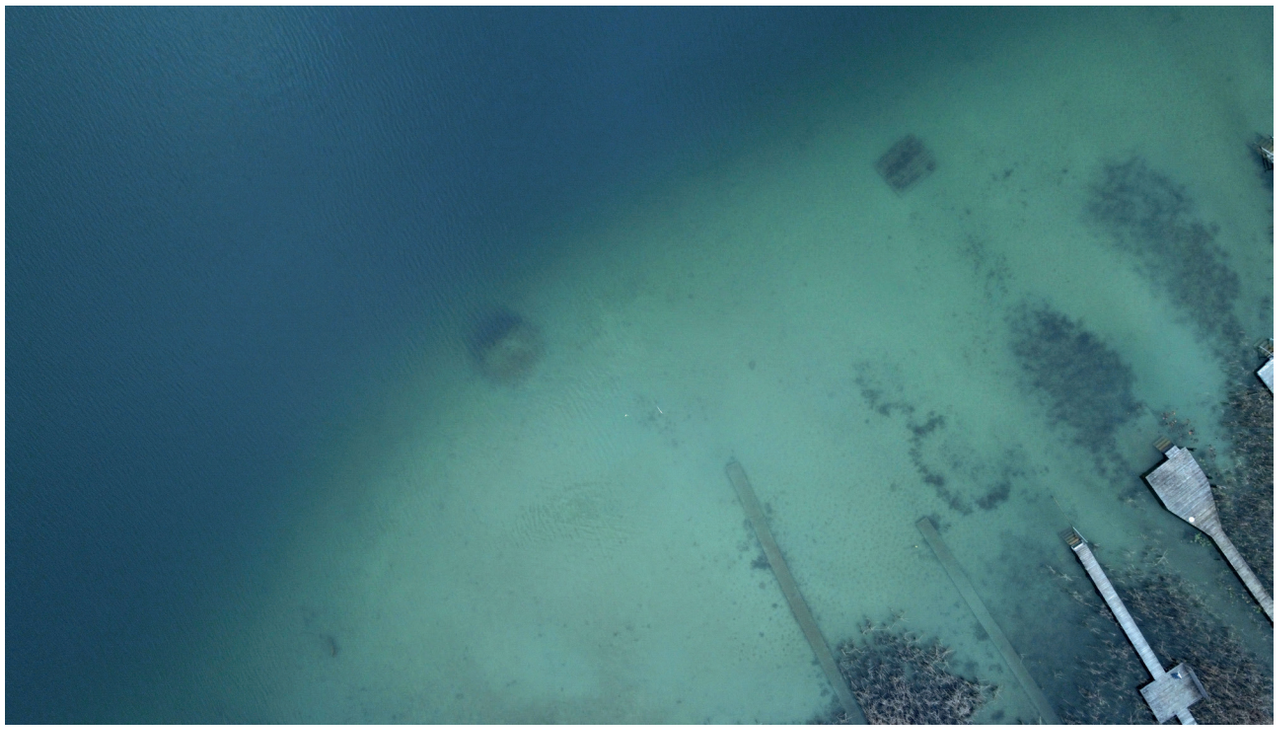

Fig. 7. Aerial view of Lake Wörthersee showing submerged stone mounds, clearly visible in Investigation Zone D. These features represent preserved traces of past fishing activities, providing evidence for historical exploitation of the littoral zone (photo by M.-C. Ries).

deposits of naturally accumulated organic matter, likely representing degraded reed belts. No stratigraphic traces of prehistoric cultural layers – such as subfossil detritus containing charcoal and cultivated plants – were identified. In several cores, glacial clay was found directly at the surface, indicating severe erosional processes, likely accelerated by motorized boating and anthropogenic shoreline modifications (Fig. 9).

Despite the absence of prehistoric material such as pottery fragments or remains of organic cultural layers from pile-dwelling sites in the four surveyed underwater zones (A–D), stray finds along the Krumpendorf lakeshore evidence the presence of prehistoric people, including a lithic artefacts (silex core) and a fully preserved ceramic vessel assignable to the Epi-Lengyel/Copper Age (late 5th to early 4th millennium BC) (Ries 2024b). This suggests that adjacent near-shore areas, particularly former submerged littoral zones now silted-up or dry, may still contain undiscovered prehistoric pile-dwelling remains. Previous human interventions, including artificial water-level regulation and shoreline modifications, may not have entirely disturbed or removed such structures, as observed in similar situations at circumalpine lakes (Dieckmann *et al.* 2012; Huber *et al.* 2020).

This implies that the shorelines of Lake Wörthersee likely preserve plenty undiscovered prehistoric pile-dwelling sites, now situated on land due to the change of the water table, which could be revealed through systematic excavation or during construction activities along the shorelines. These dry or paludified palaeo-shoreland areas possess significant archaeological potential and should be carefully monitored and subjected to systematic heritage supervision in planning processes prior to construction activities (Ebersbach *et al.* 2019). Several areas in Krumpendorf retain particular potential for future archaeological investigations. The largely undeveloped Walterskirchen Nature Reserve and zones surrounding the lakeside promenade, marina, "Bad Stich"-area, and local shoreline restaurants have previously yielded Copper Age finds, confirming prehistoric occupation (Ries 2024b; *Fundmeldung Krumpendorf* 1955).

Preservation in the shallow littoral zones is generally poor. Erosion has caused the loss of significant amount of littoral sediment layers which lead to widespread exposure of glacially formed clay and gravel deposits visible in the sediment cores retrieved in 1 m sequences via hand-operated corer (Fig. 9). Microarchaeological analyses confirm extreme erosion and sediment disturbance, while the presence of invasive neozoic fauna

Fig. 8. Dense occurrence of modern- to historic wooden pile fields, characterized by small-diameter, well-preserved vertical timber, representing traditional fishery installations ("Fischreis"), often associated with stone mounds either around or near the piles. Example from the shallow-water area in front of the Walterskirchen promontory (photo by M.-C. Ries).

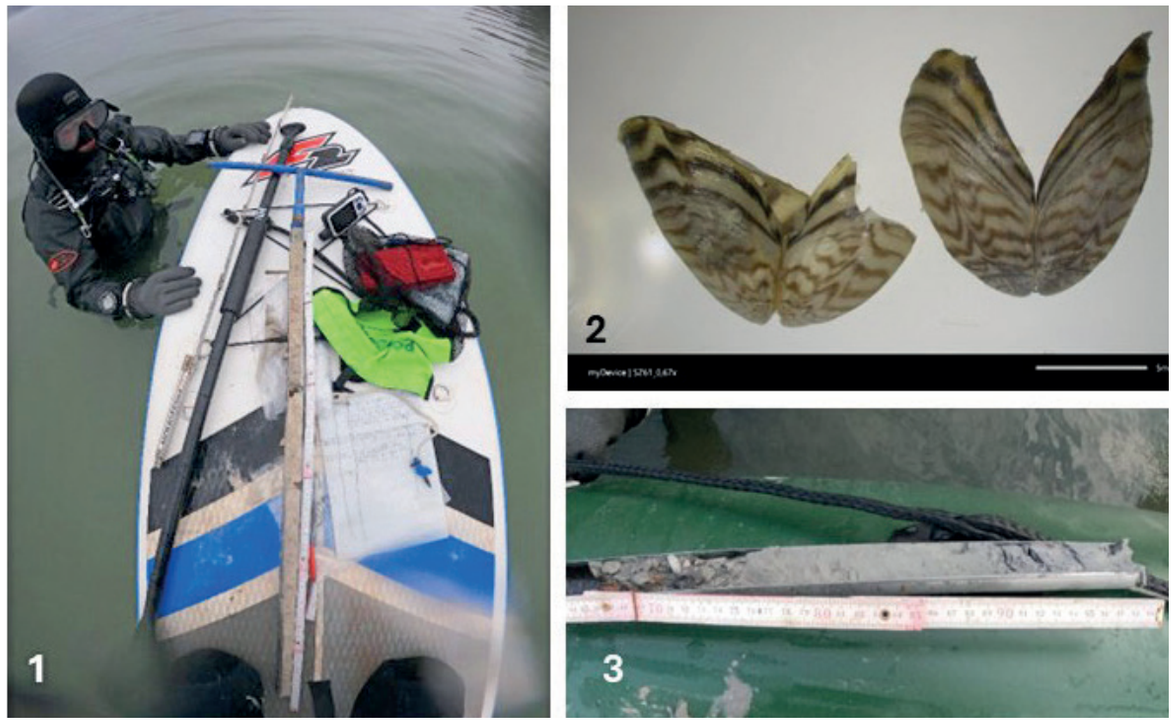

Fig. 9. Microarchaeological results document extreme erosional truncation and sediment reworking. Zebra mussels (Dreissena polymorpha) occurring to >70 cm depth below surface, demonstrate continued biotic disturbance (2). Core 19.1 comprises only consolidated, fine-grained glacial clay, evidencing full removal of post-glacial stratigraphic units in shoreline areas (3). Diver A. Laskaris during core documentation (1) (photo by M.-C. Ries).

zebra mussels (*Dreissena polymorpha*) up to 70 cm below the surface further illustrates ongoing change of the environment and anthropogenic pressures.

Overall, while accelerated erosion and historical fishing activities dominate the visible archaeological landscape around Krumpendorf, inland and formerly submerged lake zones e.g. palaeo-shorelines may still preserve intact prehistoric pile-dwelling settlements. The Krumpendorf littoral zone thus represents a complex archaeological landscape, only partially surveyed and understood. Given documented erosional dynamics and ongoing human impacts, preventive archaeological monitoring should accompany shoreline constructions, dredging, or restoration. Intensified research in both submerged and former lakeshore zones is essential to advance our knowledge of prehistoric human activity in Carinthia and to prevent the undocumented loss of cultural heritage of outstanding significance.

Case study: small mire lakes Moosburger Teiche

A multi-day coring survey in August 2023 at the Moosburg mire-lakes provided initial insights into a sensitive cultural landscape located in a wetland environment (Ries 2024c). Conducted as part of a University Innsbruck field practicum, the survey covered three transects (A–C) and revealed local sedimentation processes and anthropogenic influence, including abundant charcoal fragments and burnt clay in selected cores (Fig. 10, 11). No diagnostic features of prehistoric pile-dwellings, such as post alignments or cultural layers, were identified.

Given the presence of prehistoric and historic monuments in the area, additional archaeological remains around the Moosburg ponds cannot be excluded. The basin represents a highly sensitive archaeological zone with particular potential for the presence of wetland pile-dwelling settlements and related structures such as prehistoric timber trackways in paludified peat-environments. Follow-up investigations with advanced equipment and adequate funding are required to complete the currently fragmentary research picture.

A modern reassessment of material from earlier excavations on the elevated hilltop along the Moosburg waterbodies (Kohla 1960; 1973; Vahlkampf 1995) is urgently required. Kohla's excavations in the 1950s, conducted on the ridge north of the Mitterteich, documented evidence of a prehistoric settlement

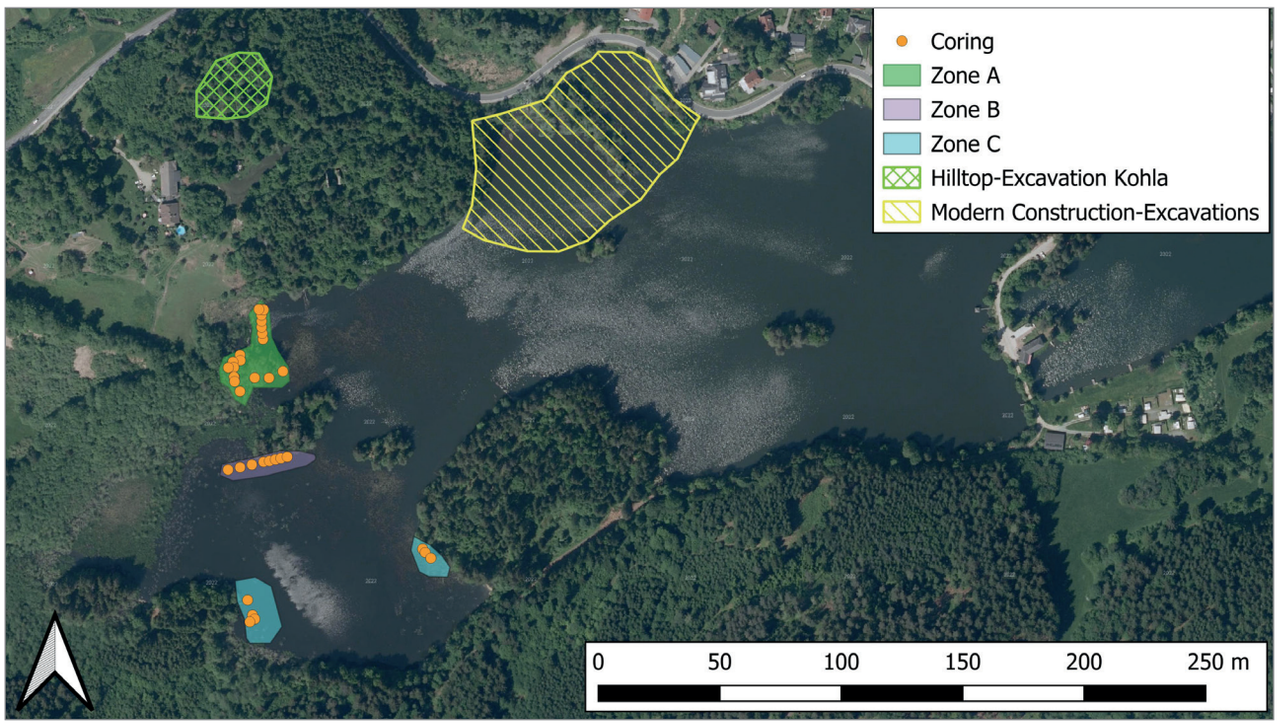

Fig. 10. Map of the surveyed zones at Moosburger Teiche. Three survey areas (Zones A–C) were defined, with investigations conducted in shallow, macrophyte-covered waters to assess archaeological potential and identify preserved remains. The study area is situated near the hilltop excavations by Kohla, which yielded settlement evidence attributable to the Epi-Lengyel cultural horizon (map by M.-C. Ries).

Fig. 11. A group of archaeology students conducting hand-operated coring and documentation of local stratigraphy in challenging environments at shore-line areas of the Moosburger Teiche Lakes (students: B. Jell and M. Kerschner) (photo by M.-C. Ries).

and provided the primary impetus for the recent field investigations. Although the original excavation yielded limited stratigraphic documentation, the recovered artefacts indicate settlement activity during the Neolithic to Copper Age which can be attributed to the Epi-Lengyel.

For example, fragments of ceramic ladles with perforated handles and biconical vessels with downward-pointing knob-like lugs and incised rim decoration were found. These forms correspond to vessel types known from the Lasinja-culture horizon. The fragment of a clay ladle or spoon with a perforated handle is characteristic of the Lasinja phase. The so-called "Knickwandschale mit abwärtszeigendem Zapfenbuckel" represents a well-defined type within the same cultural complex. Comparable assemblages are well documented at sites in neighbouring regions, such as Slovenia and Styria, supporting a clear cultural affiliation of the Moosburg material with the broader Lasinja cultural sphere (Tiefengraber 2015c; 2018; Velušček 2017; Bertha 2021; Ries 2026, in print).

Among the finds, a miniature vessel stands out due to its clear stylistic and technological links to the material culture of adjacent Southeast European regions like Slovenia, Croatia or Serbia (Kramberger *et al.* 2021). This object is currently the focus of detailed archaeometric analyses, which aim to clarify its content by residue analysis, functional use, and broader cultural significance (Fig. 12).

The ongoing study of this vessel, combined with a systematic re-evaluation of the earlier excavation material, is essential for assessing supraregional connections, and establishing absolute chronological frameworks. Integrating these data with new fieldwork and sediment analyses allows a modern interpretation of the site's occupational history and its role within the wider prehistoric landscape of the southeastern Alpine region. These efforts highlight both the scientific potential of the Moosburg site and the necessity of employing state-of-the-art investigations to fully realize its archaeological significance.

The wetland deposits of the Moosburg ponds also represent a valuable environmental-archaeological archive for studying human–environment interactions. Palaeoecological analyses could clarify local settlement dynamics and give insights into the local Neolithisation process. Any future modifications of the pond areas – shoreline redevelopment, restoration of natural habitats, construction, dredging – should be accompanied by systematic archaeological monitoring. Overall, the Moosburg mire-lakes constitute a culturally and environmentally significant landscape with high potential for prehistoric pile-dwelling settlements and for advancing understanding of Neolithic to Copper Age human activity in Carinthia.

Kapuzinerinsel in Lake Wörthersee

The currently investigated pile-dwelling site of Kapuzinerinsel in Lake Wörthersee represents a major addition to Carinthia's prehistoric settlement record. Located less than 5 km from the UNESCO World Heritage pile-dwelling-site at Lake Keutschacher See,

Fig. 12. Ceramic miniature vessel from Moosburg, originating from the early excavation campaigns. The object shows strong similarities to ceramic forms known from southeastern European regions, suggesting the possibility of a non-local "foreign type" or imported object (photo by M.-C. Ries).

the site provides the first securely dated evidence of Eneolithic occupation in the Wörthersee basin (Ries 2022a; 2022b; 2024a; 2025; 2026, in print).

Initial underwater prospection in the winter of 2021, combined diving surveys, hand-operated coring, and systematic sediment sampling (Ries 2022a). These investigations revealed dense pile fields, eroded organic cultural layers, and artefact assemblages including pottery, lithic artefacts, and a rich archaeobotanical and zooarchaeological record. The site occupies a strategic position within a central-lake constriction, likely reflecting its importance in water-orientated regional and supraregional exchange networks.

Already during the first diving surveys, stratigraphic observations and sediment analyses indicated severe erosion and the rapid degradation of submerged archaeological deposits. Subsequent microarchaeological and archaeobotanical screening of waterlogged sediments yielded uncharred cereal chaff, cultivated crops, and gathered wild plants, pointing to a mixed farming and foraging economy (Fig. 13). Radiocarbon analysis of selected terrestrial macroremains, conducted in 2022, provided the first absolute date for Kapuzinerinsel, placing its occupation in the late 4th millennium cal BC (3781±129 BP; Beta-623764, 2σ range). This result establishes Kapuzinerinsel as the oldest known settlement evidence from Lake Wörthersee and underscores its exceptional value for understanding early sedentary lifeways in Carinthia (Fig. 14).

At the same time, evidence of alarming scales of erosion induced by wave activities have already been visible during the 2021 surveys, which have consequently been reported to the Federal Monuments Office Austria (Ries 2022a).

Approximately 3 kg of unstratified pottery stray finds from the shallow-water zone of Kapuzinerinsel, collected over past decades by private individuals, are currently curated in the Kärnten Museum in

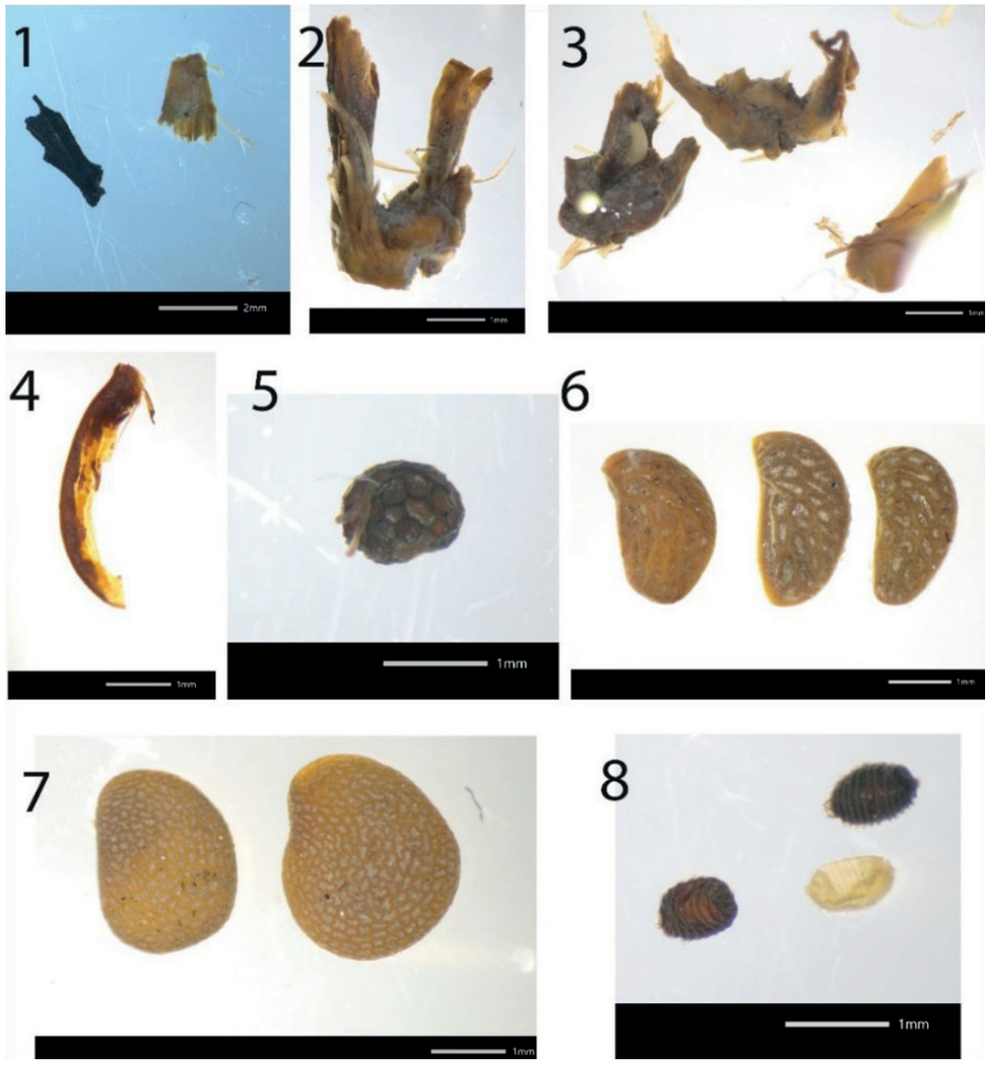

Fig. 13. Result of microarchaeological screening. Uncharred botanical macro-remains from the cultural layer samples collected during the 2021 survey at Kapuzinerinsel.

1–3. cereal chaff fragments, 4. flax seeds (Linum usitatissimum), 5. poppy (Papaver somniferum), 6. raspberry (Rubus fruticosus), 7. groundcherry (Physalis alkekengi), 8. oogonia of stoneworts (Characeae). The majority of archaeobotanical remains are strongly intermixed with reed rhizomes (visible as filamentous brown fibers) (photo by M.-C. Ries).

Klagenfurt. These materials were systematically re-evaluated and included in a typo-chronological study during 2023 (Ries 2026, in print). The assemblage also comprises artefacts recovered after a severe storm in summer 2022, which caused substantial erosion along the island's terrestrial margins. Uprooted trees were mechanically displacing cultural layers and exposing prehistoric material – a striking indicator of the increasing frequency of extreme weather events, possibly linked to climatic change resulting in the loss and destruction of archaeological heritage (Fig. 15).

The historical collections further contain stray finds retrieved from earlier disturbances, offering fragmentary but valuable insights into the site's phasing and settlement history. On this basis, preliminary working hypotheses for the chronological and cultural sequence have been formulated. The earliest phase is attributed to the Early Copper Age Kanzianiberg–Lasinja I IIa horizon (ca. 4300–3900 BC). It is followed by a distinct Middle Copper Age phase (ca. 3900/3800–3500 BC), associated with furrow incision pottery "Furchenstichkeramik" defined as the local group of Kanzianiberg–Lasinja IIc facies Keutschach (Ruttkay 1996; 1997; Samonig 2003; Ruttkay *et al.* 2004; Ries 2026, in print), and culturally related to pottery groups characterized by furrow-incisions,

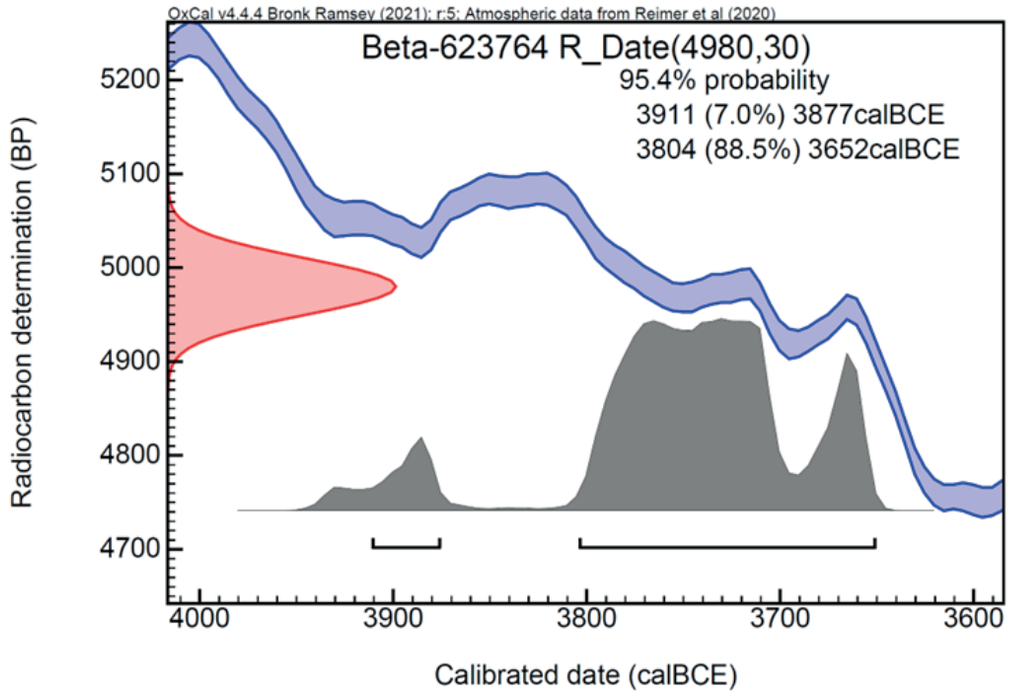

Fig. 14. Calibrated Radiocarbon date from terrestrial macrobotanical remains from the archaeological cultural layer at Kapuzinerinsel (image by M.-C. Ries/Beta Analytic).

Fig. 15. Archaeological rescue documentation following the summer storm of 2022 reveals substantial damage along the terrestrial part of Kapuzinerinsel, with uprooted trees exposing an estimated 50–70 artefacts per tree crater (photo by R. Jernej).

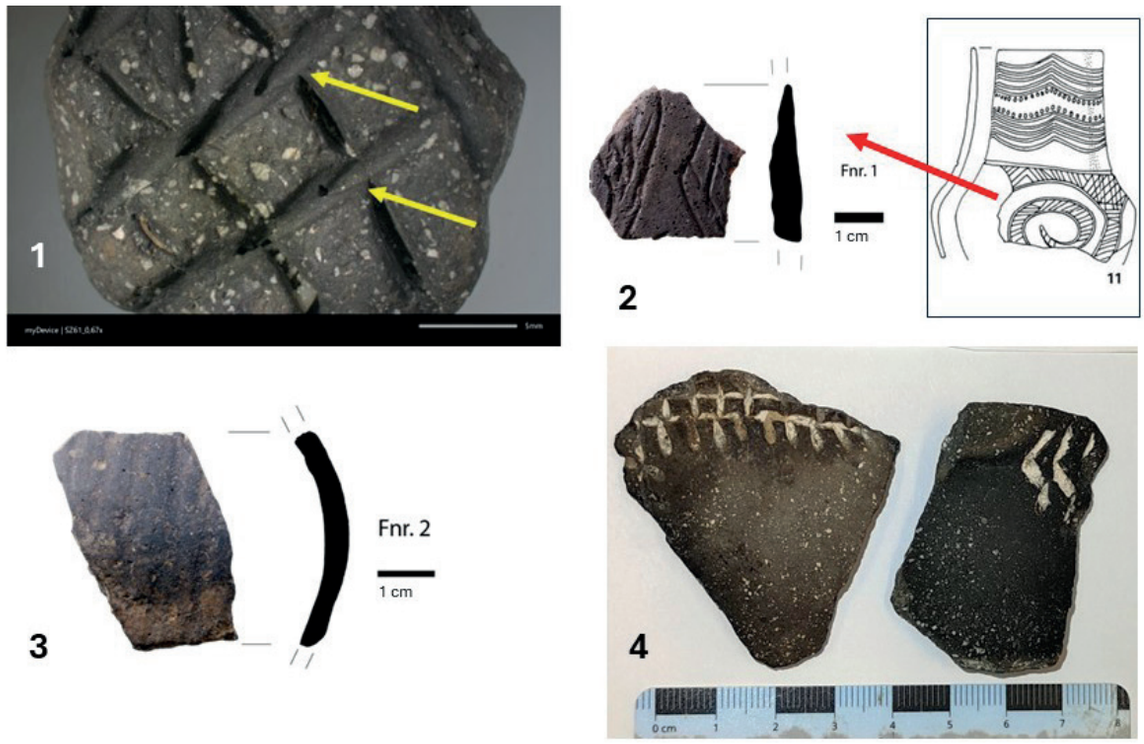

Fig. 16. Pottery fragments from Kapuzinerinsel.

1. hydrodynamically eroded sherd with clearly defined furrow incisions, 2. sherd with crossed bundles of incision lines filling curvilinear motifs, showing strong stylistic parallels to material from Keutschacher See and the Hočevarica site, 3. pottery fragment likely attributable to the Boleráz group of the Baden Culture, 4. sherds from the 2024 underwater excavation campaign, reflecting the stylistic development commonly referred to as the local "Facies Keutschach" from the 1st half of the 4th millennium BC (photo by M.-C. Ries).

similar observable in the pottery from Mondsee and Retz-Gajary groups (Fig. 16).

The ceramic assemblage includes several fragments of small, finely made jugs produced predominantly in a reducing firing atmosphere and composed of fine clay pastes. Many of these vessels exhibit polished surfaces and are equipped with band handles, while the main feature of these jugs are curvilinear incised motifs. Characteristics of this local ceramic tradition is the use of curvilinear volutes filled with fine incised lines, representing a stylistic expression that seems to be anchored in the Carinthian lake district also at Keutschacher See but shows wider cultural affiliations similarly extending into northeastern Slovenia and western Hungary. This Carinthian stylistic development has been described as the "Facies Keutschach", particularly recognizable in the white incrustation-paste inlay of the decoration applied to the incised patterns (Samonig 2003; Ruttkay *et al.* 2004; Gleirscher 2014; Ries 2026, in print).

In addition, the assemblage includes "Kerbschnitt" pottery combined with S-shaped, continuous circumferential ornamental bands along the rim, further underlining the site's role in a broader supra-regional stylistic network and strong links to Lake Keutschacher See. Material recovered during the 2024 field campaign reinforces the interpretation of the site as a nodal point within long-distance exchange networks, connecting the Eastern Alpine lakescapes with contemporaneous sites in the Austrian Salzkammergut area along the northern Alpine foothills or Slovenian sites such as Hočevarica and communities in the Transdanubian region of Hungary (Velušček 2004; 2017). Moreover, a third ceramic phase, previously unrecognised in the regional sequence of pile-dwelling settlements, can most probably be attributed to the Boleráz group of the Baden Culture (from c. 3500 BC onward). This phase is marked by vessels exhibiting shallow diagonal cannelures, closely comparable to Horizon VII at the Wildoner Schlossberg site in Styria and indicates continued occupation and shifting cultural affiliations over time (Tiefengraber 2018, fig. 212; Ries 2026, in print).

Evidence for early copper metallurgy, indicated by a clay crucible fragment containing arsenical copper, is currently under archaeometric analysis. Complementary radiocarbon and dendrochronological

analyses of waterlogged piles which are currently underway are expected to refine the chronological phasing and to reconstruct aspects of settlement layout (Zielke 2025).

Following repeated efforts to secure funding for essential rescue excavations, a small research grant was successfully obtained in 2024. During autumn 2024, a three-week targeted excavation was conducted with the support of the State of Carinthia (Art and Culture) and the Archaeological Research Network Innsbruck (AFIN). Two trenches covering 21 m² were opened in submerged and adjacent terrestrial zones (Fig. 17). Excavations revealed multi-phased occupation layers, exceptionally preserved timber structures within dense pile fields, and a diverse artefact assemblage exceeding 33 kg of recovered materials. The majority of ceramics can be attributed to the 4th millennium BC, stylistically consistent with the "Facies Keutschach" (Kanzianiberg–Lasinja IIc). Additionally, a fully preserved Iron Age animal-head fibula (5th century BC) found within the underwater excavation trench highlights the site's diachronic significance (Ries 2024).

Lithic material, including silex from at least three optically distinguishable raw material sources, grinding and hammer stones, complement the assemblage. Dendrochronological analyses of more than 100 sampled piles are ongoing to establish absolute dating and reconstruct settlement structures (Zielke 2025).

The underwater and terrestrial excavations at Kapuzinerinsel were conducted according to modern standards for pile-dwelling research, following best-practice methodologies developed in Switzerland for the systematic investigation of waterlogged prehistoric lakeshore settlements. The project involved an international team of nine archaeologists and scientific divers, with technical support from ZAPA (Slovenia) and German Collaborators (State Office for the Preservation of Monuments / Wetland Archaeology, Hemmenhofen and Terramare Archaeological Services). Excavation focused on two trenches: an underwater area measuring 4 × 5 m and a terrestrial area of 2 × 1 m.

A 1 m² grid system was implemented to ensure systematic spatial documentation (Fig. 18). Underwater dredges were used to remove sediment in con-

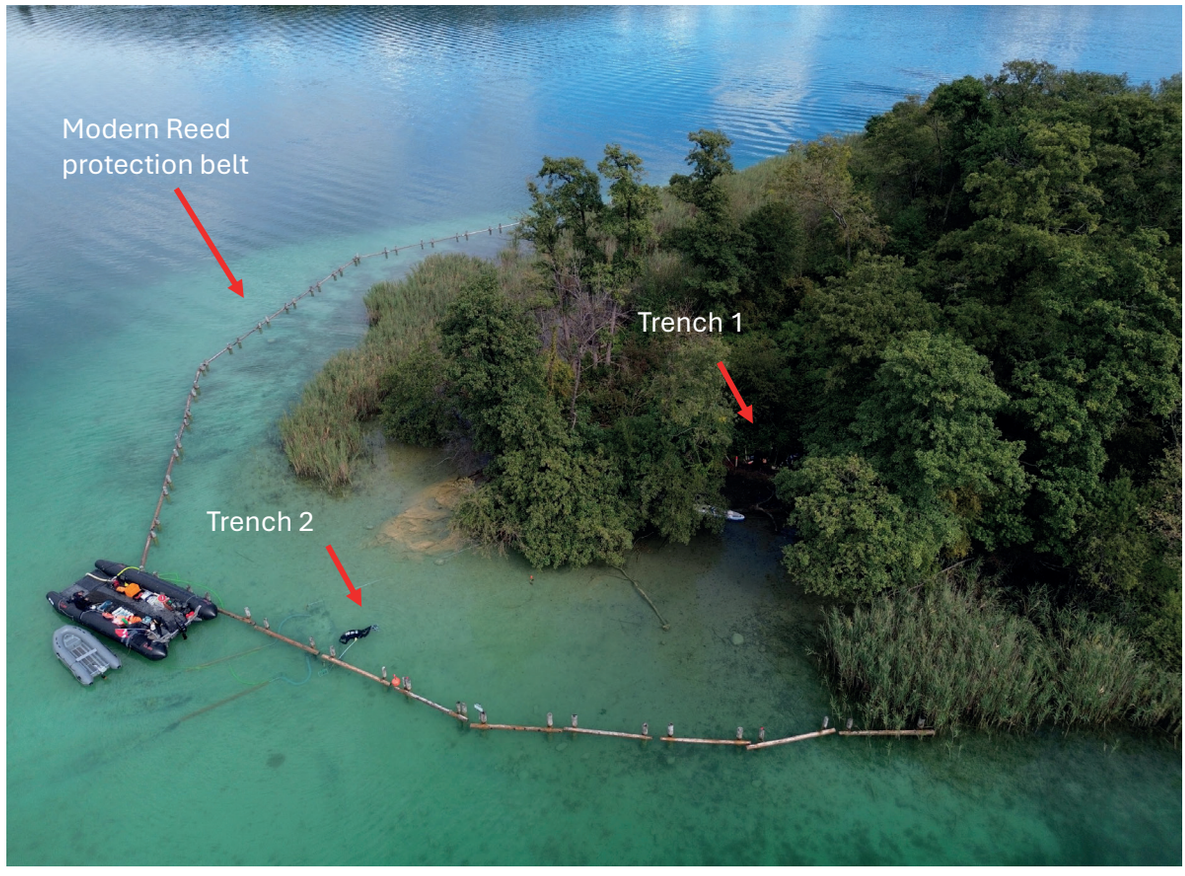

Fig. 17. Drone aerial photograph of the Kapuzinerinsel site during the 2024 underwater archaeological excavation, showing Excavation Trench 1 and Excavation Trench 2, as well as the reed protection belt established in 2019 as a nature conservation measure (photo by K. Bauer and M.-C. Ries).

Fig. 18. West side of the island showing the reed protection belt and the excavation trench in the shallow water zone, divided into 1 m² units for systematic documentation. Scientific diver conducting documentation steps; underwater dredges in use (image by M.-C. Ries).

trolled 1 m² units, while all piles were numbered and documented in situ prior to sampling. Emphasis was placed on high-resolution digital documentation, including extensive photography, video recording, and structure-from-motion (SfM) photogrammetry using Agisoft Metashape. This approach generated detailed three-dimensional models of the pile field and surrounding features, ensuring that pile positions and spatial relationships were precisely recorded. Subsequent georeferencing of square-metre photographs provided exact coordinates for each pile, enabling precise spatial analysis and integration into the site's GIS database. The procedure, inspired by modern best-practice examples developed and tested by Swiss pile-dwelling research teams, was applied at the Kapuzinerinsel excavation project to ensure systematic, high-quality documentation and recording of the underwater archaeological features (Bleicher *et al.* 2024; Reich *et al.* 2025). Excavated sediments were collected in fine mesh nets for subsequent wet-sieving on land, allowing recovery of small artefacts and microarchaeological materials. The primary objectives of the campaign included the assessment of site preservation, documentation of pile-field architecture, and targeted wood sampling for dendrochronological analysis. Semi-quantitative feature recording enabled rapid evaluation, while the integration of 3D modelling and careful sediment management maximized the preservation of contextual information. Public outreach was an integral component, with updates disseminated via social media and national television, highlighting the scientific and cultural significance of the site and the potential of Austrian underwater archaeology.

The final evaluation, detailed analysis, and publication of the Kapuzinerinsel excavations remain pending due to limited financial support and are planned for subsequent years. Preliminary observations suggest the presence of linear structures very likely island-enclosing palisades and the potential existence of remains from several multi-naved houses, representing multiple occupation phases. Excavated areas exhibit high pile densities, with up to nine wooden piles per square metre, reflecting local construction practices and enabling the reconstruction of settlement dynamics as well as past climate conditions through dendrochronological analysis of tree-ring patterns. Initial wood anatomical analyses of pile samples identified a total of 12 different wood genera, providing insights into prehistoric forest management, resource use, and human–environment interactions. Moreover, radiocarbon dating of selected samples is underway, which may allow year-precise absolute dating via wiggle-matching once integrated with the emerging mean oak chronology and individual tree-ring series.

If dendrochronological dating proves successful, as ongoing analyses are expected to show in 2026, Kapuzinerinsel could become only the second dendrochronologically dated pile-dwelling site in Austria, providing high-resolution absolute dating and a unique dataset for Chalcolithic architecture. As

the first underwater pile-dwelling excavation at Lake Wörthersee, it offers substantial potential for transdisciplinary research, enabling the reconstruction of settlement organization, socio-economic dynamics, and subsistence strategies in 4th-millennium BC Carinthia.

Kapuzinerinsel must be considered heritage at risk. Despite its exceptional significance as a 6,000-year-old site, current local conditions pose an immediate threat. A reed-protection belt established in 2019 as part of nature conservation measures has altered the site's surroundings, but the settlement remains highly vulnerable (Fig. 17). Intensively used waterskiing and boating tracks less than 50 m from the site generate an alarming scale of wave-induced erosion, destabilizing piles and degrading organic cultural layers. Without additional protective measures, substantial portions of the site will be permanently lost within the next years. Rescue excavation represents the preferred method both to safeguard the site and to document its archaeological value. Only a fraction of the settlement has been systematically investigated. Further rescue excavation, targeted sediment sampling, and archaeobotanical analyses, scheduled for the upcoming years, are urgently required to mitigate erosion, recover sensitive features and finds, and clarify occupation phases, settlement layout, and human–environment interactions. The immediate implementation of protective and monitoring measures is essential to preserve the site's integrity, scientific potential, and its status as a unique record of prehistoric lake-dwelling communities in Austria and the wider context of circum-Alpine pile-dwelling networks.

Conclusion

The pilot project assessing prehistoric settlement potential along the lakeshores and wetlands of Carinthia has clearly demonstrated the region's exceptional value for interdisciplinary archaeological research. Sites such as Kapuzinerinsel in Lake Wörthersee exemplify the multifaceted and wide-ranging insights that can be gained from combining underwater fieldwork, coring, sediment analysis, microarchaeology, and radiocarbon and dendrochronological dating. The investigations document multi-phased occupation, early agricultural practices, specialized craft production, and evidence of long-distance exchange, situating Carinthia firmly within broader prehistoric networks of the Alpe-Adria region. Moreover, these efforts provide an initial methodological and conceptual impulse for more systematic research across southern Austria's lakes and wetlands, offering a first step toward addressing long-standing gaps in chronology, settlement layout, and research on human–environment interactions.

Despite these advances, Carinthia's archaeological heritage remains highly vulnerable. hydrodynamic erosion, intensified recreational use, unsupervised shoreline modifications, and incomplete protection measures threaten the survival of key sites. The absence of defined archaeological protection zones along bodies of water, coupled with the fragmentary nature of existing site records, underscores the urgent need for preventive heritage management, rescue excavations, and to invest in archaeological infrastructure and foundational research. Small-scale pilot studies, like those conducted in Moosburg and Krumpendorf, highlight both the scientific potential and the fragility of these landscapes and their active undocumented loss. In conclusion, Carinthia offers unparalleled opportunities to reconstruct prehistoric settlement dynamics, technological innovation, and socio-economic interactions in lake-dwelling contexts. By integrating fieldwork, laboratory analyses, archival research, and heritage management, these initiatives not only provide critical data for regional and supraregional studies but also establish a sustainable framework for protecting one of Austria's significant and endangered prehistoric cultural landscapes. Immediate intervention, systematic excavation, and interdisciplinary research are essential to preserve the archaeology of these unique lakescapes, to fully realize their scientific potential, and to ensure Carinthia's integration into broader European archaeological research agendas.

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Multidisciplinary Research on the Sabatinìvka 1 Site: History and State of Art

Abstract

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The article examines the history and results of research at the site of Sabatinìvka 1, which comprises two cultural layers: the Cucuteni-Trypillia complex and the Late Bronze Age layer. The site has been investigated through a long-term, multidisciplinary collaboration involving radiocarbon AMS dating, as well as paleopedological analyses. Archival materials from the Odesa Archaeological Museum and the Institute of Archaeology of the National Academy of Sciences of Ukraine have been revisited and systematized. The paper summarizes the results of excavations conducted in 1938–1939, 1947–1949, and 2011–2018, which revealed architectural remains and buried features associated with both cultural layers. In addition, new AMS dates are presented, refining the chronology of the Cucuteni-Trypillia and Late Bronze Age occupations at the site.

Keywords: Southern Bug Area, Chalcolithic, Cucuteni A-Trypillia B1, Late Bronze age, AMS-dating, paleopedological analysis

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Introduction

Sabatinìvka 1 is a well-known multi-layered site representing both the Cucuteni A-Trypillia B1 phase and the Late Bronze Age Sabatinìvka culture, located in the middle Southern Bug region (Fig. 1). The first excavations at the site were conducted in 1932 (Kozubovs´kij 1933, 71). In some parts of the settlement, two distinct cultural layers have been identified, while in others, only a single layer – either Chalcolithic or Bronze Age – is present. Although the material culture of the Cucuteni-Trypillia complex predominates, archaeologists also recorded ceramics characteristic of the Late Bronze Age during excavations. The cultural attribution of these Late Bronze Age materials was established only several years later.

The settlement of Sabatinìvka 1 is the eponymous site for a local group of the Cucuteni A-Trypillia B1 stage, known for its unique ceramic traditions and cultural interactions. The pottery consists of items with incised decoration, as well as the first appearances of painted vessels and evidence of increasing contact with neighbouring steppe populations. Beyond its significance for the Eneolithic period, the site also lent its name to the Sabatinìvka culture of the Late Bronze Age, which became widespread across the steppe zone of the North Pontic area.

Between 2011–2018, the Podillia-Pontic archaeological expedition excavated more trenches at the settlement, conducted a paleopedological analysis, and obtained several AMS dates. These efforts were aimed at determining the chronological timeline of the Cucuteni-Trypilla and Late Bronze Age popula-

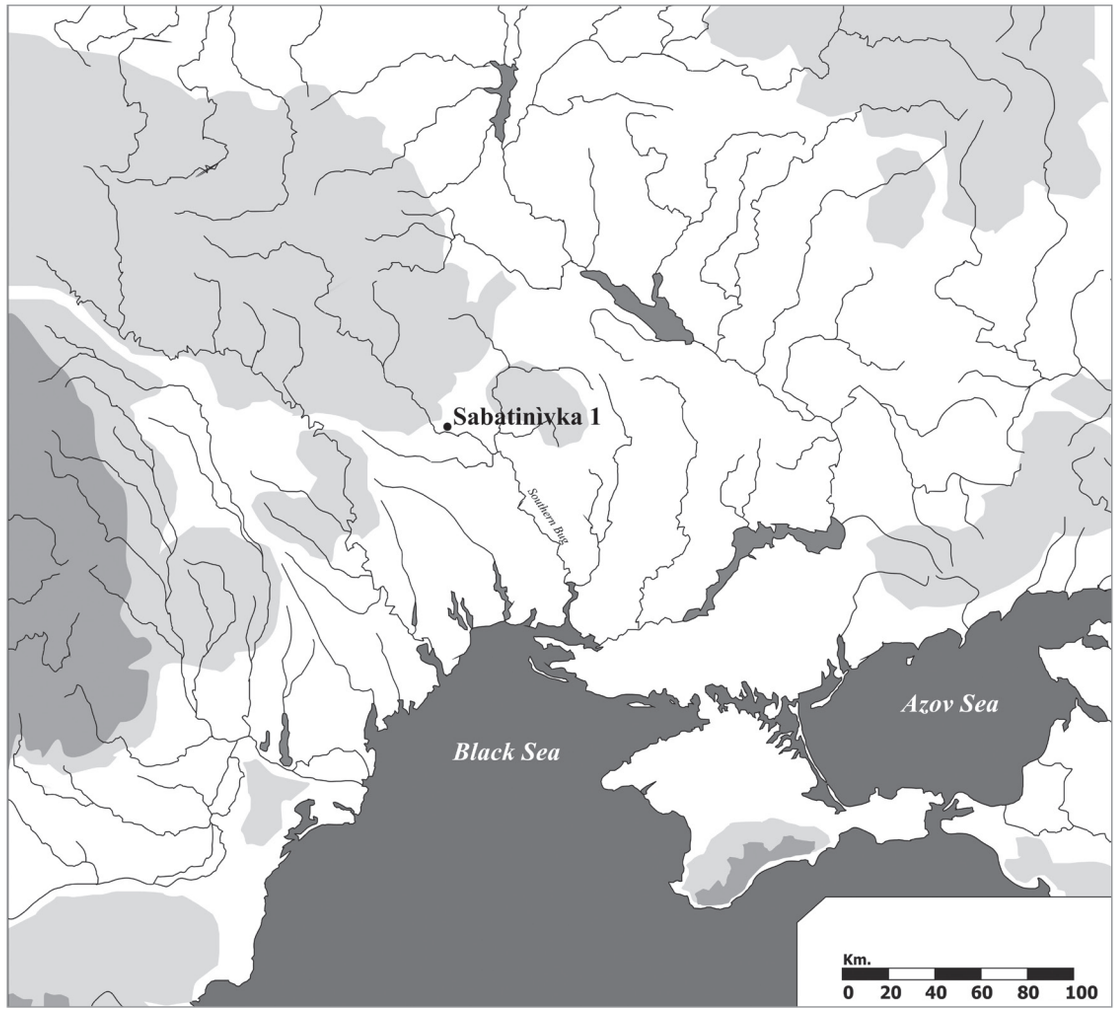

Fig. 1. The settlement of Sabatinìvka 1 in the Southern Bug valley (edited by M. Lobanova).

tion on the settlement (Kiosak and Siekerska 2021). Due to the complex history of the study, the materials from this stratified settlement have been spread across various museums in Ukraine and have not been thoroughly researched or published.

History of the field research

The site was discovered by a local resident, S. Čub, who began submitting materials to the Pervomajs´k Museum in 1928 (Kozubovs´kij 1933, 71). Finds from both cultures have been published in major comprehensive works (Passek 1949; Černâkov 1985; Geršković 1997). A detailed study of the site commenced in 1932 with excavations supervised by P. Harlampovič and T. Movčanivs´kij as part of rescue archaeological work for the future construction of the Boh power plant.

Excavations continued in 1938–1939 by the Odesa State Historical Museum (now the OAM NAS of Ukraine) under the supervision of O. Lagodovs´ka and A. Dobrovol´skij. During this phase of work, an area of 360 m² was uncovered (Fig. 2, 3). While the findings included artefacts from the Sabatinìvka culture of the late Bronze Age alongside materials from the Cucuteni-Trypillia culture, this aspect of the research has not been discussed in detail in the current publications (Dobrovol´skij [1941] 2016).

Later, in his reports, A. Dobrovol´skij highlighted his interest in finds different from the Trypillia culture during the 1938 excavations. Even so, it was not possible at that time to identify the material (Dobrovol´s´kij 1947, 3). The author also noted the presence of Late Bronze Age artefacts in the western part of the 1938 excavation, which was characterized by numerous animal bone finds.

Since the 1930s, the settlement was studied with an interdisciplinary approach and this helped to consider the cultural layer of the Bronze Age in more detail. The only archaeozoological definitions from the

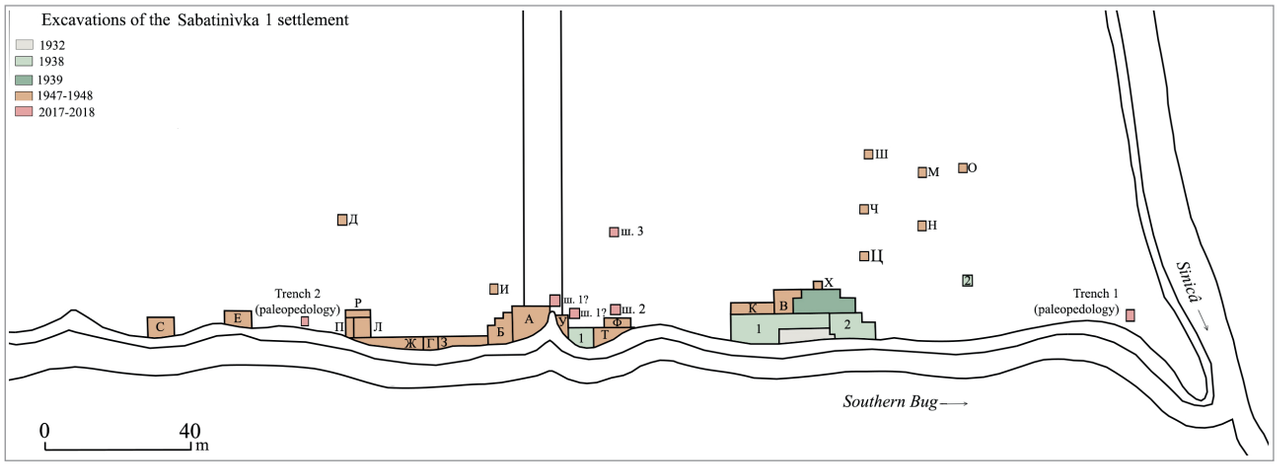

Fig. 2. Plan by A. Dobrovol´skij showing the location of excavations during the works in 1938–1939 and 1947–1948 (Dobrovol´s´kij 1952, fig. 1) with the addition of the location of the trenches carried out in 2017–2018 (drawn by M. Lobanova).

Fig. 3. Work at the Sabatinìvka 1 settlement (1938–1939) (source: the archive of the Odesa Archaeological Museum [OGIM 69040/90]).

settlement materials are known from the unpublished work of 1941 by O. Brauner (1941). Unfortunately, the identification was made without context, making it difficult to define the cultural attribution of the remains.

Work on the settlement continued in the post-war years of 1947–1948 (Dobrovol´s´kij 1952, 78). During the research, two cultural layers were discovered – A and B. According to A. Dobrovol´skij, the first corresponds to the Trypillian culture layer while the second, B, corresponded to the late Bronze Age (during the excavations, eight building remains were discovered (Dobrovol´s´kij 1952, 84). One of the key tasks was to identify areas where these horizons spread. The work concluded that Trypillian material predominates in the eastern part of the settlement (towards the Sinicâ River).

The next stage of field research at Sabatinìvka 1 only began in the 2010s and also focused on the localization of sites near the village of Sabatinìvka (Kiosak and Golovko 2013). Thanks to the analysis of archival materials and the survey of the hypothetical locations of the sites, assumptions were made about the location of settlements from different periods. As a result of the work, three trenches were opened in the central part of the settlement and two profiles were cleaned (in the western and eastern parts of the site; Fig. 2). Two cultural layers can be traced in the profiles and trenches, documenting many finds attributed to the Cucuteni-Trypillia and Sabatinìvka cultures. The Sabatinìvka culture includes ceramic fragments and tools (Kiosak *et al*. 2010) and a bronze needle (?) (Kiosak *et al*. 2018, fig. 19). In 2018, during the study of sections at Sabatinìvka 1, a paleopedological analysis was conducted by Ž. Matviišina (Lobanova *et al*. 2021).

Stratigraphy and plan

Thanks to the availability of archival documents and collections from the Sabatinìvka 1 site in the Odesa Archaeological Museum and the Institute of Archaeology of the National Academy of Sciences of Ukraine, it is possible to reconstruct the stratigraphy and develop a scheme of the location of cultural layers. Unfortunately, these sources are not exhaustive, but it is possible to study the plan and reconstruct the stratigraphy of cultural layers based on these sources.

The site is located along the Southern Bug River, and the eastern part of the settlement is bordered by the Sinicâ River, which flows into it. Thus, two geomorphological forms can be observed in the settlement's territory: the terrace of the Southern Bug River and the floodplain terrace of the Sinicâ River. Sabatinìvka 1 is located on a slope that rises from the river's edge, increasing from 3 to 12–15 m. This location of the settlement contributed to the partial destruction of objects and the mixing of cultural layers.

During the excavations in 1932, two trenches were made – A and B. They were arranged in two parallel lines along the shore cliff. The total area of the excavation was 100 m^2. The excavations were completed at a depth of 1.95 m. The authors of the excavations (P. Harlampovič and T. Movčanivs´kij) characterized (according to F. Kozubovs´kij) the horizons as follows: from 0.2 m to 1.60 m – chernozem mixed with sand and ash (mixed cultural layer); from 1.6 m to 1.95 m – also chernozem mixed with sand and ash ("stable Trypillian layer") (Kozubovs´kij 1933, 73). At this stage of the research, the Cucuteni-Trypillian layer was described in detail.

For a more accurate identification of the layers, a trench was made in 1939, which was attached to the northern edge of the 1938 excavation. The following description of the layers is available from A. Dobrovol´skij's field diaries: 1. 0–0.80/0.95 m – humus (black soil); 2. 0.80/0.95–2.10 m – sandy layer; 3. 2.10–2.90/3.0 m – loam; 4. 2.90/3.0 m and below – clay loam (Dobrovol´skij 1939).

During the 1947–1948 research, a series of trenches were made along the shore cliff, in the western part of the settlement (to study the Late Bronze Age layer) and in the eastern part (to study the Trypillian layer), and an extension was made to the northern edges of the 1930s excavations (excavations B and K) (Dobrovol´s´kij 1952, 78–79). A slightly different stratigraphy was discovered in these areas: 1. 0–0.25 m – modern chernozem; 2. 0.25–0.70 m – lumpy chernozem; 3. 0.70–1.0 m – transition from chernozem to loam; 4. 1.0–1.6 m – humus loam; 5. 1.6–2.2 m – light humus loam; 6. 2.2 m and below – loess (Dobrovol´s´kij 1947, 8).

During the 2010s, three trenches were opened in the central part of the settlement (Fig. 2). The available descriptions of the sequence of layers at Sabatinìvka 1 differ significantly and cannot be integrated without additional research. As noted above, cultural layers belonging to the Sabatinìvka culture, Cucuteni-Trypillia complex may be found at the site under consideration.

Despite the stratigraphic recording of finds during the 1938–1939 excavations and the availability of planigraphic data, the archival materials remain incomplete. No profiles or detailed photographs of the features have been preserved, which reflects the methodological standards of the period. As a result, the discovered objects cannot be interpreted with greater precision.

Analysis of archival sources on the Sabatinìvka 1 site made it possible to reconstruct the plan of this Cucuteni-Trypillia settlement with objects discovered during research in the 1930s and 1940s (Lobanova 2021; Fig. 4). The largest number of them was recorded at the 1938–1939 excavation site. Four groups of objects were identified that are connected by a logical link: 1) platforms at the excavation site with squares 1AB–4AB and excavations T and Ф, 2–3) two probable structures (1938 and 1939) and household pits next to them, and 4) numerous clusters of shells (excavations of 1932 and 1938).

Late Bronze Age materials were particularly numerous at depths of 0.9–1.3 m in the 1938–1939 excavations. Cucuteni-Trypillia objects are associated with depths of 1.4–2 m in this section of the site, where two layers were present. In the western part of the site, remains of the houses of the Sabatinìvka culture were found at depths of 1.3–1.5 m (Dobrovol´s´kij 1952, 84).

In addition, analysing the ceramic collection from the 1938–1939 excavations at the Odesa Archaeological Museum of the NAS of Ukraine made it possible to identify a small number of fragments of Sabatinìvka culture ceramics from the Late Bronze Age (Fig. 5). They are largely outnumbered by the Trypillian materials (46 fragments of Late Bronze Age ceramics, compared to more than 2,000 shards of Trypillia culture). The highest concentration of these finds was observed in the upper part of the excavation at a depth of up to 1.45 m. The finds were also located in the lower layers, possibly due to destruction and mixing of the layers.

Paleopedological investigations

During the survey work of the Podillia-Pontic expedition in Sabatinìvka 1, the above-mentioned paleopedological analysis was carried out by Ž. Matviïšina (with the participation of L. Sorokina). Two profiles were opened to study the ancient soils at Sabatinìvka 1. The results of this analysis allowed conclusions to be drawn about the ancient soils, the environment of the Trypillian population, and subsequent climatic changes in the region (Lobanova *et al*. 2021). The profiles are located in different parts of the settlement at a distance of 230 m from each other (Fig. 2).

According to Ž. Matviïšina 's description, the materials from the two profiles were different. Profile 1 is characterized by a light to medium loamy granulometric composition of the material (Lobanova *et al*. 2021, fig. 11). The soil-forming material was lake-alluvial deposits of medium to heavy loamy granulometric composition. The second profile is located at a higher geomorphological level – on a river terrace. The profile's material was significantly sandy, and the subsoil was formed on loose alluvial sands.

In profile 1, three Holocene soils were examined, which were separated by layers of loess-like and other loams. Ž. Matviïšina describes them as follows (Lobanova *et al*. 2021, 42): topsoil – 0.0–1.15 m (Pk to a depth of 1.5 m), which is separated by a layer of loess-like loam (1.15–1.5 m Pk), followed by soil with Trypillian material (1.5–2.5 m), and lake-alluvial deposits (2.5–3.5 m) at the bottom level. From top to bottom, there is a developed meadow-chernozem soil (0.0–1.1 m), where the bulk of the bone artefacts can be traced. The horizon with Trypillian materials is ordinary, carbonate (presumably secondary) chernozem. On the surface, and below it, there are floodplain lake-alluvial stratified loams.

Thus, these soils developed under meadow vegetation during a period of moisture and active grass growth, which allowed for the formation of thick humus horizons. Such processes could have taken place in the temperate climate of the forest-steppe and northern steppe. The soils could have been meadow-chernozem silty, light to medium loamy, deeply humus-rich, with loess-like loams as the parent material.

Unlike the topsoil, the "Trypillian" soil was distinguished by its greyish-blue tones, significantly lower humus content, heavier granular composition, and stratification with elements of a fragmentary-lamellar structure. It was assumed that the primary material was somewhat more leached. Considering that the soil was formed on lake-alluvial deposits in the floodplain, with stratification, but without clear differentiation into genetic horizons and only partially supplemented with humus, it can be classified as floodplain-soddy (Lobanova *et al.* 2021, 44). The conditions for the formation of such soil were somewhat warmer than modern ones, probably in the conditions of natural zones shifted to the north.

In profile 2, it was possible to describe two sod soils, which were separated by a lighter light grey loamy-sandy soil, and the lower soil was formed on loose alluvial sands. The soil in the upper part of the profile is dusty-sandy-light loamy to sandy loam in terms of granulometric composition, but more sandy. Based on these characteristics, this soil is defined as meadow-turf deep humus. It was formed under abundant grass cover during meadow processes (Lobanova *et al.* 2021, 46).

The lower soil with gradual transitions between horizons becomes lighter towards the bottom. It is less humus-rich and more sandy than the soil in the upper part of the profile. A lumpy-crumbly structure characterizes it. Similar to samples from cleaning 1, this soil is identified as floodplain-soddy, light loamy-sandy loam of medium thickness, formed on carbonate sandy loam and alluvium, and below – carbonate-free alluvium (Lobanova *et al.* 2021, 46).

In profile 2, as in profile 1, the sequence of soil changes is preserved: the lower soil is floodplain-soddy, with carbonates in the profile and short-term loess accumulation; the upper soil is soddy, with carbonates throughout the profile, sandy, and more

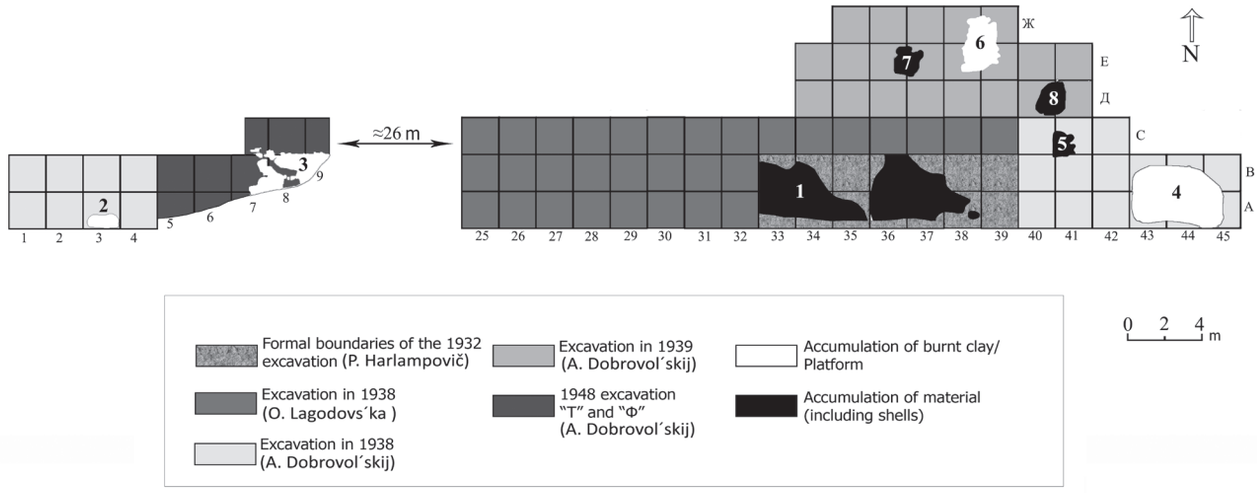

Fig. 4. Sabatinìvka 1. Excavations in 1932, 1938–1939, and 1948 with identified objects (Lobanova 2021, fig. 1).

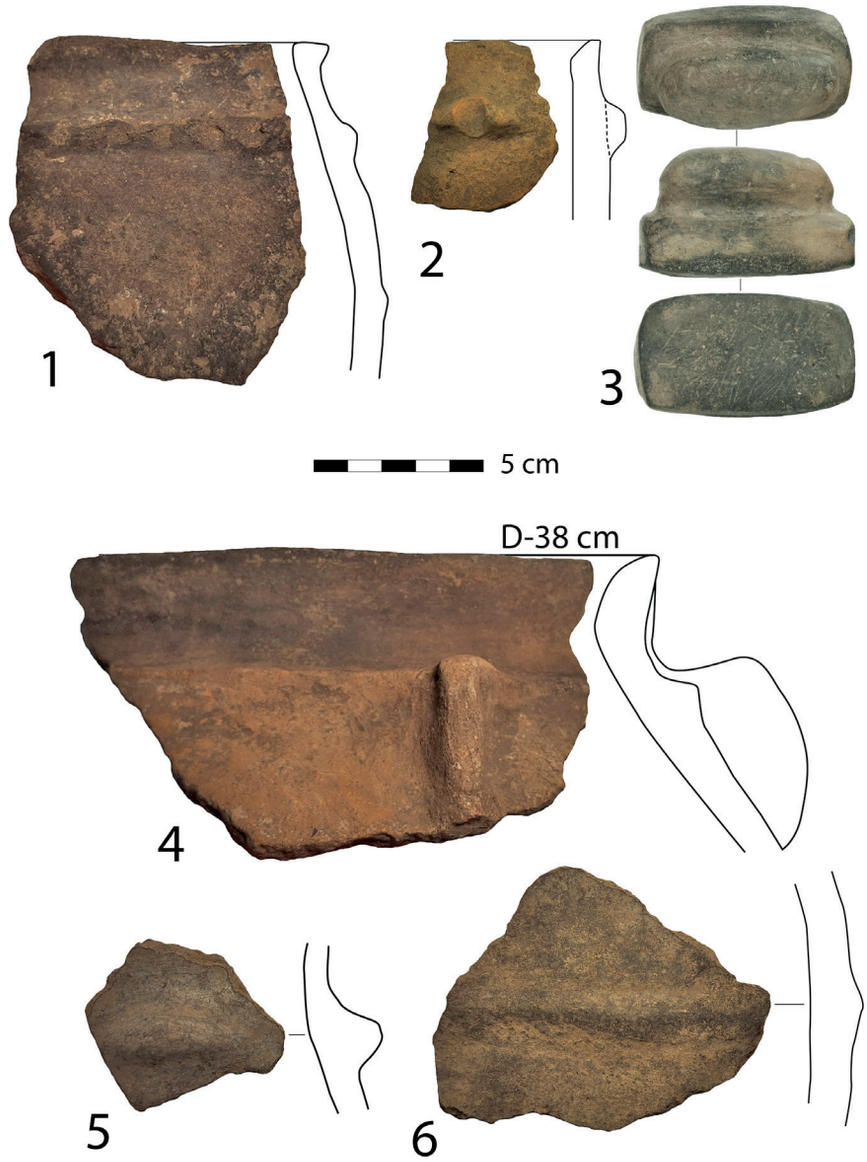

Fig. 5. Finds from the Late Bronze Age layer (Sabatinìvka 1) (photo by M. Lobanova and O. Katašins´kij).

humus-rich. Climate change trends involved a transition from warmer natural conditions to cooler ones with higher humidity. This shift, characterized by meadow landscapes with tall grasses, led to the development of humus accumulation processes and the formation of a deep humus horizon. Correlation with archival data allows us to assert that the cultural layer of the Trypillian period is associated with the surface and humus horizon of the lower soil. In contrast, artefacts from the Late Bronze Age are found in the upper soil.

Chronology

Recently, a series of new radiocarbon dates have been obtained from the archaeological deposits of Sabatinìvka 1. Prior to that, the age of Sabatinìvka was determined by typological parallels of both material remains complexes as a whole (Černâkov 1985; Burdo 2015) and some individual objects (Dobrovol´s´kij 1952). In addition, there was a conventional radiocarbon date for the Trypillian layer of Sabatinìvka from the Kyiv Laboratory (Burdo 2001–2002). Unfortunately, these particular series of dates from this institution did not coincide well with those from other laboratories (Rassamakin 2012; Gaskevič 2014) and require cross-laboratory validation and cannot be accepted as valid chronological data on their own (Kiosak *et al*. 2023).

For this purpose, a process was followed to select samples for examination in a laboratory in Poznań. Animal bone samples were chosen from depths that, based on preliminary stratigraphic research, were likely to correspond to the Trypillian layer. These assumptions were drawn from the analysis of collections from the settlement, research of archival documents, and paleopedological analysis. The samples were selected from a depth of 1.80–2.30 m, resulting in one date corresponding to the Cucuteni A-Trypillia B1 stage (Poz-160799) and two to the Bronze Age (Poz-160800, Poz-160801; Fig. 8). The challenges with the samples could be attributed to the site's destruction, the mixing of layers, and the research methods used in the 1930s.

Unfortunately, at this stage, few dates confirm the Cucuteni-Trypillia culture at the Sabatinìvka 1 settlement. In addition, there is a problem with synchronizing periodisations and the results obtained (Kiosak and Lobanova 2021). The new date (Poz-160799) shows a later chronology compared to the previously available date from the Kyiv laboratory (Ki-7202; Tab. 1). According to materials from the Kyiv laboratory, after calibration, the date varies between 4827 and 4496 calBCE (95.4%). The new date gives a later result of 4324–4049 calBCE (95.4%).

The sample comes from square 36B and a depth of 1.80 m. The dominance of the Trypillian finds characterized this area (Fig. 6, 7). At the same time, it was located in an area that was not completed during the 1932 excavations (Fig. 4). During the 1938 excavations, work was carried out in this area. The cultural layer was likely not fully explored in 1932. Due to the location of the 1932 excavation at the very edge of the cliff, the southern part (A) was destroyed by landslides in 1938. Therefore, excavations were continued from the floor level of the 1932 excavation in its northern part (B). Starting from a depth of 2.3 m, a large number of flint tools were found. According to the 1930s plan, this is the location of squares 32B–38B. Thus, despite the striking finds from the Trypillian layer, the 1932 research did not provide a complete stratigraphy of the site. However, during the 1932 excavations, only Cucuteni-Trypillia materials were found here.

A similar dating situation can be observed at another Cucuteni A-Trypillia B1 site in the region – the Berezivs'ka GES. The Kyiv dates yielded an earlier result, whereas the new AMS dates from different laboratories indicate results corresponding to the 2nd half of the 5th millennium BCE (Lobanova 2024, 57). Similar chronological intervals are shown by the results from the settlements of Kam'âne-Zavallâ 1 and Šamraï (Tab. 1; Fig. 9).

Moreover, the Bern AMS facility LARA produced two more dates on the Late Bronze Age complex of the site recovered in the pedological soil-section, when it was cleaned in 2018. In terms of calibration, they cover the time period of 1611–1462 and 1526–1438 calibrated BCE (calBCE, at two standard deviations (2σ), respectively, here and thereafter calibration with OxCal 4.4 and IntCal20 calibration curve (Bronk Ramsey and Lee 2013; Reimer *et al*. 2020). The dates are partially statistically simultaneous and form a fairly tight sequence. When combined, the dates indicate a timespan of 1596–1450 (calBCE,2σ). The combination probability criterion indicates the methodological correctness of this operation (X2-Test: df=1 T=1.8(5% 3.8)). When calculating the sum of dates, the graph will show two probability peaks, but with a smooth transition between them. The most likely time for the coexistence of both definitions is the period 1527–1497 calBCE (63.4% probability). One more novel date Poz-160800 (3230±35 BP) corresponds well with these dates. It comes from 2.10–2.30 depth. In fact, these three dates can be effectively

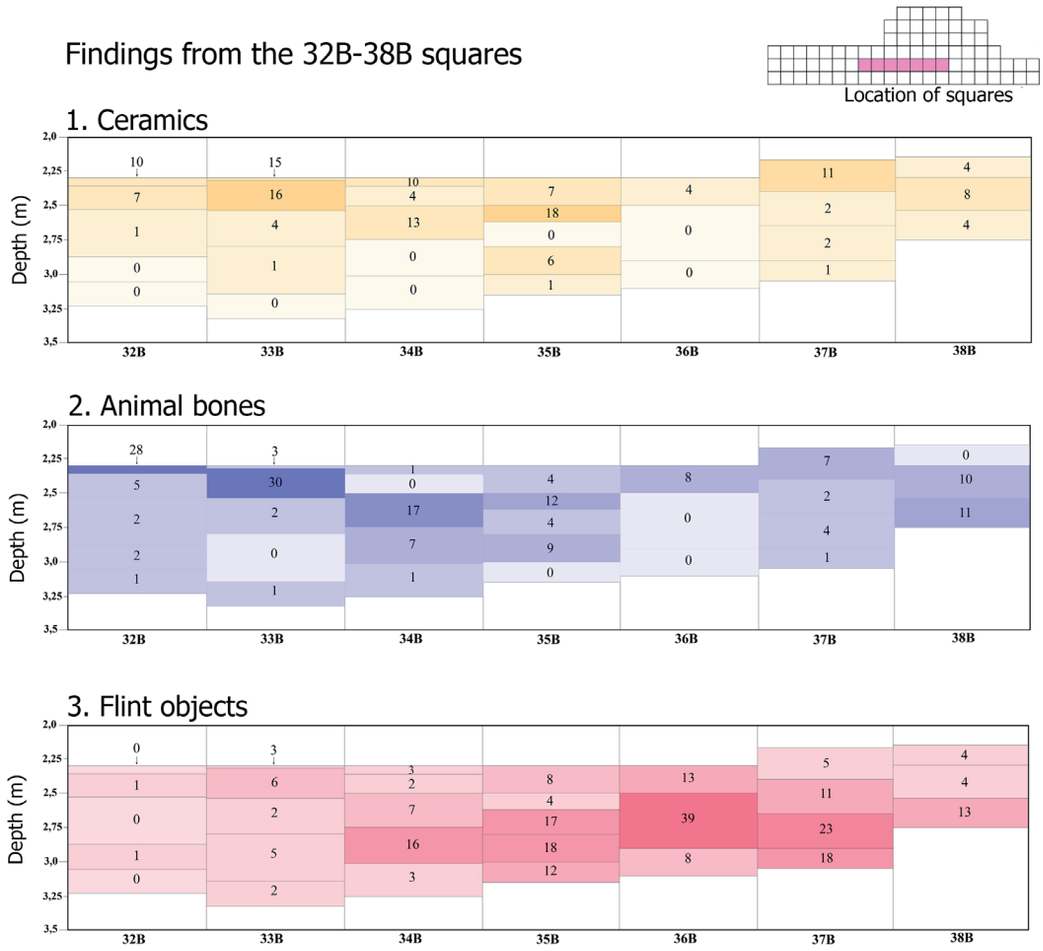

Fig. 6. Sabatinìvka 1 (1938). Location of finds in squares 32B–38B according to field diaries (edited by M. Lobanova).

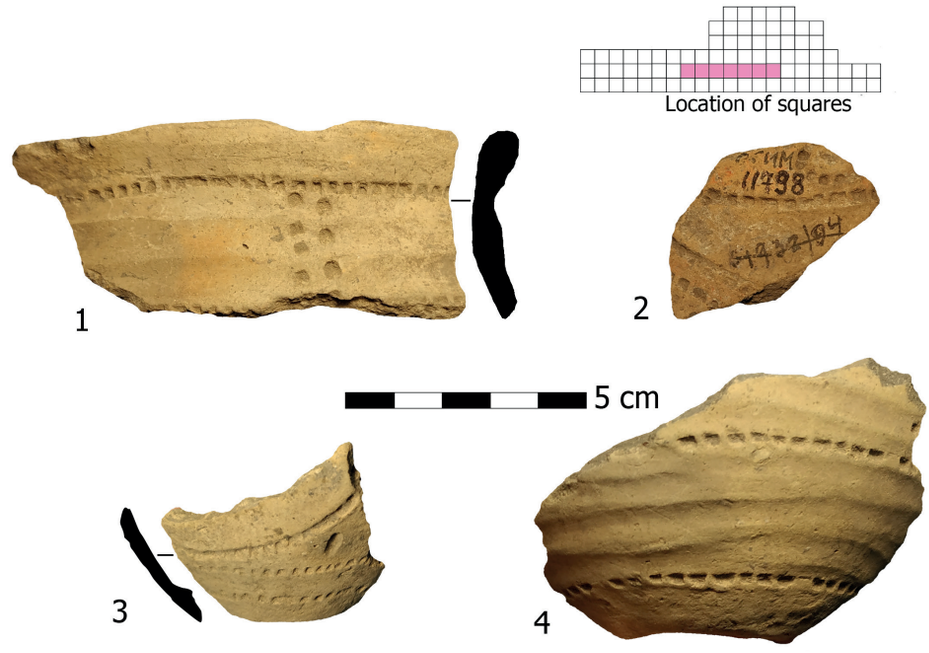

Fig. 7. Ceramic finds from squares 36–38B (photo by M. Lobanova).

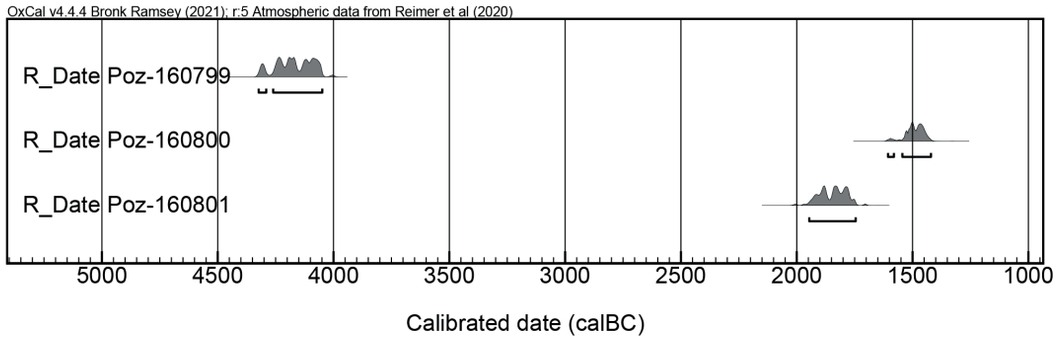

Fig. 8. Newly obtained AMS dates from the Sabatinìvka 1 settlement.

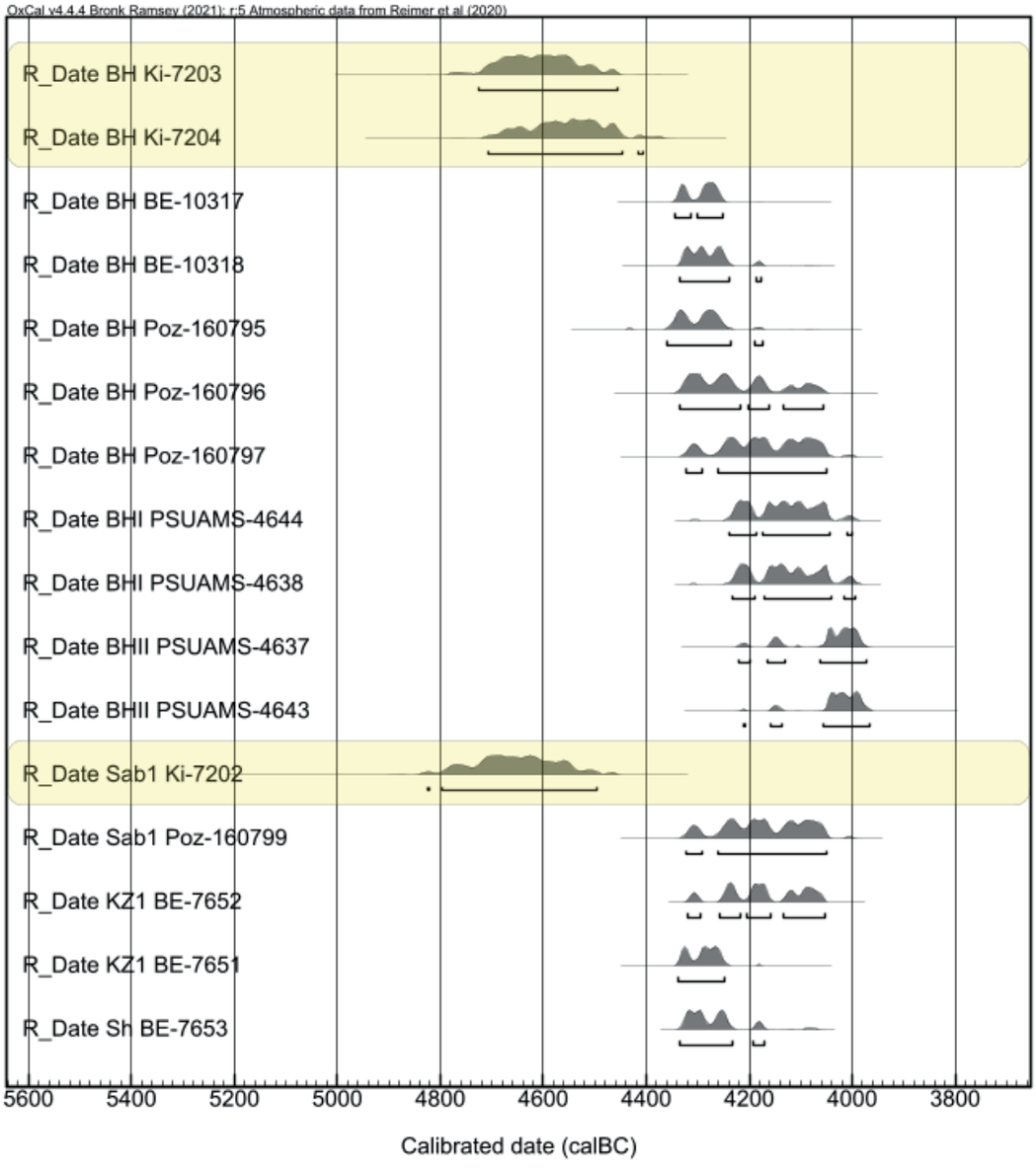

Fig. 9. AMS and conventional (highlighted in yellow) dates from the Sabatinìvka 1 settlement (Burdo 2001–2002; Kiosak *et al*. 2021; Harper *et al*. 2023; Lobanova 2024).

Table 1. Chronological data on the Sabatynivka group of settlements (Cucuteni-Trypillia cultural complex)

Site	Name	14C Date	Uncertainty	Sample	From (95.4%)	To (95.4%)	Reference
Berezivs'ka GES	Ki-7203	5760	55	Animal bone	4725	4456	Burdo 2001–2002
Berezivs'ka GES	Ki-7204	5710	60	Animal bone	4707	4408	Burdo 2001–2002
Berezivs'ka GES	BE-10317	5438	21	Animal bone	4344	4251	Kiosak *et al*. 2021
Berezivs'ka GES	BE-10318	5406	21	Animal bone	4335	4177	Kiosak *et al*. 2021
Berezivs'ka GES	Poz-160795	5450	40	Animal bone	4361	4174	Lobanova 2024
Berezivs'ka GES	Poz-160796	5380	40	Animal bone	4336	4056	Lobanova 2024
Berezivs'ka GES	Poz-160797	5340	40	Animal bone	4324	4049	Lobanova 2024
Berezivs'ka GES (I)	PSUAMS-4644	5295	25	Animal bone	4238	4000	Harper *et al*. 2023
Berezivs'ka GES (I)	PSUAMS-4638	5285	25	Animal bone	4235	3996	Harper *et al*. 2023
Berezivs'ka GES (II)	PSUAMS-4637	5235	25	Animal bone	4222	3973	Harper *et al*. 2023
Berezivs'ka GES (II)	PSUAMS-4643	5220	25	Animal bone	4212	3966	Harper *et al*. 2023
Sabatinìvka 1	Ki-7202	5805	65	Animal bone	4827	4496	Burdo 2001–2002
Sabatinìvka 1	Poz-160799	5340	40	Animal bone	4324	4049	
Kam'âne-Zavallâ	BE-7652	5346	21	Animal bone	4319	4054	Kiosak *et al*. 2021
Kam'âne-Zavallâ	BE-7651	5424	21	Animal bone	4339	4248	Kiosak *et al*. 2021
Šamraï	BE-7653	5394	21	Animal bone	4334	4171	Kiosak *et al*. 2021

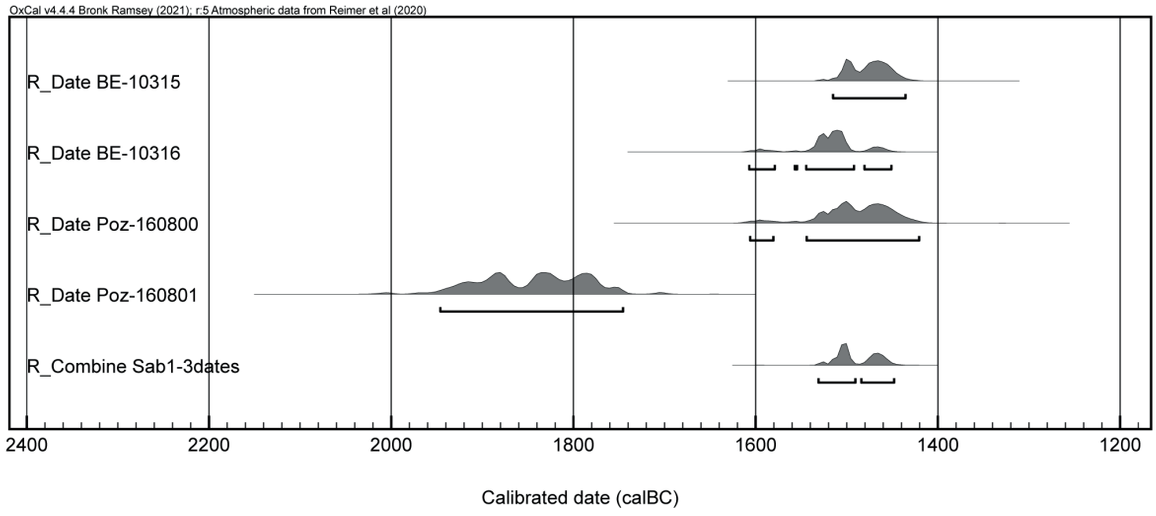

Fig. 10. Bronze Age dates from Sabatinìvka 1: calibration (Kiosak and Siekerska 2021).

combined (Fig. 10, 11). They encompass 1532–1448 calBCE at 95.4% probability or 1518–1458 at 63.4% probability (X2-Test: df=2 T=1.8(5% 6.0)). Thus, the horizon of Sabatinìvka culture dates to the very late 16th – the 1st half of 15th century BCE. This is in line with the typological expectations (Kiosak and Siekerska 2021).

Another new date (Poz-160801) is unexpectedly earlier. It can be calibrated to the timespan of 1946–1746 calBCE (95.4%). This period corresponds better to the timeframe of the preceding cultural aspects of the Middle Bronze Age, not that of the Sabatinìvka culture. In particular, Monteoru and Babyne cultures' sites produced similar dates in series (Mimohod 2010;

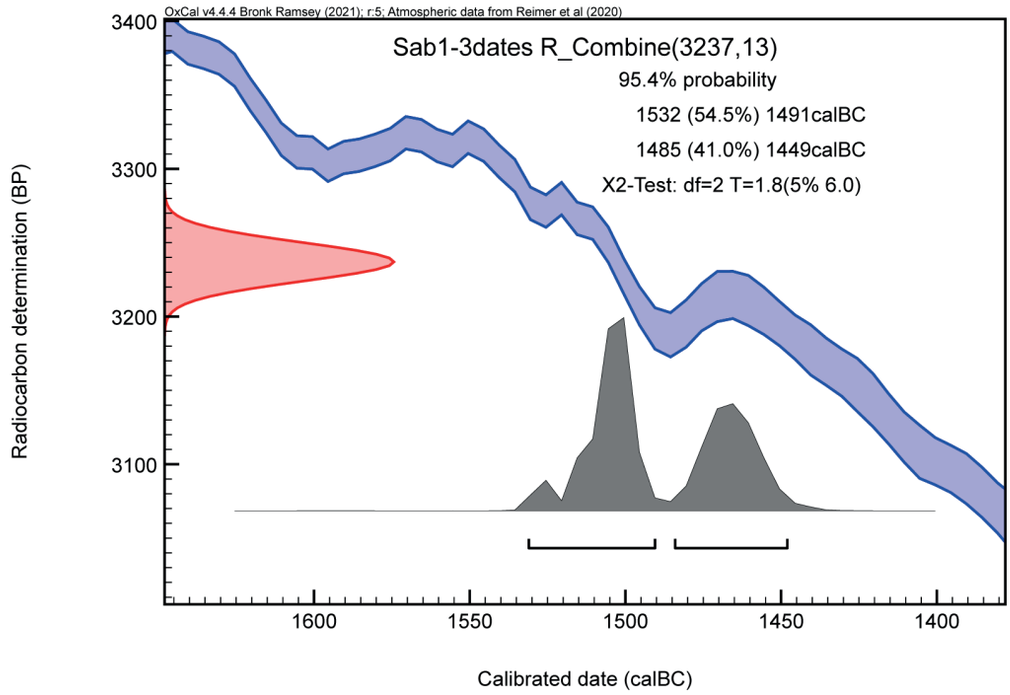

Fig. 11. Details of the combination of three late Bronze Age dates from Sabatinìvka 1 (Kiosak and Siekerska 2021).

Palincaș 2010; Bolohan *et al*. 2015; Staniuk 2021). The Babyne-like materials were reported from the Sabatinìvka cultural layer at the site (Černâkov 1985). However, they were believed to be an organic part of the Late Bronze Age assemblage giving an archaic outlook on the latter. Thus, this new radiometric evidence provides us with a reason to revise this interpretation and put forward the issue of the Middle Bronze Age habitation on the area of the Sabatinìvka 1 site.

Conclusions

Thus, archival and material archaeological sources partially enable us to reconstruct the chronology of Sabatinìvka 1. The site's location on a slope contributed to the destruction and mixing of cultural layers, making it impossible to determine the "peaks" of material distribution in some areas.

The results of paleopedological analysis revealed two stages of soil formation. New radiocarbon dating data allow us to place cultural layers and soil formation cycles on a chronological scale and link them to the stages of Holocene climate change.

The new date obtained from the Cucuteni A-Trypillia B1 layer corresponds to the new AMS dates from other settlements of the Sabatinìvka group. This group of sites, densely populated in the micro-region of the Middle Bug River, could have existed for several centuries in the 2nd half of the 5th millennium BCE, according to the results of accelerated mass spectrometry dating.

The new chronological data provide two closely correlated dates for the Late Bronze Age horizon of the Sabatinìvka 1 site, placing it within the very late 16th–1st half of the 15th century BCE, in agreement with typological expectations. Additionally, an unexpectedly earlier date suggests the presence of a Middle Bronze Age occupation at the site, prompting a reconsideration of its cultural sequence.

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Wooden Wagons in the Kurgans of the Northwestern Pontic Region (Catalogue)

Abstract

Ivanova S. 2025. Wooden Wagons in the Kurgans of the Northwestern Pontic Region (Catalogue). *Analecta Archaeologica Ressoviensia* 20, 57–78

Wooden wagons held a special place in the funerary rites of the ancient populations of Eurasia. The tradition of placing wooden wagons in burials began in the 4th–3rd millennia BC. The most well-known examples from this period are the wagons of the Âmna [Yamna] culture. Their distribution is uneven across its territory, with the highest concentration observed in the North-western Black Sea region, within the Budžak/Âmna [Budzhak/Yamna] cultural area. Burials contain various wooden wagons components and differing numbers of wheels. The individuals buried with wooden wagons or with their parts held a high status in the society of the Budžak/Âmna culture. This article presents a catalogue of burials with wooden wagons discovered in the North-western Black Sea region.

Keywords: Bronze Age, Âmna culture, Budžak culture, wooden wagon

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Introduction

The Budžak culture is a part of the Âmna cultural-historical area. It encompasses the territory of a certain geographical region (Northwest Pontic), has its own specificity and can be defined as an archaeological culture in its own right. The Northwest Pontic region stands out as a special geographical region. Its eastern boundary is the Southern Bug River, and its western boundary is formed by the Prut and Danube rivers. The southern border is the Black Sea, and the northern border is the forest steppe zone. Nikolaj Merpert identified graves of the Northwest Pontic region into a specific cultural variant of the Âmna cultural-historic community. Later on, Leo Klejn referred them to a distinct "Nerušaj" culture, which Ivan Černâkov renamed into the "Late Âmna Budžak" culture. In our view, the uniqueness of the Budžak culture was already discernible during its formation stage, which allows it to be synchronized with the Âmna cultural-historical region in general: 3300–2200 BC and not only with the late Âmna period (Ivanova 2023, 202–203).

In the Northwestern Pontic region, 23 burials of the Budžak/Âmna culture containing remnants of wooden wagons are known (Fig. 1), and this is more than in any other region of the Âmna cultural and historical community. In the Early Bronze Age, more wagons were found only in the burials of the Novotitorovskaâ culture, North Caucasus (Ivanova and Cimidanov 1993; Ivanova 2025).

Wagons in these burials are represented in various forms:
- findings of wheels only (7: five complexes with two wheels, one complex with three wheels, and one complex with a single wheel),
- findings of wagon's body parts (6),
- findings of both wheels and wagon body parts (9),
- findings of wheels and sleds as part of the wagon body (1).

Researchers have suggested that the wagon's components in graves symbolically replace actual wagons,

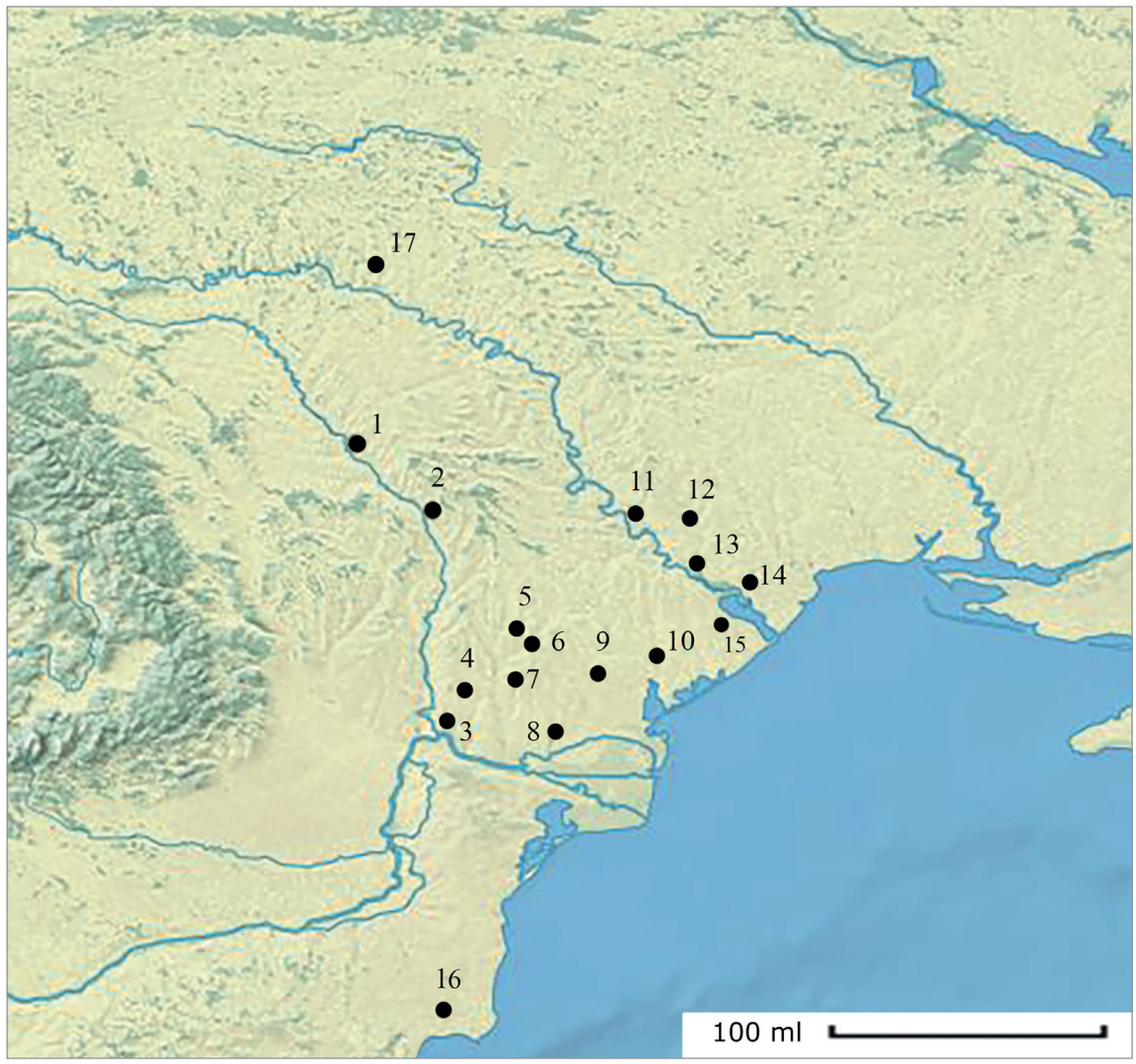

Fig. 1. Map of the graves with transport remains.

1 – Petrești 3/9; 2 – Sărăteni 1/4; 3 – Giurgiulești 2/9; 4 – Etulia 1/14; 5 – Balabanu 13/13; 6 – Taraclia 10/18, 10/19, 18/10; 7 – Kurči 20/16; 8 – Bagate 1/6; 9 – Holms´ke 1/7, 2/10, 2/17; 10 – Novoselicâ 19/16; 11 – Bîcioc 1/5, 1/7, 1/15; 12 – Nikolscoe 7/28; 7/33; 7/44; 13 – Âs´ki 1/18, 2/2; 14 – Maâki 5/5; 15 – Semenivka 8/8; 16 – Plačidol 1/1; 17 – Pisarìvka 6/2.

based on the principle of *pars pro toto* ("a part for the whole") (Klejn 1963), while retaining their equivalence at the semantic level. The placement of wagons and their parts varies: either inside the burial chamber itself or on ledges. The wheel diameters range from 0.4 to 0.8 meters. Wheels were manufactured using several methods: from a solid piece of wood or as composite structures made of two or three sections joined with wooden pins.

Findings of wheels alongside wooden plank constructions in graves are usually interpreted as remnants of wagons, with the planks presumed to be parts of the wagon body. Such constructions are typically found beneath the deceased person or on a ledge. However, wooden constructions without wheels are often interpreted as stretchers. Irina Kovaleva argues that these were not stretchers but detachable wagon bodies, specifically associated with funerary rituals (Kovaleva 1999, 99–103).

Wagon + sled combination. A wagon using sleds as its body was discovered in burial Holms´ke 1/7 (Černâkov *et al.* 1986). Excavations revealed a wooden structure beneath the skeleton. Initially, it was interpreted as a stretcher, but a reconstruction by one of the excavation participants reinterpreted it as a sled. It is hypothesized that sleds served as the wagon body during the summer (Novickij 1985, 234). Similar sled designs are known to have formed the basis of wagon bodies, serving either as the wagon frame or body (Izbicer 1993). Sleds may have been attributes of the

burial rites for the nobility and religious figures, even during the summer months, as suggested by ethnographic data and medieval sources (Anučin 1890, 2, 29–32, 71).

Position of the deceased. Most frequently, the deceased were placed in a contracted position on their backs, with arms extended along the body and legs bent at the knees (19 cases, two of which involved legs positioned in a diamond shape, nicknamed "frog-like"). In three burials, the deceased were found lying on their backs tilted to the right, in one burial tilted to the left, and in another, face-down on their stomach.

For some burials, the sex and age of the deceased persons have been determined (Tab. 1).

Table 1. Anthropological data

№	Location	Men	Women	Children
1.	Bagate 1/6 (adult and child)	?	?	7–8 year
2.	Holms´ke 1/7	35–45		
3.	Holms´ke 2/10	–	Maturus	–
4.	Holms´ke 2/17	? Adult		
5.	Nicolscoe 7/33	? 18–20		
6.	Novoselicâ 19/16	Adult		
7.	Petreşti 3/9	+		
8.	Taraclia II 10/18	35–45		
9.	Taraclia II 10/19	45–55		
10.	Taraclia II 18/10			1 year 6 m.
11.	Âs´ki 1/18	45–50		
12.	Âs´ki 2/2	70		

A comprehensive analysis of the data enables a sociological perspective on burials with wagons. The dimensions of these burials almost always exceed average sizes, indicating a higher level of labor efforts in their preparation. Labor effort analysis is traditionally employed in reconstructing the social structure of ancient societies (Saxe 1970; Binford 1971; Chapman 2003; Ivanova 2003). This characteristic, along with the presence of extraordinary artefacts in the graves (such as silver ornaments and metal knives), points to the high social status of the deceased persons (Ivanova 2000, 400). The discovery of a wagon in a burial is often regarded as one of the key indicators of belonging to the upper social strata of Bronze Age steppe societies (Kuzmina 1974; Masson 1998; Pustovalov 2000; Bondár 2018, among others). Special status of the persona was emphasised by the wagon placed by his community in his burial. As wagons are a rather rare find in the burial rituals in the Bronze Age, the presence of a wagon makes the burial unusual (Shishlina *et al.* 2014, 393).

Other important factors such as philosophical and religious beliefs and the influence of circumstances must be taken into account. Mortuary remains are a form of ritual communication in which fundamental social values are expressed (Parker Pearson 1982, 100; Larsen 1995).

A large body of evidence testifies to the ideological significance of wheeled vehicles and draught animals in large parts of Western Eurasia during the late 4th and 3rd millennium BC. They played a role in the cosmologies and rituals, it is clear that this novel form of practice also had wider conceptual influence. Some of the most important evidence for this claim comes from funerary contexts in Central Europe and the Pontic Steppe, in which the use of wheeled vehicles and draught animals are prominent themes (Johannsen and Laursen 2010, 15–16).

Some concrete interpretations are also interesting. For example, Stuart Piggott suggested that the wagon in the burial symbolizes the journey between life and death (Piggott 1992, 20). Kristian Kristiansen drew attention to the special symbolism cosmogonic aspect of transport with three wheels: in Vedic texts, the sun is often described as a cart with three wheels (Kristiansen 2011, 258). Incidentally, three wheels were found in Holms´ke 2/10.

Among the complexes with wagons, male burials predominate, although burials of a woman (with a child) and children have also been recorded. It is possible that the woman accompanied the burial of the boy, preserving the pattern of wagons being associated with male burials. However, without determining the sex of the children, this assumption cannot be confirmed. The presence of wagon burials for young children, without accompanying adults, may indicate a custom of inheriting social status. The absence of weapons in these burials does not allow us to attribute them to the "military elite" (Ivanova and Cimidanov 1993, 23–24). On the other hand, the predominance of men in extraordinary burials with wooden wagons suggests the existence of gender stratification, an observation previously highlighted by other authors (Ivanova and Subbotìn 2001).

Some of the burials have radiocarbon dates (Fig. 2).

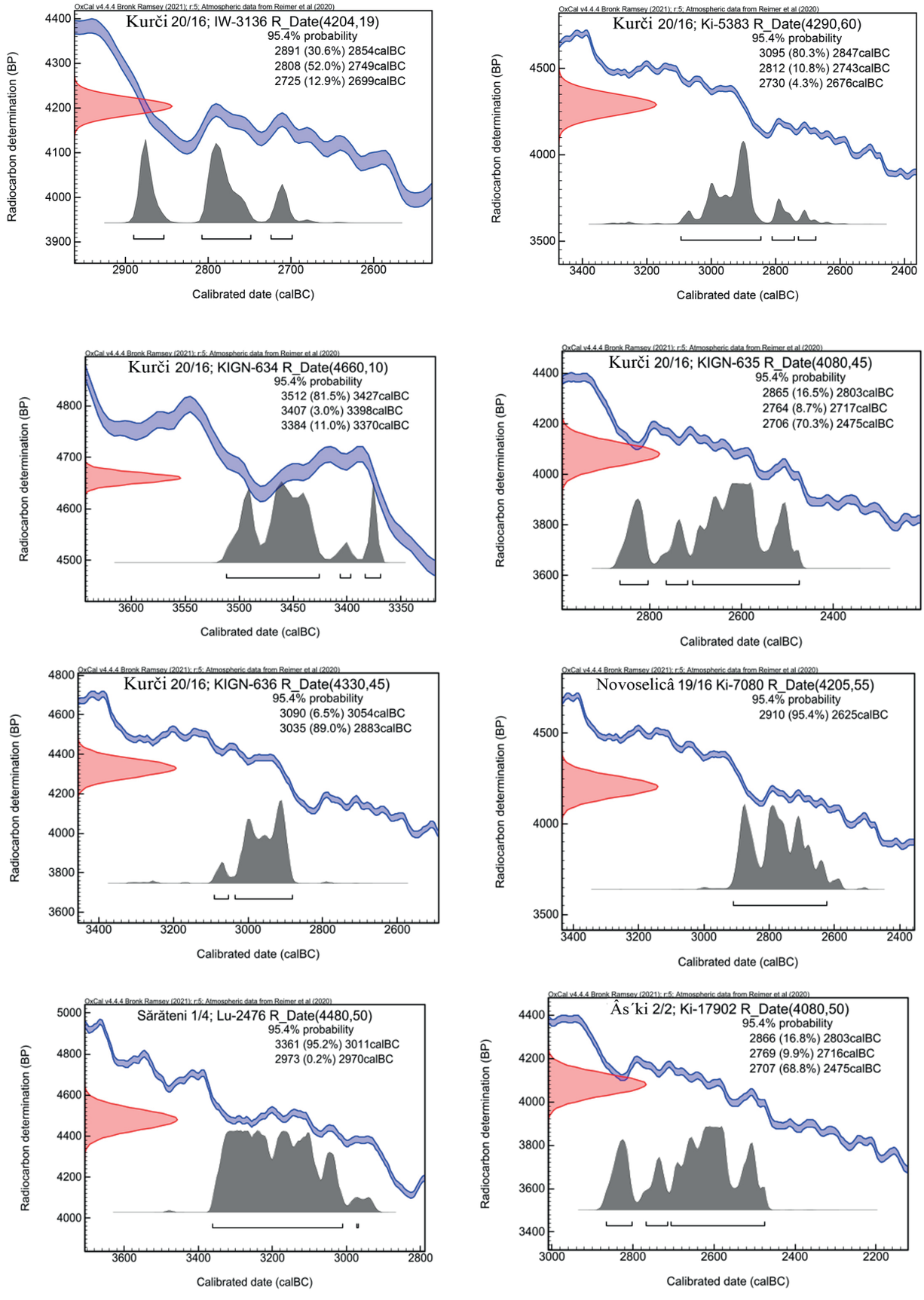

Fig. 2. Radiocarbon dates of graves with wooden wagons, calibration of radiocarbon dates by the OxCal 4.4.4. package (Bronk Ramsey 2024).

It is intriguing to compare the wagon finds from Budžak culture burials with reconstructions of the Âmna culture wagons from other regions, as well as with other Bronze Age cultures. These comparisons support the hypothesis that the so-called "stretchers" may in fact be parts of wagons (Fig. 3).

It is probable that the burials in Pisarìvka, Vìnnicâ region of Ukraine, and Plačidol, Bulgaria (Fig. 1) are associated with the movement of the Âmna population northwards and westwards. For them, the nearest area with concentration of wooden wagons is precisely the Northwestern Pontic region.

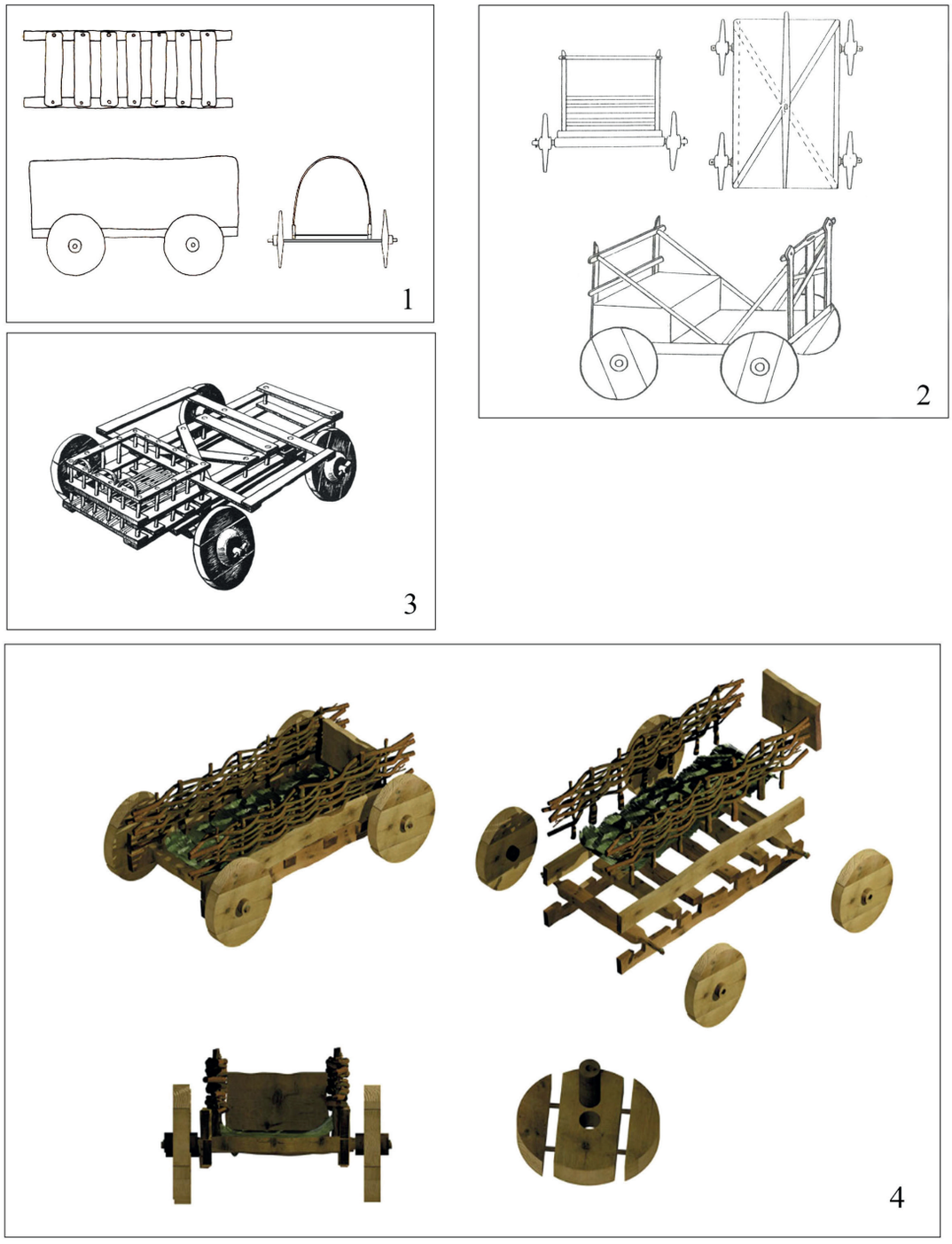

Fig. 3. Reconstructions of the some wagons from other regions.
1 – "Luk'ânivka" kurgan, grave 1 (Âmna culture); 2 – Vidnožino (Catacomb culture);
3 – Ostannij 1/150 (Novotitorovskaâ culture); 4 – Ulan IV/4 (1–3 – Pustovalov 2000; 4 – Shishlina *et al.* 2014).

Budžak culture populations utilized routes westwards to sources of metal (Ivanova 2013; 2021; 2023), and wagons may have been necessary elements in these trade routes. *The areas favouring the spread of prestigious copper tools from approximately 4600 BCE are also areas with evidence of early wagon use. It is here that we need to look, not for the origins of the wagon but for the mechanisms of its diffusion. These were the networks in which, as far as we can see, prestigious objects were distributed and prestigious knowledge communicated. It is in this context that the innovation represented by the wagon demands to be seen* (Burmeister 2017, 75).

The data on burials with wagons are presented in the Catalogue (see the further part of the paper).

Catalog of graves with wood wagons

Bagate 1/6 / Багате, Izmail region, Ukraine, 45° 41' N, 28°93' O, (secondary) was located 8.5 m northwest (320°) of the barrow's center, at a depth of 1.48 m. The grave, measuring 1.75 × 1 m, with a depth of 0.86 m, was made with a ledge (Fig. 4). At the level of the ledge, on the northeast side, traces of a bark bedding and remnants of two wooden wheels were found. The diameter of the wheels was 0.62 m, with hub diameter of 0.2 m. The burial was a double one: an adult and a child aged 7–8 years. Both were oriented with their heads to the northeast (3°). They were lying on their backs, arms extended along their bodies, with legs bent at the knees. The leg bones of the adult were lying into a rhomb ("frog-like" position). Both skeletons, especially the skulls, were intensely stained with ochre (Alekseeva and Tošev 2009).

Balabanu 13/13, Taraclia region, Republica of Moldova, 45°93' N, 28°57' O, (secondary) was found 18 m east (100°) of the mound's center, at a depth of 6.5 m. The grave was made with a ledge, it's measuring 2.8 × 2.5 m, while the grave measured 2 × 1.3 m and was 0.9 m deep (Fig. 5). At the level of the ledge, the grave was covered by 11 oak logs laid crosswise. At the corners of the ledge, four oak wheels (diameter 0.65 m) stood at a 45° angle, with holes for mounting on axles (diameter 8 cm) and hubs (diameter 16 cm). The buried individual (an adult) was lying on their back in a crouched position, tilted to the left, with their head oriented to the north (5°). The left arm was extended to the knees, while the right arm was bent, with the hand resting on the pelvis. The skeleton was intensely stained with red ochre. Brown remains from bedding was observed at the bottom (Čebotarenko *et al*. 1989).

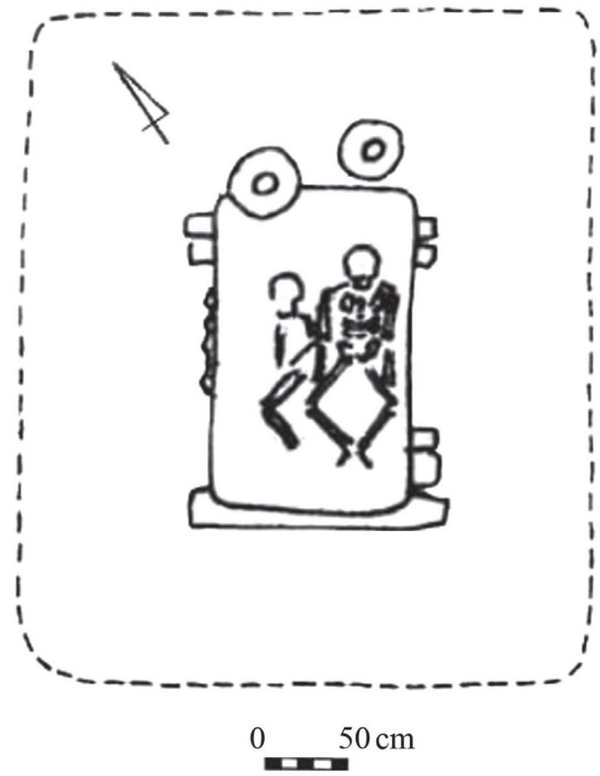

Fig. 4. Plan of the Bagate 1/6 grave (Alekseeva and Tošev 2009).

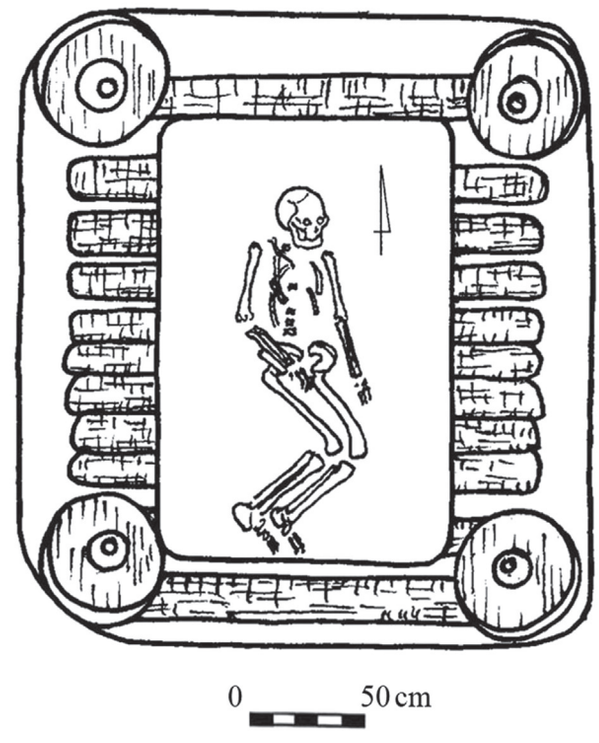

Fig. 5. Plan of the Balabanu 13/13 grave (Čebotarenko *et al.* 1989).

Bîcioc 1/6, Grigoriopol region, Republica of Moldova, 46°92' N, 29°48' O, (secondary) was found 9 m east (100°) of the mound's center at a depth of 2.95 m. The burial measured 2.6 × 1.75 m, with a depth of 0.73 m, with slight widening towards the bottom (Fig. 6). The buried individual was lying on their back in a crouched position, with arms extended along the body, and the head oriented to the north (5°). The legs were lying into a rhomb position. The skeleton was stained with red ochre, with the arm bones particularly intensely colored. Beneath the skeleton, a wooden structure made of 6 longitudinal and 7 cross boards was identified. Two other boards lying on top were positioned crosswise. Dark brown remains from bedding with traces of ochre and chalk was observed above them. A bark cushion, up to 5–6 cm thick, was found under the skull. In the corners of the chamber, there were holes from stakes. A bronze (?) trapezoidal adze (5.7 cm in length) was found near the left humerus, and a knife-like gray flint blade with retouch (7.5 cm in length) was found near the right foot (Agul´nikov 1985; Ârovoj 1985).

Bîcioc 1/7, Grigoriopol region, Republica of Moldova, 46°92' N, 29°48' O, (secondary) was located 10 m northwest (320°) from the center of the barrow, at a depth of 2.92 m. The ledge measured 3.6 × 2.5 m, and the grave was 1.7 × 1.1 m in size, with a depth of 0.8 m (Fig. 7). The grave was covered with seven oak planks laid crosswise. On the northern ledge, above the logs, there was an accumulation of small stones. The deceased was lying in a crouched position on his back with arms extended along the body, head facing west (260°). The leg bones were turned with the knees to the right. Beneath the skeleton, traces of a wooden structure made of four longitudinal boards and three transverse boards laid on top were observed. The entire

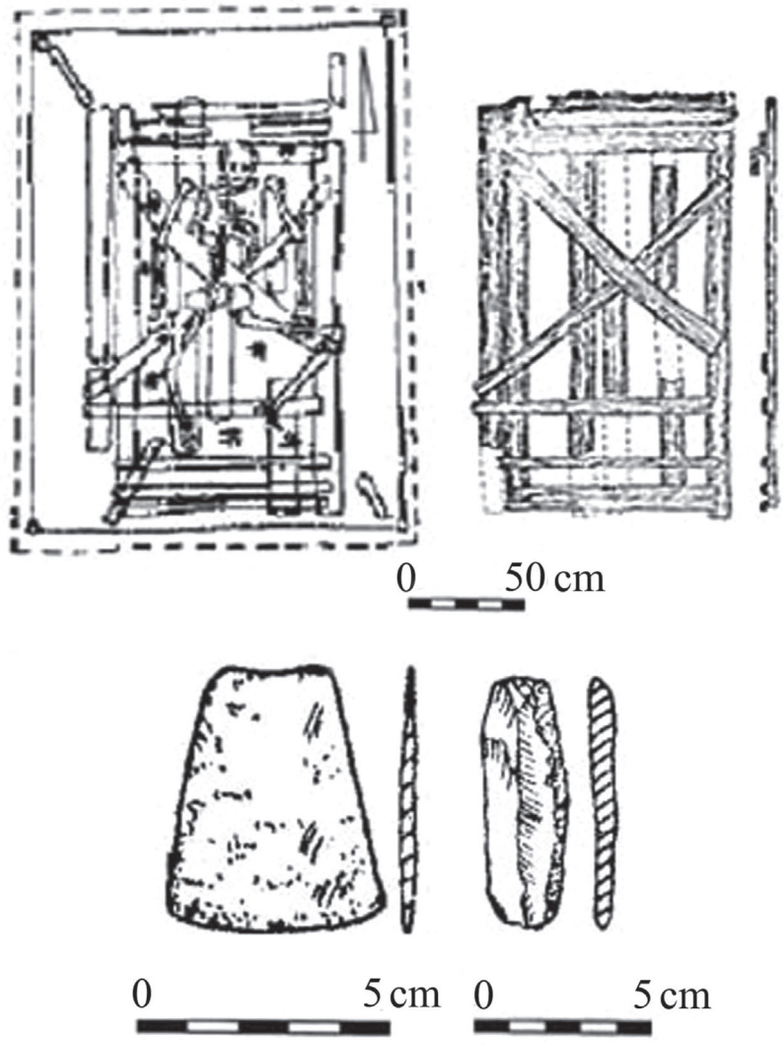

Fig. 6. Plan of the Bîcioc 1/6 grave (Agulnikov 1985; Yarovoy 1985).

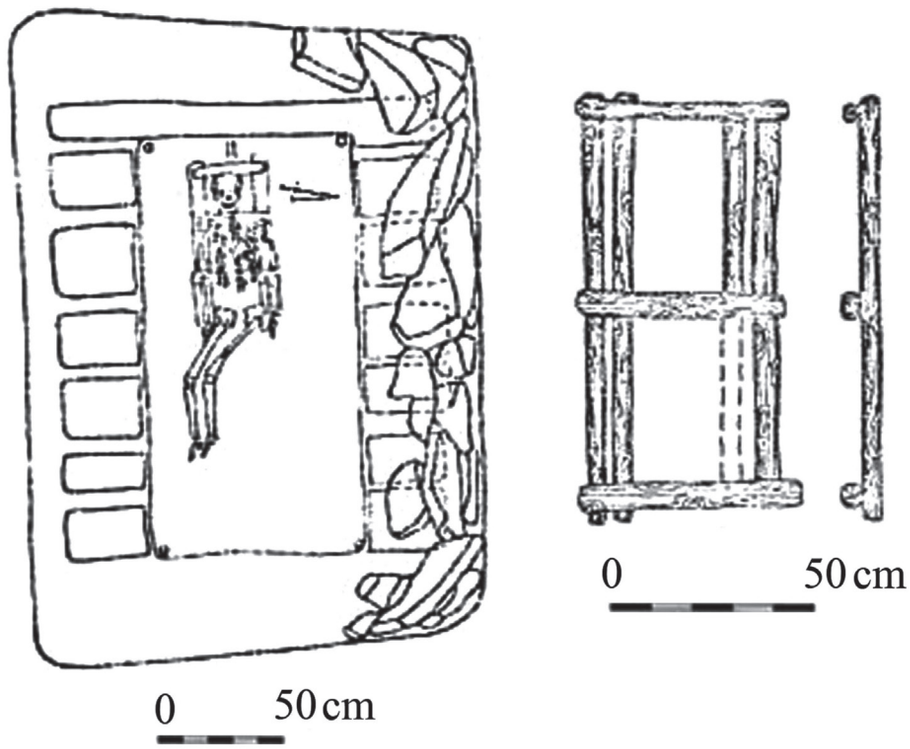

Fig. 7. Plan of the Bîcioc 1/7 grave (Agulnikov 1985; Yarovoy 1985).

floor was covered with dark brown decay with ochre inclusions. In the corners of the chamber, there were holes from stakes (Agul´nikov 1985; Ârovoj 1985).

Bîcioc 1/15, Grigoriopol region, Republica of Moldova, 46º92' N, 29º48' O, (secondary) was located 12 m southeast (140°) from the center, at a depth of 2.5 m. The burial measured 2.1 × 1.65 m, with a depth of 0.6 m (Fig. 8). The deceased was lying in a crouched position on his back, with arms along the torso, head facing northeast (45°), and legs arranged in a diamond shape. The skeleton was faintly stained with ochre, with the skull more intensely colored. Beneath the skeleton, there was a structure made of six longitudinal boards and four transverse ones laid on top. Above the structure was a layer of dark brown decay from bedding with inclusions of ochre and chalk. A stone grinding tool measuring 10 × 6 cm was found near the left humerus (Agul´nikov 1985; Ârovoj 1985).

Etulia 1/14, Vulcănești region, Republica of Moldova, 45º54' N, 28º43' O, (secondary), possibly the main burial for the second mound. It was located 1.3 m south of the kurgan center. The grave was made with a ledge; the ledge measured 5.8 × 3.7 m, with a depth of 3.85 m (Fig. 9). The pit measured 3.05 × 1.8 m and was 1.75 m deep. On the ledge the remains of a covering made of 7 oak logs laid longitudinally were lying, and beneath them were the imprints of two mats. The deceased was lying on a wooden platform covered with plant bedding. The skeleton was lying face down, head facing east (90°). The bones were intensely stained with ochre. Clumps of ochre were found near the left shoulder. To the left and right of the skeleton were isolated animal bones. At the bottom of the pit, symmetrically leaning against the southern and northern walls, were four wagon wheels. In three cases, only their imprints remained; one was partially preserved. It was made from a solid wooden disc with a single-sided hub. Its diameter was 0.8 m, thickness 14 cm, hub diameter 12 cm, and axle hole diameter 3–4 cm. To the right of the pelvis a crushed pot (height 19.9 cm, maximum diameter 18 cm) was lying (Serova 1981).

Giurgiulești 2/9, Cahul region, Republica of Moldova, 45º48' N, 28º19' O, (secondary), the main burial for the second level of barrow. It was located in the center, at a depth of 1.6 m, in a pit with a ledge. The ledge measured 5 × 2.8 m, the burial was 1.8 × 1.3 m, and the depth was 0.92 m (Fig. 10). On the ledge, leaning against the western wall, was a wooden wheel (diameter 0.6 m) made from a solid cross-section of a log. The wheel had a central hole (diameter 13 cm) and a hub (diameter 18 cm, height 6 cm).

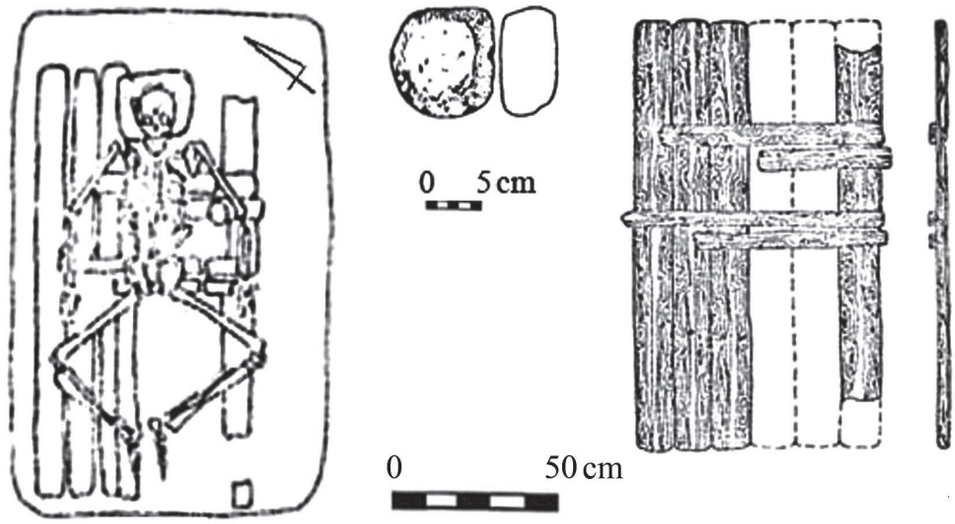

Fig. 8. Plan of the Bîcioc 1/15 grave (Agul´nikov 1985; Ârovoj 1985).

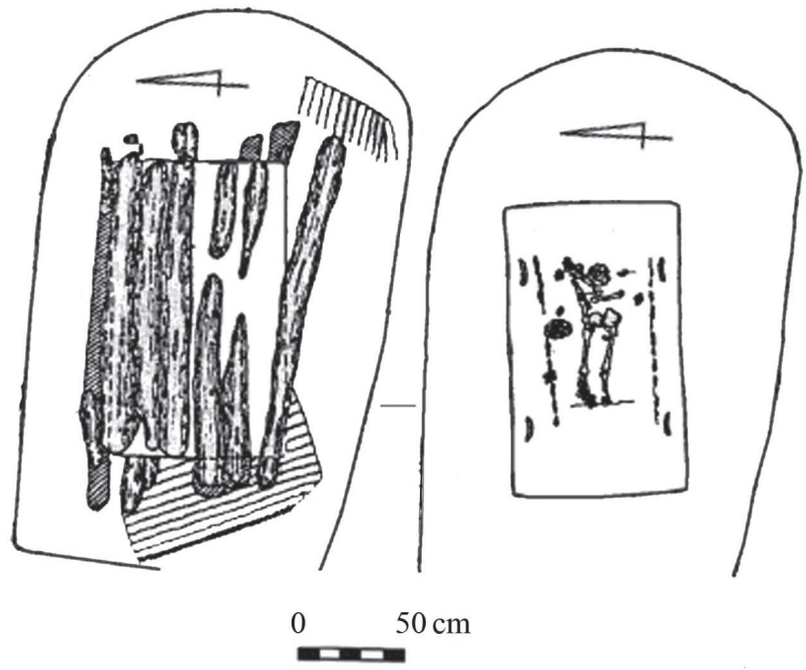

Fig. 9. Plan of the Etulia 1/14 grave (Serova 1981).

At the level of the ledge, the chamber was covered with a mat with longitudinal and two perpendicular black stripes along the edge. The mat was covered by a layer of brushwood laid across the chamber, and on top of that were two rows of logs: the lower row was laid along the pit, and the upper row across the pit. The deceased (an adult) was lying in a crouched position on the back, with arms extended along the body and bent at the elbows, knees bent to the right. The skeleton was oriented to the west (270°), stained with red ochre, and sprinkled with chalk. It was lying on a wooden structure made of five thin wooden slats crossed diagonally (length 1.2–1.1 m, width 4 cm, and thickness 1 cm). Under the lattice at the bottom of the burial were remnants of light brown plant bedding and a sprinkling of chalk. At the bottom, along the edges of the chamber, there were four holes from stakes. Two silver spiral pendants with 1.5 turns were found at the left temple of the deceased, and a third similar pendant was found at the right temple. A flint

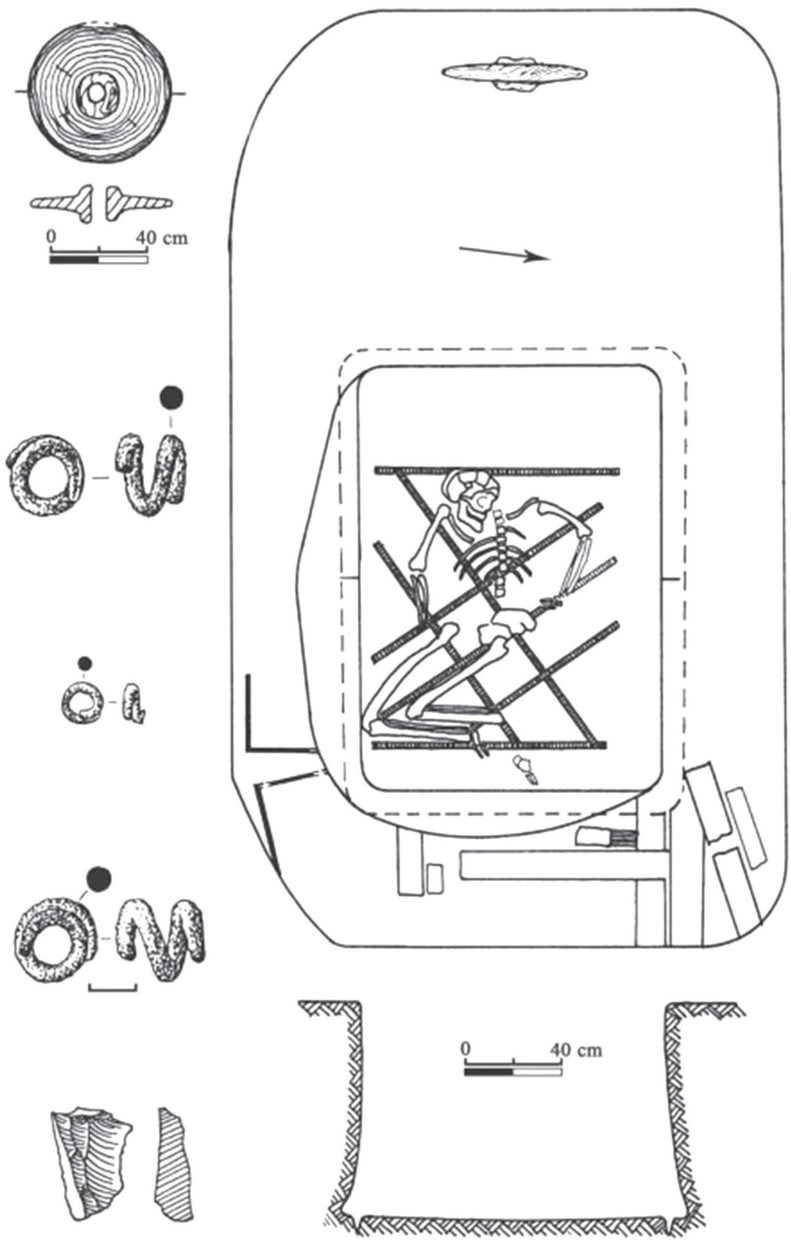

Fig. 10. Plan of the Giurgiulești 2/9 grave (Haheu and Popovici 2010).

flake was found near the left wrist (Haheu and Popovici 2010).

Holms´ke 2/10 / Холмське, Arciz region, Ukraine, 45º76' N, 29º22' O, (secondary) was located 10 m northeast of the mound's center (10°), at a depth of 2.36 m, in a grave with a ledge. The ledge measured 4.4 × 3.1 m, and the burial chamber measured 2 × 1 m with a depth of 1 meter (Fig. 11). At the level of the ledge, the chamber was covered with a reed mat, over which wooden beams were laid lengthwise. Near the southern corner of the chamber, on the ledge, two wooden wheels were lying flat, and a third wheel was located near the western corner. All the wheels were three-part, connected by pins. The diameter of two wheels was 0.6 m, while the third measured 0.7 m. The diameter of the dual-sided hubs was 0.2–0.24 m, and the diameter of the axle holes was 0.07 m. On the ledge above the southeast corner of the chamber, traces of an unidentified wooden structure with cross-placed elements were observed, possibly part of a wagon's body. In three locations on the ledge, there were traces of ash, charred wood and reed, as well as parts of a wooden lattice structure. The buried individual was lying in a flexed position

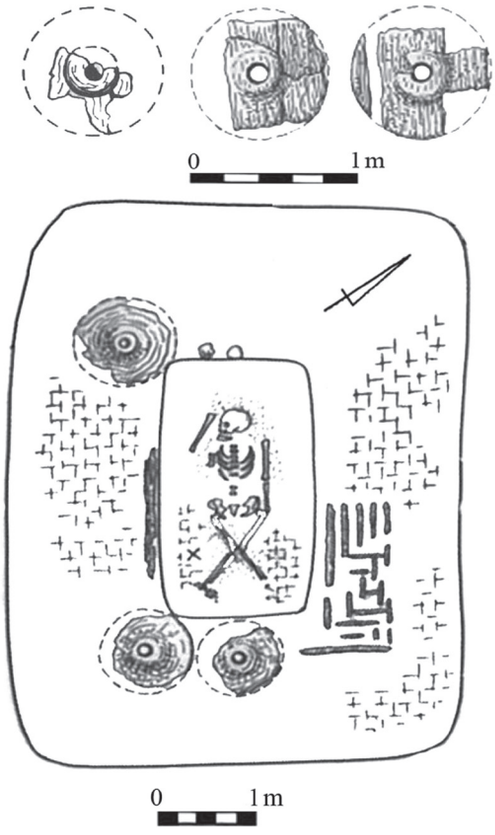

Fig. 11. Plan of the Holms´ke 2/10 grave (Gudkova and Černâkov 1981).

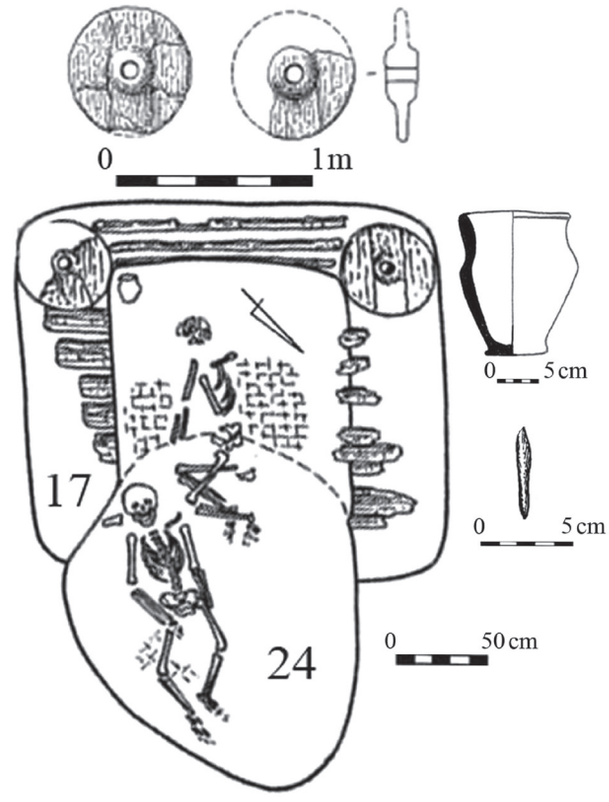

Fig. 12. Plan of the Holms´ke 2/17 grave (Gudkova and Černâkov 1981).

on their back with arms extended along the body and legs bent at the knees, head facing northwest (300°). The leg bones had disintegrated in a cross pattern. The skeleton was stained with ochre. At the bottom of the chamber were decayed remains of reeds, bark, and a layer of chalk (Gudkova and Černâkov 1981; Černâkov *et al.* 1986).

Holms´ke 2/17 / Холмське, Arciz region, Ukraine, 45°76' N, 29°22' O, (secondary) was located 14.2 m southeast of the mound's center (130°), at a depth of 2.84 m, in a grave with a ledge. The ledge measured 2.6 × 2.3 m, and the burial grave measured 2.1 × 1.4 m with a depth of 0.85 m (Fig. 12). The grave was covered with cross-laid logs. In the southern and western corners of the chamber, on the ledges, poorly preserved remains of two wooden wheels were found. The wheels were three-part, and one still had pins connecting its parts. The wheel diameter was 0.45 m, and the dual-sided hubs had a diameter of 10 cm. The walls of the burial chamber were coated with liquid clay. The buried person was lying in a flexed position on their right side, head facing southwest (210°). The right arm was extended towards the knees, while the left arm was bent, with the hand towards the pelvis. In the southern corner of the pit stood a vessel (Gudkova and Černâkov 1981; Černâkov *et al.* 1986).

Kurči 20/16 / Курчі, Bolgrad region, Ukraine, 45°68' N, 28°57' O, (secondary burial) was located 8 m northeast of the mound's center (40°) in a pit with a ledge. The ledge measured 4.7 × 3.6 m, and the burial pit measured 2.6 × 2–1.8 m (Fig. 13). The pit was covered with longitudinally laid planks. In the chamber, remains of well-crafted boards, 0.35 m wide and 3 cm thick, were recorded. The buried individual (an adult) was lying in a flexed position on their back, with arms along the torso and legs bent at the knees, head facing southeast (150°). The skeleton was covered in dark red ochre. The skull was also filled with this ochre, but the nasal cavity was filled with bright red ochre. The skeleton was lying on a layer of decayed organic matter up to 1–1.2 cm thick. Near the skull, on this layer, there were seven black strips, each up to 1 cm wide. A strip (10–13 cm long), applied with ochre, was found on the decayed material to the right of the pelvis. Around the area covered by the decayed material, wooden planks were placed. On one of the planks (up to 1.5 m long and 7 cm wide), four grooves were noted. In the southern corner of the chamber, a wagon wheel was lying

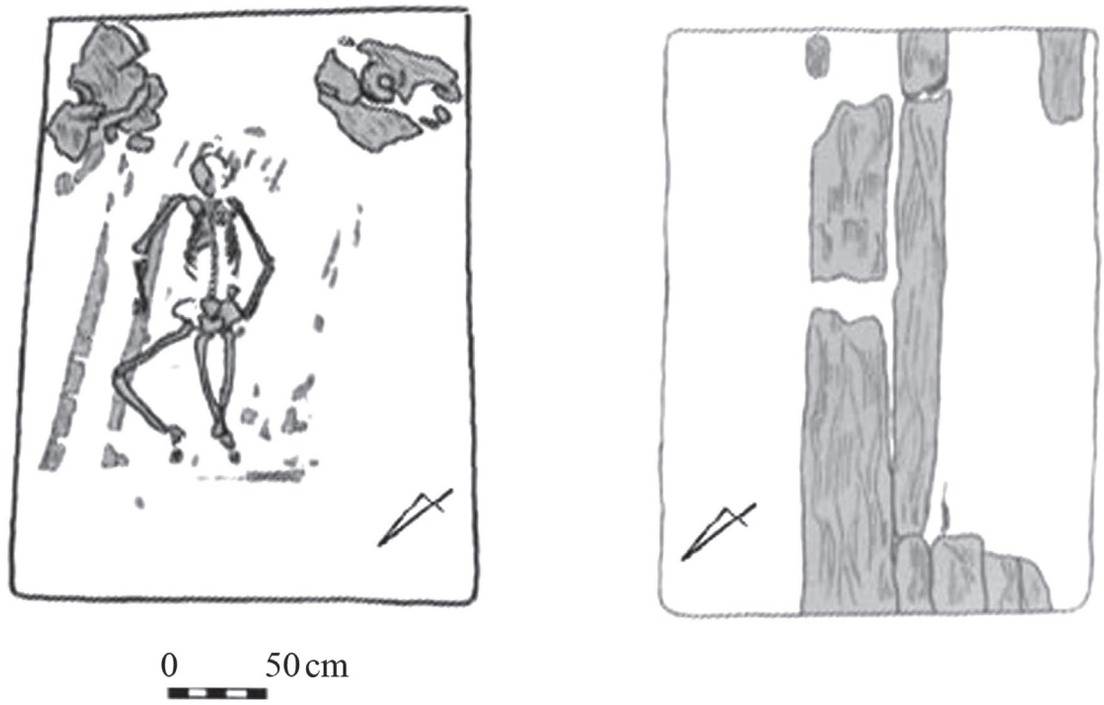

Fig. 13. Plan of the Kurči 20/16 grave (Tošev 1992).

flat, hub facing upward. In the eastern corner, another wheel was positioned at an angle, leaning against the chamber wall. Their diameter was 0.6 m, the hubs measured 18–20 cm in diameter, and the diameter of the holes in the hubs was 7 cm. On the left side of the skull and under the lower jaw were two spiral-shaped pendants with 3.5 coils, made of silver wire (Ivanova 1989; Tošev 1992; Mellorì and Telegìn 1994).

Maâki 5/5 / Маяки, Odessa region, Ukraine, 46º41' N, 30º26' O, (secondary) was located in the northern sector of the mound at a depth of 2 m. The ledge measured 4.2 × 4 m, and the burial pit measured 2.5 × 1.8 m (Fig. 14). The pit was covered by seven cross-laid logs. In the corners of the ledges, four wooden wheels with hubs were placed. The wheels had a diameter of 0.6 m, and the hubs were 20 cm in diameter. The walls of the chamber were covered with reed mats, fastened with poles. The buried person was lying on their back with arms extended along the body, head facing southwest (220°), and legs bent at the knees, turned to the right. The skeleton, particularly the frontal bones, was sprinkled with ochre. Under the skeleton were the remains of a reed bedding (Šmaglij and Černâkov 1985).

Nikolscoe 7/28, Slobozia region, Republica of Moldova, 46º87' N, 29º85' O, (secondary) was located 4.0 m southwest (230°) from the center of the barrow, at a depth of 3.0 m. The burial was made with a ledge, and its dimensions were 3.6 × 2.5 × 2.2 m, with a depth of 0.35 m from the level of fixation (Fig. 15). At the level of the ledge, a wooden covering was discovered, consisting of two planks measuring 3.4 × 0.16 m, laid along the walls of the ledge, and eight planks measuring 0.4–0.6 × 2.1 m, laid across the burial pit. The logs were coated with lime and white clay. The pit measured 2.05 × 2.1 m and had a depth of 0.9 m. At the bottom, in the corners, and in the center of the pit, six holes were traced, with a depth of up to 10 cm.

The buried person was lying on their back in a crouched position, with the head oriented to the north (345°). The arms were placed along the body. The legs were preserved in their original position, with the knees facing upward. The skeleton was coated with ocher, most intensively on the skull and leg bones. A mat made of dark gray fibers was traced under the body. Below the head was a "pillow" of dark brown decay. Dark brown decay with ocher and chalk inclusions covered the entire bottom of the pit.

To the right of the skull, a light yellow flint knife, 11.5 cm long, was found. Under the skull a bone hammer-shaped pin was found, 16.5 cm long and 1.0 cm in diameter. The surface of the pin was polished (Agul´nikov and Sava 2004).

Nikolscoe 7/33, Slobozia region, Republica of Moldova, 46º87' N, 29º85' O, (secondary, main for third mound) was located in the center of the barrow

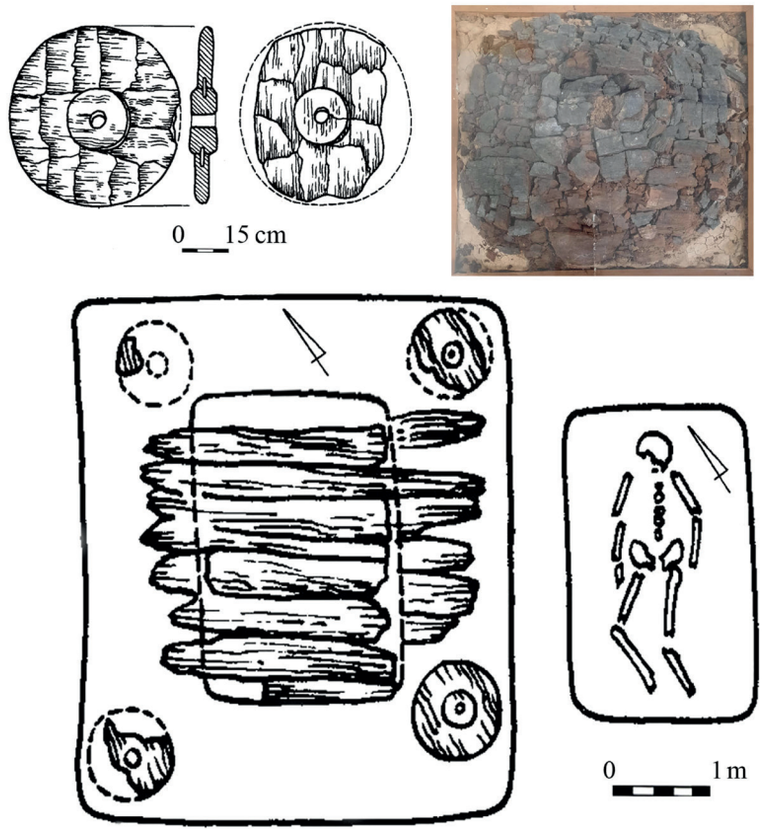

Fig. 14. Plan of the Maâki 5/5 grave (Šmaglij and Černâkov 1985); wooden wheel from the collection of the Odessa Archaeological museum (photo by S. Ivanova).

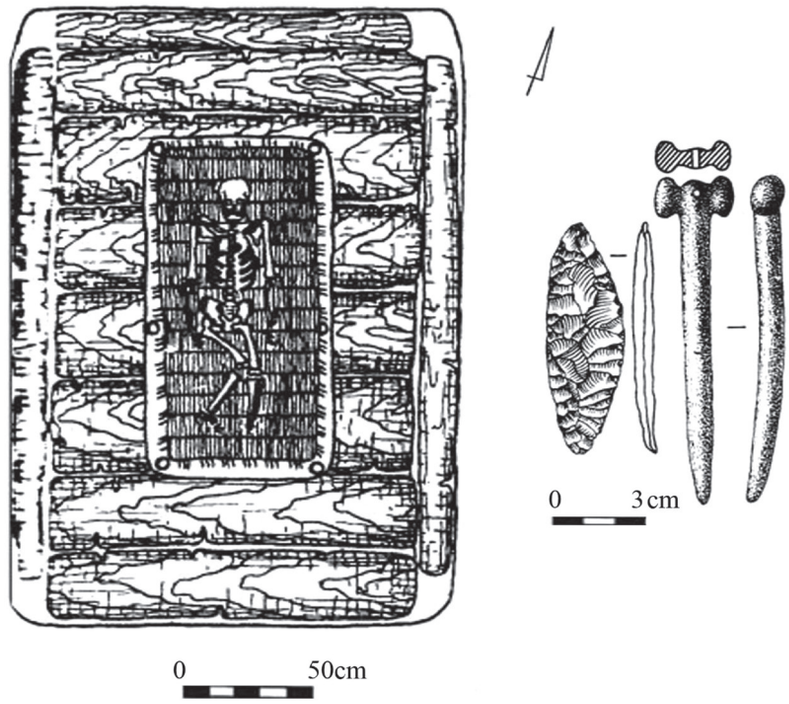

Fig. 15. Plan of the Nikolscoe 7/28 grave (Agul´nikov and Sava 2004).

The ledge measured 4.4 × 3.6 m, and the pit was 2.6 × 1.4 m, with a depth of 1.5 m (Fig. 16). The grave was covered with logs laid crosswise and lengthwise. On the ledge, in the northwest and southeast corners of the pit, remains of two wooden wheels with a diameter of 0.8 m, protruding hubs, and axle holes 10 cm in diameter were found. Along the long walls of the pit, remains of long wooden planks were noted. The wood was covered with a chalky dusting. The buried person (18–20 years old) was lying in a flexed position on their back, with one arm bent and the other extended along the body, oriented with the head to the southwest (210°). The legs were bent at the knees to the right. The skeleton, especially the skull and feet, was stained with bright red ochre. Beneath the skeleton, a layer of chalk dusting was traced, and underneath that, a layer of wood decay. To the left of the skull, 33 light gray flint flakes without traces of processing were found (Agul´nikov and Sava 2004).

Nikolscoe 7/44, Slobozia region, Republica of Moldova, 46°87' N, 29°85' O, (secondary) was discovered 11 m southwest (210°) from the center of the barrow, at a depth of 5.1 m. The burial was made with a ledge measuring 3.2 × 2.65 m, with a depth of 0.35 m from the level of fixation (Fig. 17). At the level of the ledge, the burial was covered with two logs measuring 2.5 × 0.15 m, lying along the edges of the ledge, and seven logs measuring 0.3–0.2 × 2.15 m, laid across the burial pit. The pit measured 1.75 × 0.9 m and had a depth of 0.75 m. Along the perimeter of the pit's bottom, a rectangular groove was identified, with a width of 8.0–10.0 cm and a depth of 15.0 cm. In the corners of the pit, four rounded holes from stakes were traced, with a diameter of 6.0 cm and a depth of 12.0 cm.

The buried individual was lying on their back in a crouched position, with the head oriented to the southwest (215°). The arms were straight, placed along the skeleton, and the legs were directed with the knees to the right. The skeleton was coated with bright red ocher. Under the body and across the entire bottom of the burial pit, dark brown decay was traced. Several flint flakes were found in the filling of the pit (Agul´nikov and Sava 2004).

Novoselicâ 19/16 / Новоселиця, Tatarbunari region, Ukraine, 45°82' N, 29°69' O, (secondary) was located 11 m northeast of the center of the barrow (45°), at a depth of 1.2 m, in a grave with a ledge. The ledge measured 5 × 3.1–2.6 m and the pit was 2 × 1–0.8 m, depth 1.15 m (Fig. 18). On the ledges, in the corners of the pit, four wooden wheels and remains of

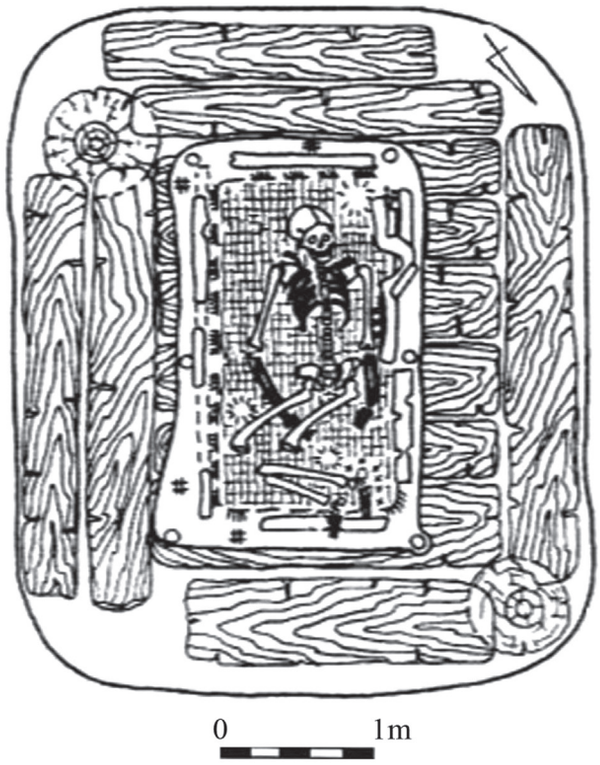

Fig. 16. Plan of the Nikolscoe 7/33 grave (Agul´nikov and Sava 2004).

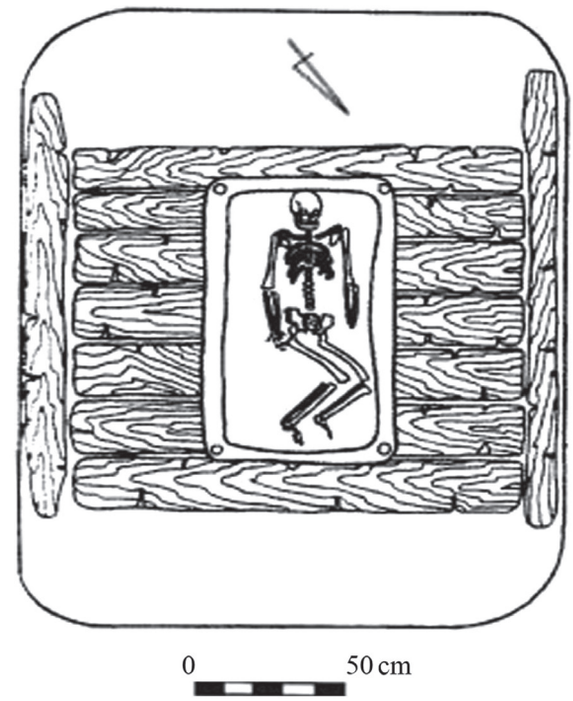

Fig. 17. Plan of the Nikolscoe 7/44 grave (Agul´nikov and Sava 2004).

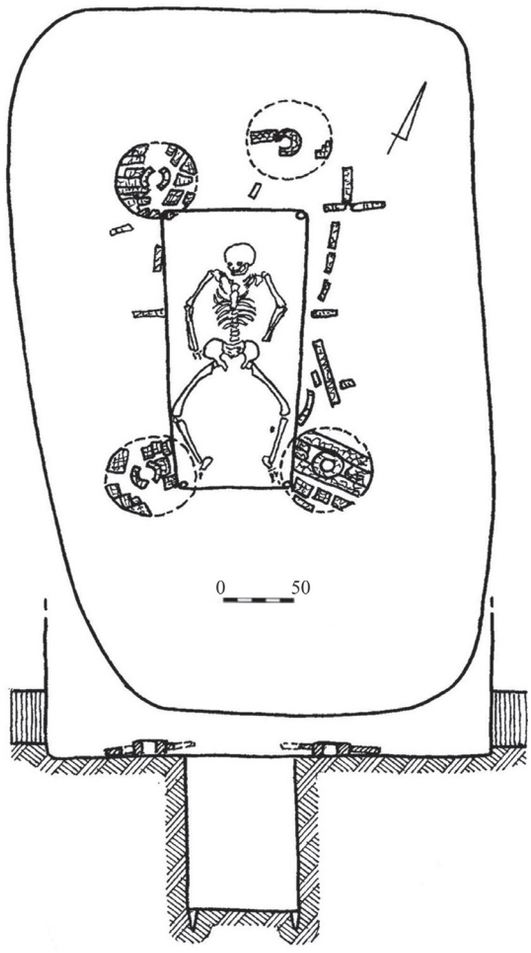

Fig. 18. Plan of the Novoselicâ 19/16 grave (Subbotin *et al.* 1995).

other wagon parts were placed. Traces of decay from a plant-based mat were found above and below them. The wheels had a diameter of 0.6 m and double-sided hubs were 13 cm in diameter. In the corners of the pit, holes from stakes were placed. The deceased was lying in a flexed position on their back, with arms spread at the elbows along the body and legs bent at the knees, head to the NW (335°). The skull was stained with red ochre. Near the shin of the left leg was a fragment of a red ochre tile. At the bottom, remains of a mat covered with chalk were found (Subbotin *et al.* 1995).

Petrești 3/9, Ungheni region, Republica of Moldova, 47°30' N, 27°74' O, (secondary), the main burial for the second mound, made in the center of the barrow at a depth of 0.7 m, in a grave with a ledge. The ledge measured 3.2 × 2.8 m, and the pit measured 2.1 ×1.4 m, with a depth of 1.2 m (Fig. 19). At the level of the ledges, the pit was covered with longitudinally laid oak logs. Above the covering, a wagon was probably placed, of which the remains of four wheels with a diameter of 0.6 m survived. The wheels were lying at an angle of 25° against the walls of the ledges. Below them, remains of oak beams and poles, apparently from the wagon's construction, were traced in the pit. Various remains of structural details were also noted on the ledge. The entire surface of the ledges was covered with a layer of native clay, on top of which traces of a reed mat were recorded. At the bottom of the pit, in the corners and along the walls, 8 holes from stakes were found. The buried person was lying in a flexed position on their right side, head to the southwest (220°). The right arm was extended toward the knees, and the left arm was bent, with the hand resting on the pelvis. The skeleton was evenly stained with bright red ochre, especially the skull. Under the skeleton, brown decay from a mat was traced. A lump of bright red ochre was found near the skull. On the ledges, a burned scraper made of dark gray flint (3.8 × 2.6 cm) with fine retouching was found (Ârovoj 2020).

Sărăteni 1/4, Leova region, Republica of Moldova, 46°61' N, 28°46' O, (secondary) located 2.3 m north of the center of the barrow (7°), at a depth of 1.6 m, in a grave with a ledge. The ledge was partially preserved. The burial measured 1.93 × 0.93–0.88 m, with a depth of 0.37 m, and was covered with logs laid

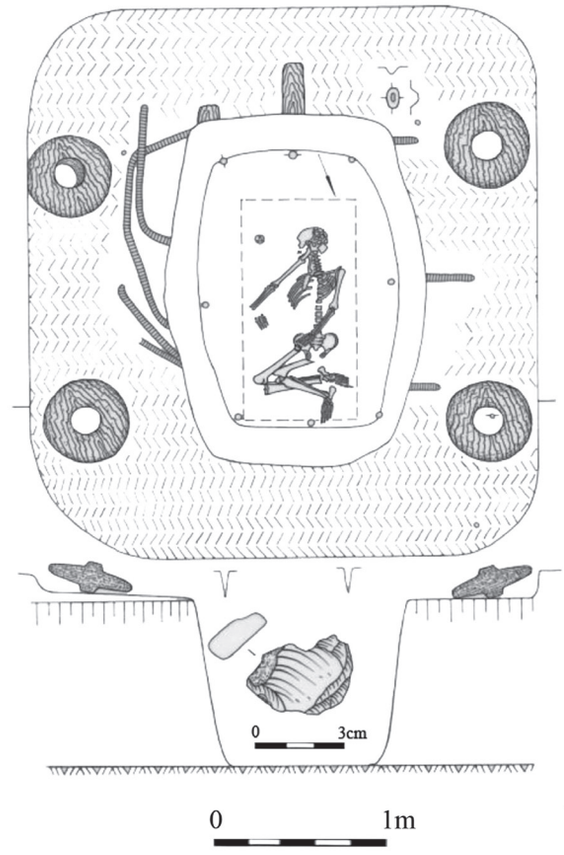

Fig. 19. Plan of the Petrești 3/9 grave (Ârovoj 2020).

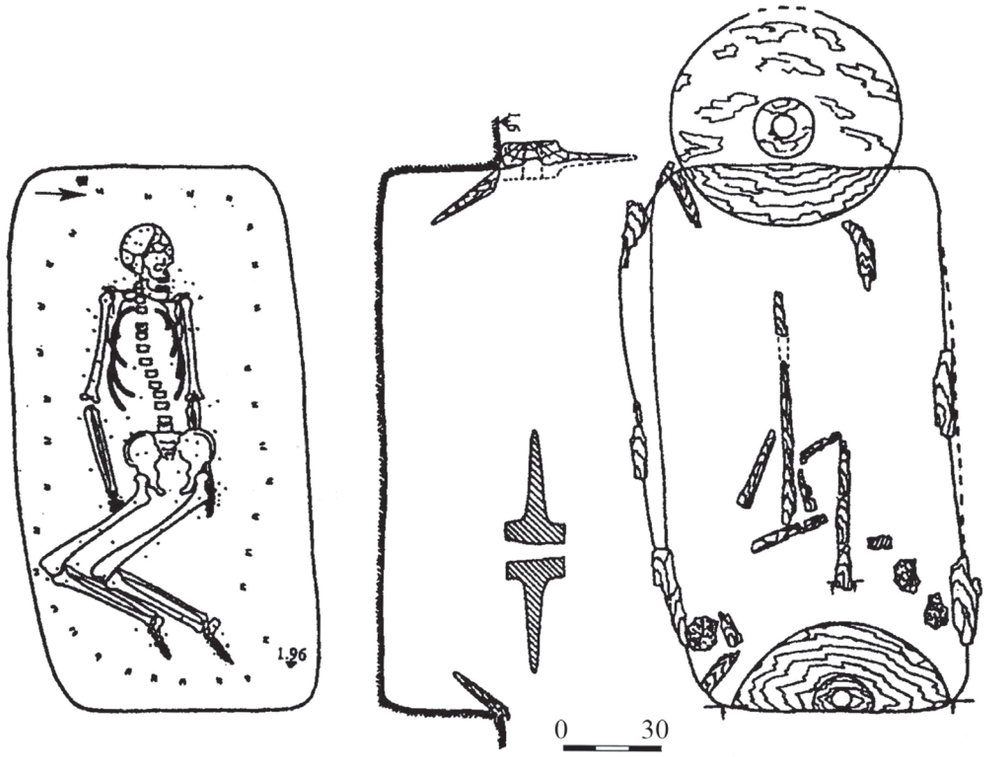

Fig. 20. Plan of Sărăteni 1/4 grave (Leviţki *et al*. 1996).

crosswise (Fig. 20). On the ledges, on the logs of the covering on the western and eastern sides of the pit, two wooden wagon wheels. with a diameter of 0.78 m were lying. They made from thick logs, with axle holes diameter 7 cm and low hubs (diameter 20 cm, H – 8 cm). The buried person (an adult) was in a flexed position on their back, with arms extended along the body, head to the west (270°), with the knees turned to the right. The skeleton was stained with red ochre. At the bottom, remains of decayed plant-based bedding were found (Leviţki *et al*. 1996).

Taraclia II 10/18, Republica of Moldova, 45°90' N, 28°66' O, (secondary) was located 8 m to the northwest (325°) of the center of the barrow, in a pit with a ledge. The ledge measured 4.5 × 3.36 m, the grave measured 2.1 × 1.1 m, and had a depth of 1.1 m (Fig. 21). At the level of the ledge, the pit was covered by six longitudinally laid logs, which were coated with lime. In the eastern part of the ledge, beneath the covering logs, traces of a black mat were found, and two wooden wheels were lying on the logs. One of the wheels with a diameter of 0.4 m had an axle hole with a diameter of 16 cm, and was covered with a white-colored decay. The second wheel, with a diameter of 0.45 m, axle hole with a diameter of 16, was located 0.5 m from the first. In the corners of the grave, holes

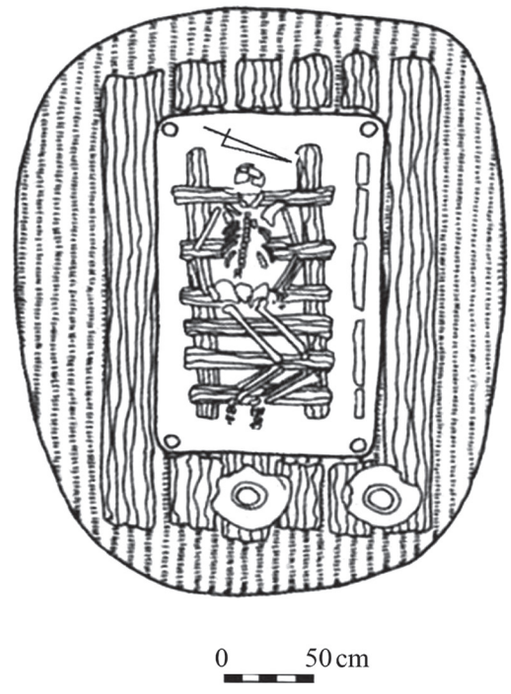

Fig. 21. Plan of the Taraclia II 10/18 grave (Sava *et al*. 2019).

from wooden stakes were identified. The deceased was lying in a flexed position on their back, head facing southwest (255°), with arms spread at the elbows along the body and with the knees turned to the left. The skeleton was stained with red ochre, particularly the skull, with a patch of ochre to the right of the skull. Under the skeleton, a wooden structure consisting of two side longitudinal planks (1.9 m long) and six crosswise planks (0.9–0.8 m long) was found. To the left of the structure, remnants of another longitudinal pole (1.87 m long) were traced. The structure was covered with a layer of dark brown decay, and the bottom of the pit was also covered with a layer of dark brown decay (Sava *et al*. 2019).

Taraclia II 10/19, Republica of Moldova, 45°90' N, 28°66' O, (secondary) was located 21.5 m to the northeast of the center of the barrow (75°), at a depth of 10.7 m, in a grave with a ledge. The ledge measured 3.8 × 2.65 m, with a depth of 0.7 m, and the pit measured 2.96 × 1.65 m with a depth of 1.3 m (Fig. 22). The pit was covered with ten crosswise laid logs, beneath which, on the ledge, traces of a mat were found. At the bottom of the pit, in the corners and along the walls, ten holes were present. The deceased was lying in a flexed position on their back, head facing north (10°), with arms along the body and with the knees turned to the left. The skeleton was stained with bright red ochre, especially the skull. To the left of the skull, a patch of ochre was found. Beneath the skull, a "pillow" of dark brown decay up to 6 cm thick was identified. Beneath the skeleton, the remains of a wooden structure consisting of three longitudinal planks (2.1 m long) and seven crosswise planks (1–0.9 m long) were found. Above the planks and under the skeleton, there was a layer of dark brown decay. Additionally, remains of a black mat with a wavy white pattern were traced at the bottom of the chamber. In the northwest corner of the pit was vessel. To the right, near the shoulder bone, on the wooden structure a copper four-sided awl (9.5 cm long) and a copper double-edged knife with a flat tang (13.2 cm long) were lying. Near the temporal bones, spiral-shaped silver earrings with 1.5 coils (with a diameter of 1.5 cm) were found. Two more (disintegrated) smaller earrings and three cylindrical bone beads (with a diameter of 0.2 cm) were also found near the skull (Sava *et al*. 2019).

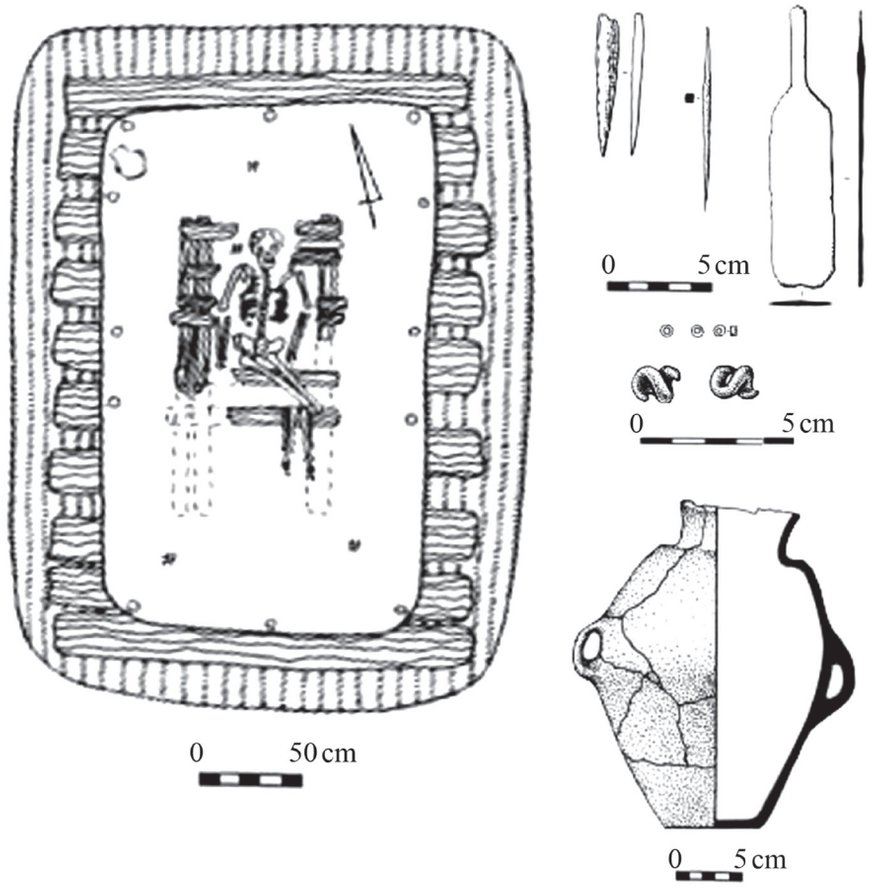

Fig. 22. Plan of the Taraclia II 10/19 grave (Sava *et al*. 2019).

Taraclia II 18/10, Republica of Moldova, 45°90' N, 28°66' O, (secondary) was located 9 m northeast of the center of the barrow (35°), at a depth of 1.92 m, in a grave with a ledge. The ledge measured 2.6 × 1.8 m, and the burial pit measured 1.2 × 0.76 m, with a depth of 0.9 m (Fig. 23). Remains of the wagon's carcass and longitudinally laid planks covering the pit were found on the ledge. The wagon structure consisted of two poles (with a diameter of 5 cm) running along the northeast and southeast walls and a third along the southwest wall. The poles were joined together with rectangular-sectioned wooden dowels. In the corners of the pit the remains of four wooden wheels were lying (with a diameter up to 0.75 m, thickness 4 cm). They made from two different halves, with hubs (height up to 10 cm) and axle holes (with a diameter of 7 cm). The pit's covering consisted of eight longitudinally laid planks up to 2.1 m long, covered with a thick layer of reed bedding decay. The buried child (1 year 6 months old) was lying in a flexed position on their back, the head was oriented southeast (140°), with arms extended along the body and slightly bent at the elbows, the leg bones arranged into a rhomb. The skeleton was heavily dusted with red ochre, particularly the skull. The pit floor was covered with dark brown decay from the bedding, with ochre inclusions. One spiral earring with 1.5 coils (with a diameter of 1 cm) was found near each temporal bone, one made of silver and the other of copper. A cup-shaped vessel was near the southeast wall of the pit. Red ochre traces were found on its inner surface. Another vessel was located to the left of the skull, near the southwest wall (Sava *et al*. 2019).

Âs'ki 1/18 / Яськи, Odessa region, Ukraine, 46°50' N, 30°07' O, (secondary) was located 14.5 m southeast of the center of the barrow (130°), at a depth of 5.2 m, in a grave with a ledge. The ledge measured 6 × 3.5 m, and the burial pit 2.7 × 1.7 m (Fig. 24). The pit was covered with 11 crosswise wooden laid logs and a mat, on top of which were the remains of a dismantled wagon. In the corners of the ledge the remains of four wooden wheels were lying (with a diameter up to 0.55 m), they had an axle hole with a diameter of 20 cm). The deceased (an adult) was lying in a flexed position on their back, with his arms along his body, and his head to the southwest (220°). The bones of the legs, bent at the knees, had slightly collapsed to the right. The entire skeleton was coated with ocher. Near the skull, two spiral pendants (with a diameter of 1 cm)

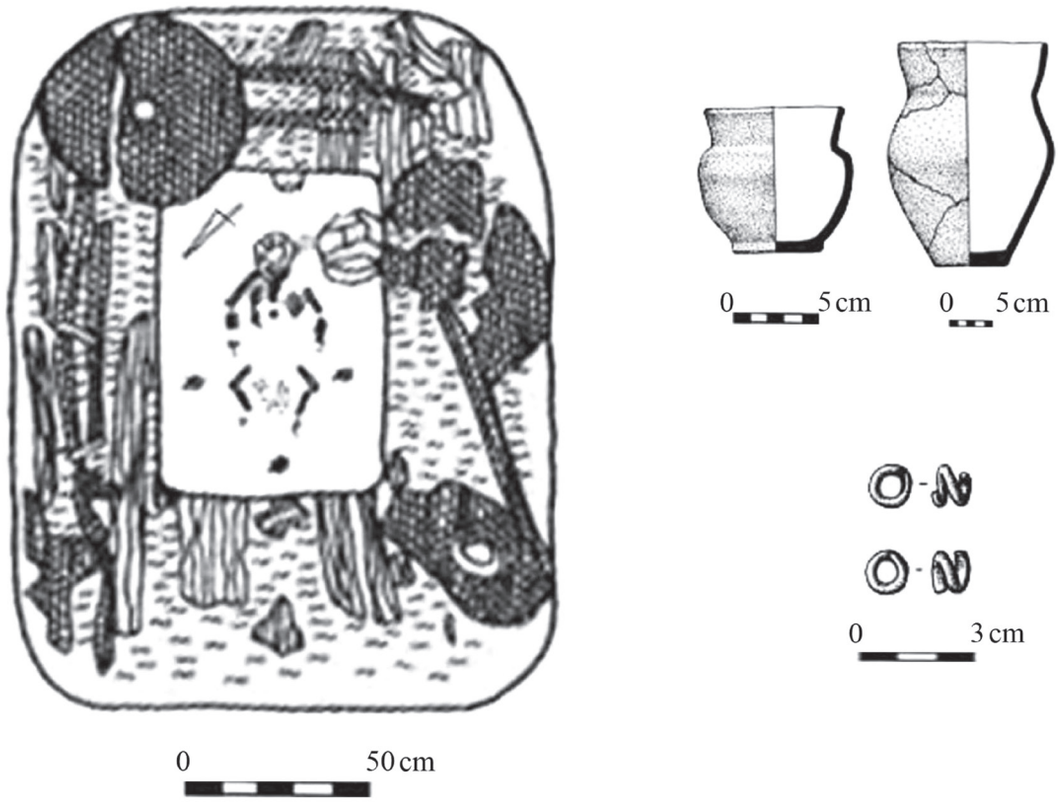

Fig. 23. Plan of the Taraclia II 18/10 grave (Sava *et al.* 2019).

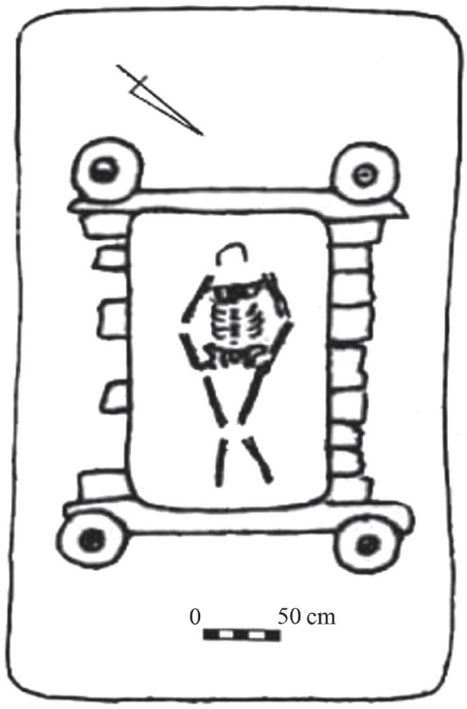

Fig. 24. Plan of the Âs′ki 1/18 grave (Alekseeva 1992).

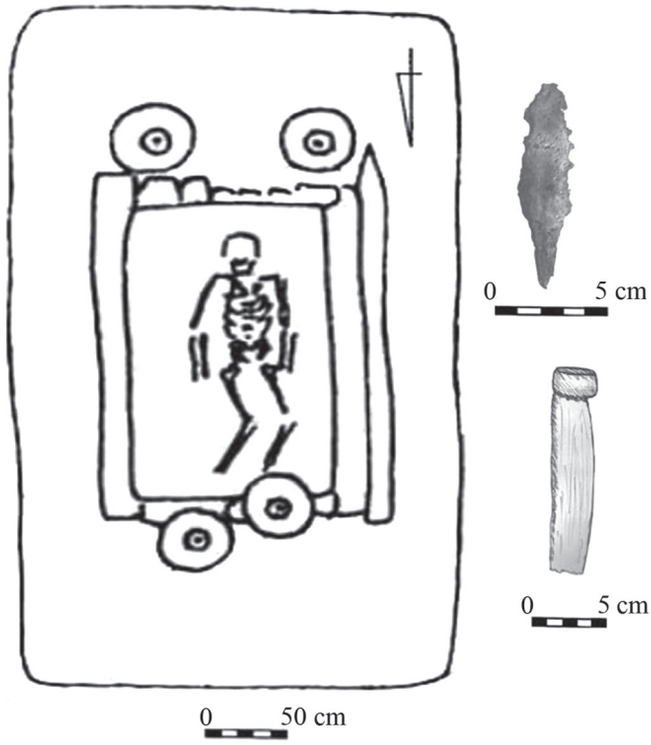

Fig. 25. Plan of Âs′ki 2/2 grave (Dergačev 2023).

were found, they made of thin silver wire, coiled one and a half turns. A triangular clay tile (6 × 6 cm) was lying on the left radial bone. A granite grinding tool (7.5 × 4.5 cm) was next to the ulna. The bottom of the pit was covered with a thick layer of brown ocher, and underneath, with a layer of chalk (Alekseeva 1992).

Âs′ki 2/2 / Яськи, Odessa region, Ukraine, 46°50' N, 30°07' O, (secondary) was located 8 m west (275°) of the center of the barrow, at a depth of 2.85 m. The burial was made with a ledge measuring 3.5 × 2.5 m, and the pit measured 1.8 × 1.2 m (Fig. 25). The grave was covered with planks laid lengthwise and crosswise, with the remains of a mat fixed on top. At the bottom of the ledge were the remains of a wagon. The four wagon wheels lay in pairs on the short sides of the ledge, they are made of a single piece of wood, with hubs. Near the base of the wagon, a harness detail was found in the form of an elongated bar (0.3 m long) with one thickened end and notches on one side. The deceased (an senile age) was lying in a flexed position on their back, with the head oriented to the south (185°), with his arms extended along his body; the legs bent to the left. A copper (?) leaf-shaped knife with a flat tang (9 cm long) was found in the burial (Dergačev 2023).

Other type of transport (wagon + sledges)

Holms′ke 1/7 / Холмське, Arciz region, Ukraine, 45.76, 29.22 (secondary, main for the fourth mound) was located 5 m northeast (75°) of the center of the barrow, at a depth of 3.34 m. The most massive, fourth mound of the barrow was built over it, increasing the diameter of the barrow from 24 m to 90 m, and the height from 2.4 m to 6 m. The grave measured 2.12 × 1.03 m, with a depth of 1.2 m, and was covered with several reed mats, supported by three wooden boards (Fig. 26). The mats were 1.25 m long and 0.07–0.12 m thick, woven in different patterns, with black stripes along the edges. The mats were secured at the edges of the pit with wooden pegs, leaving indentations in the soil. Above the mats, the pit was covered with three large limestone slabs. One of these slabs was an anthropomorphic stele (1.45 m long, 0.75 m wide). The other slabs were unprocessed. The entire area around the pit, within more than a 1 meter, was lined with grass stems, which left imprints in the soil. Directly adjacent to the slabs were the remains of four wooden wheels, lying flat on the mats. One wheel was located in the northeastern and northwestern corners of the grave, and two in the southwestern corner. Each wheel was made

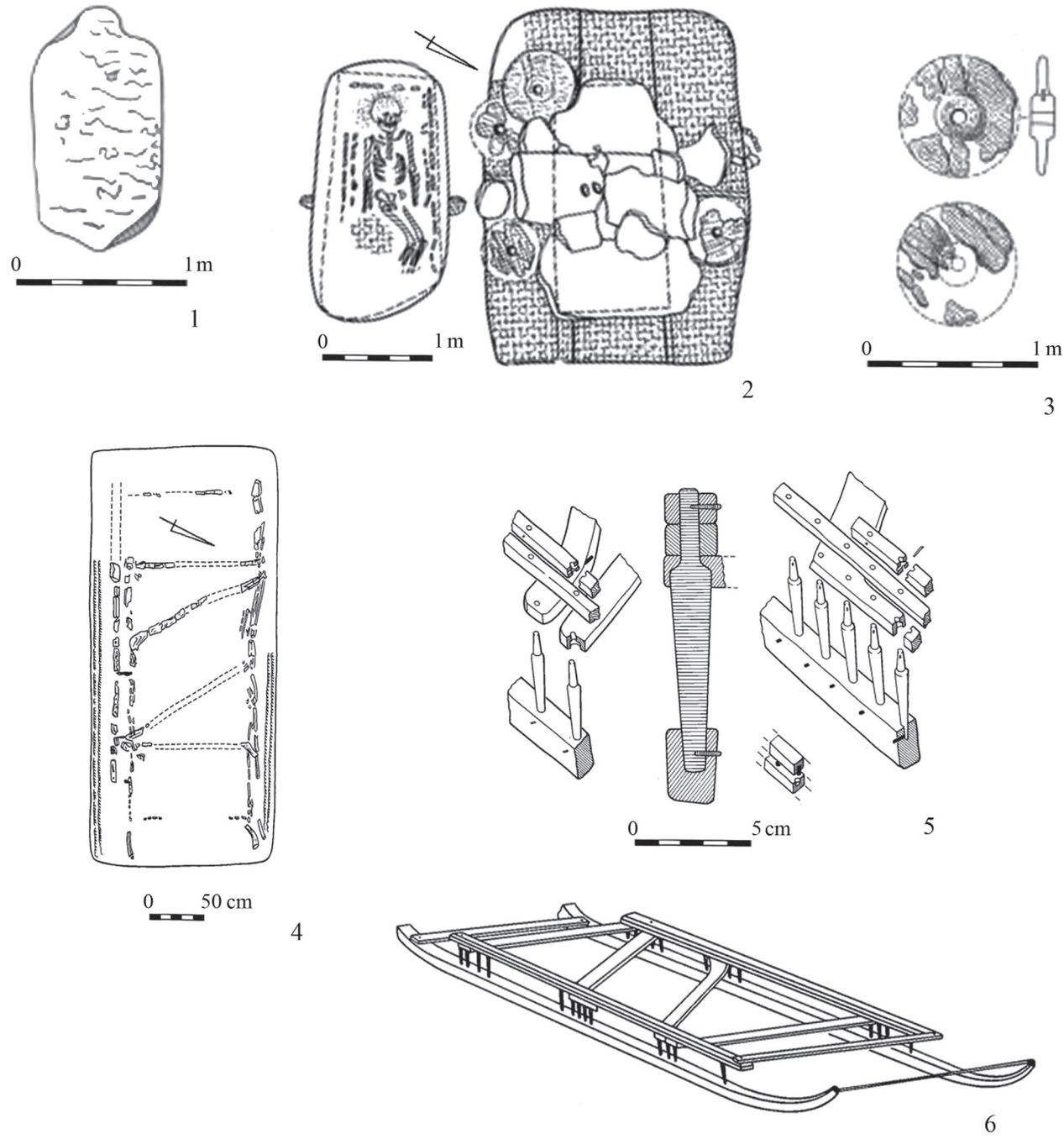

Fig. 26. Plan of the Holms´ke 1/7 grave (Gudkova and Černâkov 1981; Novickij 1985).

from three pieces of wood. In several cases, wooden dowels used to fasten them were detected. The wheels had a diameter of 0.7 m, with hubs protruding on both sides with a diameter of 21 cm, holes for axles with a diameter of 6.2 cm, and a hub thickness of 9 cm. The imprints of the outer edge of the wheels clearly showed traces of wood processing, with narrow transverse notches. These were sharp, without signs of wear, indicating that the wheels were either unused or had been covered with leather around the rim. The preservation of the wheels was poor; only two wheels were extracted as monolithic pieces for Odessa Archaeological museum. Besides the wheels, along the northern edge of the chamber, a leather object (vessel? pouch? headdress?) with embossed (red ornamentation) designs was found on the mat. Inside was some disintegrated bone object. The vertical walls of the pit were coated with liquid clay. On the pit floor, small holes from stakes were dis-

covered at the corners and along the middle of the long walls. The buried person was lying in a flexed position on their back, with their head facing southwest (245°), with arms stretched along the body, and knees bent to the left. The skull and upper chest bones were stained with ochre. Traces of a possible headdress were noted on the skull. A chalk deposit was found under the skull, with weak traces of burning near the feet. Around the skeleton, there were decayed remnants, possibly from leather (?) clothing. Under the skeleton, a rectangular wooden structure was found, made from wooden beams of various cross-sections, connected by dowels of various shapes and sizes. During the excavation and preservation of the wood, the main fastening points of this structure were identified, and it was reconstructed as a sled (Gudkova an Černâkov 1981; Novickij 1985; Černâkov *et al.* 1986).

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Święte, Site 11: Monumental (?) FBC Cemetery in the Subcarpathian Loess Region

Abstract

Król D., Olszewski A., Dobrakowska T., Dobrakowski M., Orczyk K., Szpila M. 2025. Święte, Site 11: Monumental (?) FBC Cemetery in the Subcarpathian Loess Region. *Analecta Archaeologica Ressoviensia* 20, 79–97

The article presents an analysis of the Funnel Beaker Culture cemetery at Święte, site 11 (Subcarpathian Loess Region, southeastern Poland), identified during rescue excavations carried out prior the construction of the A4 highway. A total of 49 graves were recorded and excavated, forming a well-organized burial ground with poorly preserved human remains and modest grave goods. Although no direct traces of monumental long-barrow constructions were recorded during excavation, GIS-based spatial analyses and the placement of Corded Ware Culture graves along the margins suggest that such structures may once have existed within the FBC cemetery but did not survive. The cemetery should therefore be cautiously interpreted not as a flat burial ground, but as a more complex, potentially monumental sepulchral space.

Keywords: Funnel Beaker Culture, Corded Ware Culture, long barrows, graves, Eneolithic

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1. Introduction

During rescue excavations prior to the construction of the A4 highway, more than a dozen distinct Funnel Beaker Culture (FBC) sites dating to the 4th millennium BC were discovered and investigated in the Subcarpathian Loess Region of southeastern Poland (e.g., Mazurek *et al.* 2013; Król *et al.* 2014a; 2014b; Pelisiak and Czubak 2014; Rybicka *et al* 2014; Dębiec *et al.* 2015; Sznajdrowska 2016). Among these, three sites were identified as funerary in nature: Skołoszów, site 7 (Król *et al.* 2012; 2014a; Cwaliński *et al.* 2017), Szczytna, site 6 (Król *et al.* 2014b), and Święte, site 11 (Olszewski 2011; Olszewski and Włodarczak 2018).

At the first two FBC cemeteries, numerous burial pits were documented, along with clear or partially preserved traces of timber long barrows, evidenced by features such as foundation ditches and other structural components (Król *et al.* 2012; 2014a; 2014b; Olszewski and Włodarczak 2018; Król and Sznajdrowska-Pondel 2022). In contrast, no recognizable remains of such monumental structures were recorded at Święte, site 11 (Olszewski 2011; Olszewski and Włodarczak 2018). Although no direct traces of long barrows were

identified there, the indirect evidence presented by A. Olszewski and P. Włodarczak (2018, 54) in the context of Corded Ware Culture (CWC) graves deserves closer attention. It is possible that such monuments once existed at this burial ground; however, owing to their predominantly timber construction and the impact of subsequent destructive processes, no direct traces have survived. The absence of clear archaeological evidence may therefore not indicate their non-existence but may rather be seen as a reflection of the fragility of these prehistoric structures (cf. Król and Sznajdrowska-Pondel 2022).

The FBC cemetery at Święte, site 11 was discovered and excavated in 2010 and 2012–2013 during large-scale archaeological investigations carried out by a consortium of companies comprising Narnia, Arche, and Archgeo. The fieldwork was directed by A. Łukaszewska in 2010 and 2012, and by T. Dobrakowska in 2013. In addition to the remains of FBC and CWC burial practices, the site also yielded traces of Bronze Age settlement, features from the Roman period, as well as evidence related to World War I activity (Olszewski 2011; Bohr *et al.* 2011; Dobrakowska and Dobrakowski 2014). Nevertheless, despite its importance, this FBC burial ground has not yet been comprehensively analyzed and contextualized within the broader framework of Eneolithic funerary practices in Central Europe in the 4th millennium BC. This study, therefore, aims to present this intriguing cemetery in greater detail and to explore whether it should be interpreted as a purely flat burial ground, or whether there are grounds for assuming the existence of "hidden" monumental structures within it (cf. Olszewski and Włodarczak 2018; Król and Sznajdrowska-Pondel 2022).

2. Location of the site

Święte, site 11 is situated on the eastern edge of the Subcarpathian Loess Region, within the Lower San Valley, part of the Sandomierz Basin (Solon *et al.* 2018), approximately 4 km southeast of Radymno (Fig. 1). It lies on the western Pleistocene terrace of the San River at an elevation of about 202 meters above sea level and roughly 900 meters from the present-day riverbed.

The elevation difference between the surface of the Święte 11 site and the Holocene valley floor is nearly 12 meters, with a significant slope of 17° (approximately 30.6%). The surface is characterized by a gently undulating microrelief with drainless hollows – morphological depressions where water tended to stagnate (Reder and Stępniewski 2011).

All FBC burial features were recorded in the western part of the site, within an area of approximately 100 m² (Fig. 2).

3. Overview of graves

Feature 755. The grave was oriented E-W and measured 218 × 108 cm, with a depth of 21 cm. The pit had a rectangular shape and was clearly distinguishable from the surrounding sediment. The fill consisted of grey humic soil. No human remains were preserved. No grave goods were recorded.

Feature 756. The grave was oriented E-W and measured 230 × 142 cm, with a depth of 48 cm. The pit had a roughly rectangular shape with rounded corners and was clearly distinguishable from the surrounding sediment. The fill consisted of dark grey humic soil. The grave pit was disturbed on the western side by a 20th-century intrusion and on the eastern side by a niche grave associated with the CWC. Small, non-diagnostic fragments of human bone were found within the fill. No grave goods were recorded.

Feature 757. The grave was oriented E-W with a slight deviation towards NE-SW and measured 268 × 94 cm, with a depth of 21 cm. The pit had a roughly rectangular shape with rounded corners and was clearly distinguishable from the surrounding sediment. The fill consisted of dark grey humic soil. No human remains were preserved. A flint flake was discovered in the grave.

Feature 758. The grave was oriented E-W with a slight deviation towards SE-NW and measured 234 × 104 cm, with a depth of 37 cm (Fig. 3: 1–2). The pit had a roughly rectangular shape with slightly rounded corners and was clearly distinguishable from the surrounding sediment (Fig. 3: 1). The fill consisted of two layers: the lower part was composed of dark gray humic soil, while the remaining part of the fill consisted of light gray humic soil mixed with loess (Fig. 3: 2). No human remains were preserved. Two artefacts were recorded: a collared flask and a retouched flake fragment (Fig. 3: 1, 3–4).

Feature 759. The grave was oriented E-W and measured 234 × 80 cm, with a depth of 34 cm. The pit had a roughly rectangular shape with rounded corners and was clearly distinguishable from the surrounding sediment. The fill consisted of two layers: the lower layer was composed of dark grey humic soil mixed with loess, while the remaining part of the fill

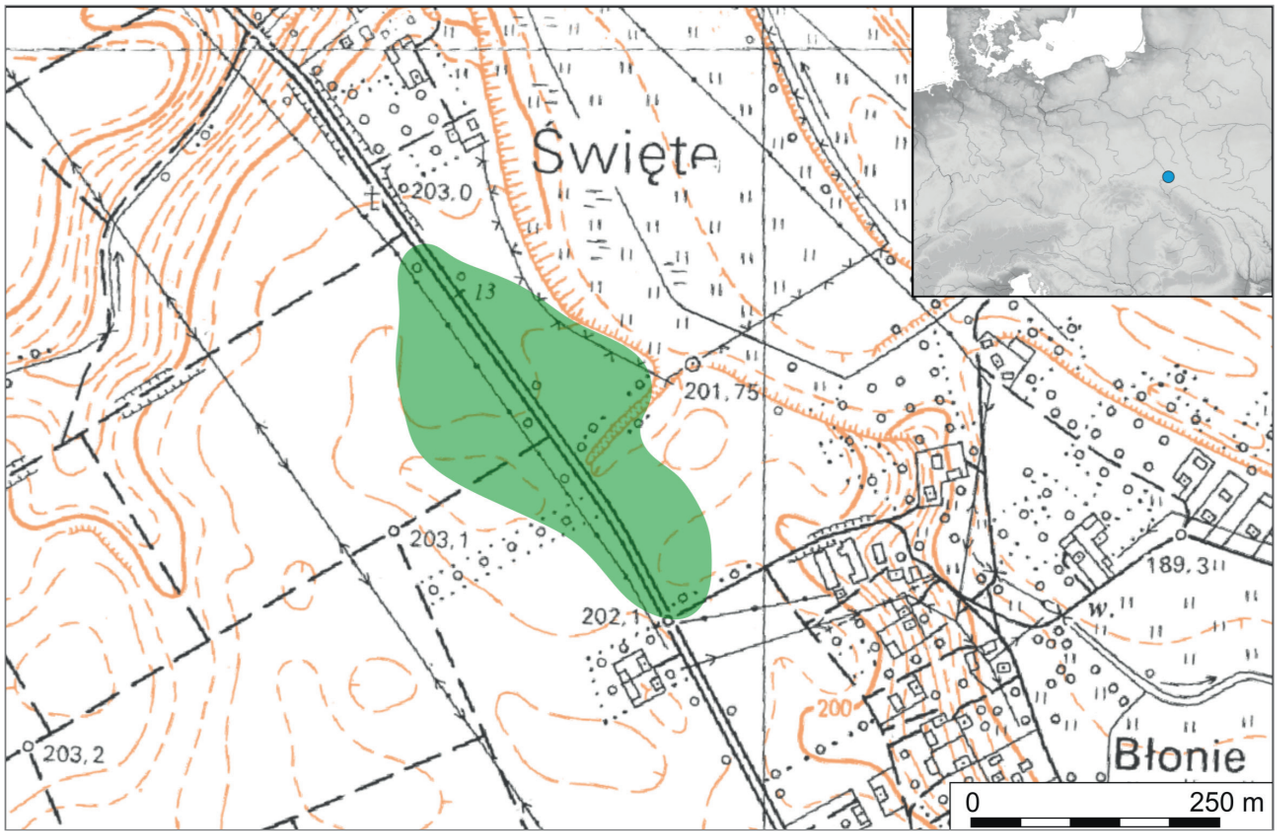

Fig. 1. Święte, site 11. Location of the site (edited by D. Król).

consisted of uniform dark grey humic soil. No human remains were preserved. A flint flake was discovered in the grave.

Feature 760. The grave was oriented E-W and measured 182 × 74 cm, with a depth of 34 cm. The pit had a roughly rectangular shape with rounded corners and a slightly concave northern side, and was clearly distinguishable from the surrounding sediment. The fill consisted of grey humic soil. No human remains were preserved. A flint flake was discovered in the grave.

Feature 761. The grave was oriented E-W and measured 216 × 108 cm, with a depth of 40 cm (Fig. 4: 1–2). The pit had a roughly rectangular shape with slightly rounded corners and was clearly distinguishable from the surrounding sediment (Fig. 4: 1). The fill consisted of three layers: in the lower part of the grave, on the western side, a dark grey humic soil layer approximately 2 cm thick was visible; the middle layer was composed of fairly uniform loess about 6 cm thick; the remaining part of the fill consisted of dark grey humic soil mixed with loess (Fig. 4: 2). Small, non-diagnostic fragments of human bone were found within the fill. Two artefacts were recorded: a collared flask located in the western part of the grave, and a flint blade made of Volhynian raw material found in the central part (Fig. 4: 1, 3–4).

Feature 762. The grave was oriented E-W and measured 224 × 80 cm, with a depth of 24 cm (Fig. 5: 1–2). The pit had a roughly rectangular shape with rounded corners and was clearly distinguishable from the surrounding sediment (Fig. 5: 1). The fill consisted of two layers: the lower layer, up to 10 cm thick, comprised dark grey humic soil, while the upper layer consisted of grey humic soil mixed with loess (Fig. 5: 2). The central section of the feature was disturbed by a modern intrusion. In the western part of the grave, human teeth were discovered, belonging to an individual of at least Infans II age category (Fig. 5: 1). A collared flask was also found in the western part of the grave (Fig. 5: 1, 3).

Feature 766. The grave was oriented E-W with a slight deviation towards SE-NW and measured 260 × 110 cm, with a depth of 18 cm. The pit had a roughly rectangular shape with slightly rounded corners and a slightly concave northern side, and was clearly dis-

Fig. 2. Święte, site 11. Plan of the FBC cemetery with CWC graves.
1 – FBC graves with inventory; 2 – FBC graves without inventory; 3 – FBC graves with human remains; 4 – CWC graves (edited by D. Król).

tinguishable from the surrounding sediment. The fill consisted of dark grey humic soil. No human remains were preserved. No grave goods were recorded.

Feature 767. The grave was oriented SE-NW and measured 250 × 114 cm, with a depth of 58 cm (Fig. 6: 1–2). The pit had a roughly rectangular shape and was clearly distinguishable from the surrounding sediment (Fig. 6: 1). The fill consisted of three layers: the bottom layer, approximately 10 cm thick, was composed of dark grey humic soil; the middle layer, also about 10 cm thick, consisted of light grey humic soil mixed with loess; the uppermost layer was made up of uniform dark grey humic soil (Fig. 6: 2). No human remains were preserved. Two artefacts were recorded: a collared flask located in the eastern part of the grave, and a flint arrowhead found in the western part (Fig. 6: 1, 3–4).

Feature 768. The grave was oriented E–W with a slight deviation towards SE-NW and measured approximately 200 × 94 cm, with a depth of 20 cm. The pit had a roughly rectangular shape with slightly rounded corners and was clearly distinguishable

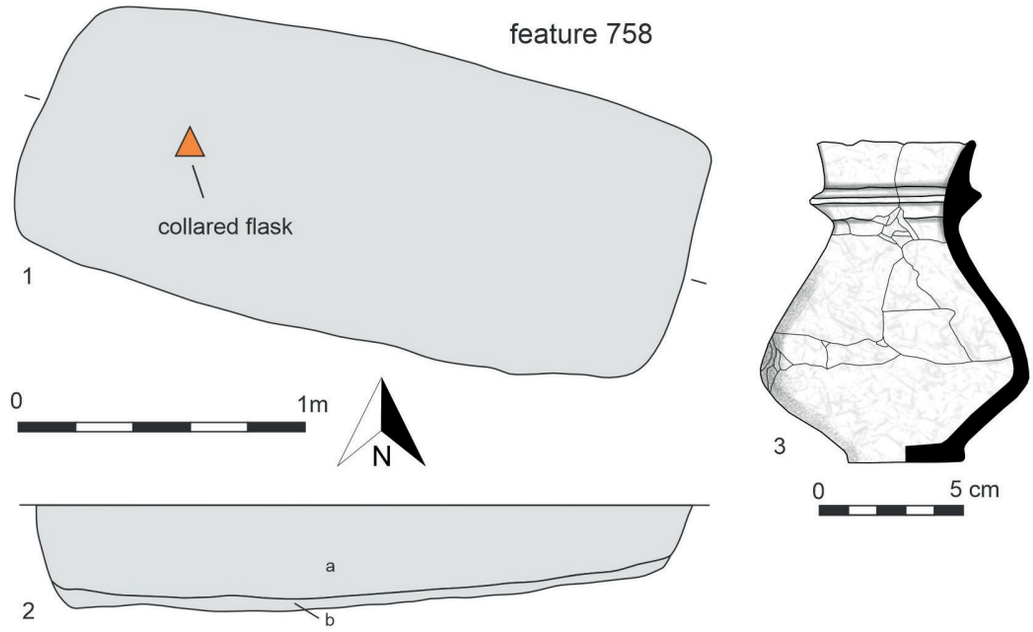

Fig. 3. Święte, site 11. Feature no. 758 and inventory.
1 – plan of the grave; 2 – cross-section of the grave; 3 – collared flask; a – light gray humic soil mixed with loess; b – dark gray humic soil (drawn by Ł. Grusiecka and A. Olszewski; redrawn by K. Orczyk).

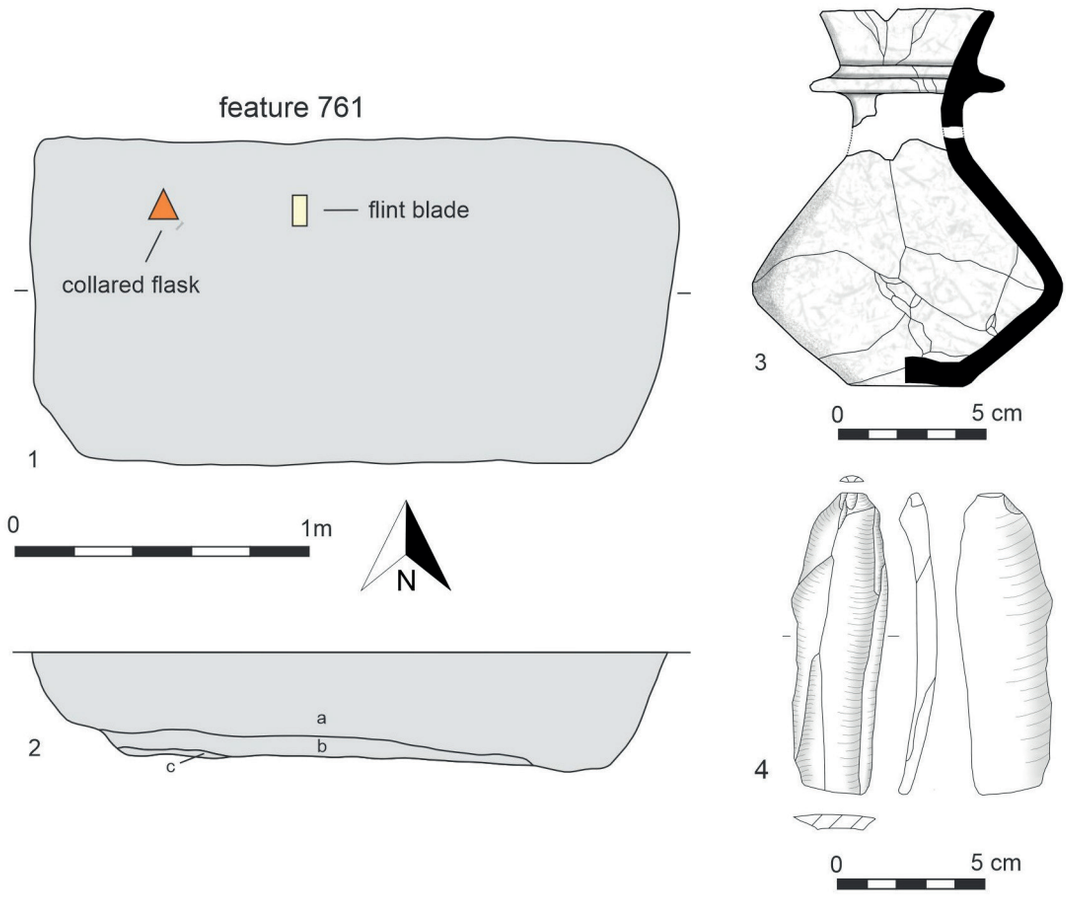

Fig. 4. Święte, site 11. Feature no. 761 and inventory.
1 – plan of the grave; 2 – cross-section of the grave; 3 – collared flask; 4 – flint blade; a – dark grey humic soil mixed with loess; b – fairly uniform loess; c – dark grey humic soil layer (drawn by Ł. Grusiecka and A. Olszewski; redrawn by K. Orczyk).

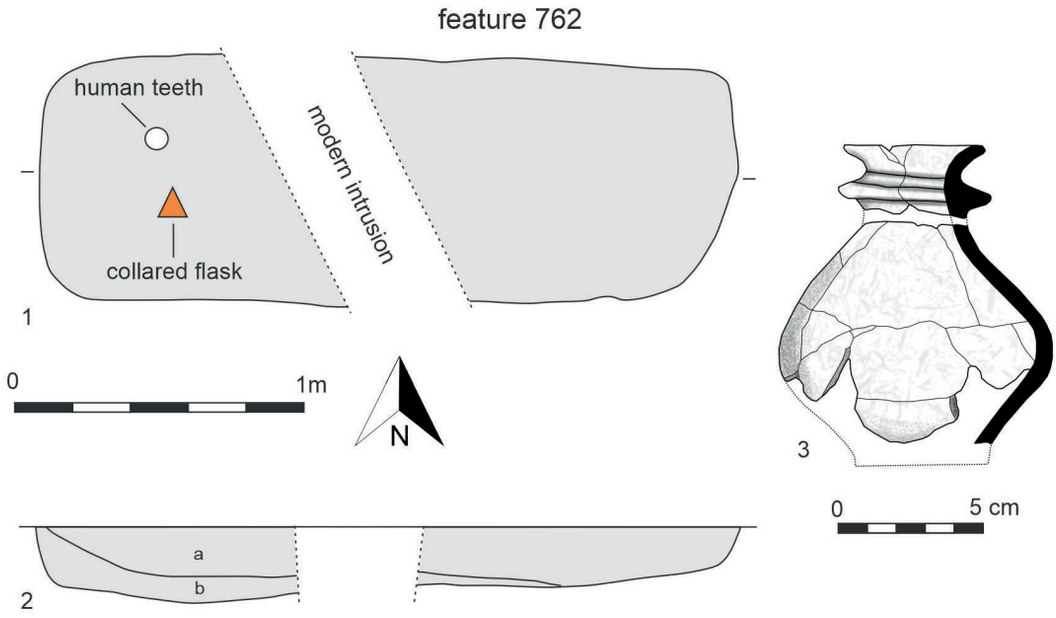

Fig. 5. Święte, site 11. Feature no. 762 and inventory.
1 – plan of the grave; 2 – cross-section of the grave; 3 – collared flask; a – grey humic soil mixed with loess; b – dark grey humic soil (drawn by Ł. Grusiecka and A. Olszewski; redrawn by K. Orczyk).

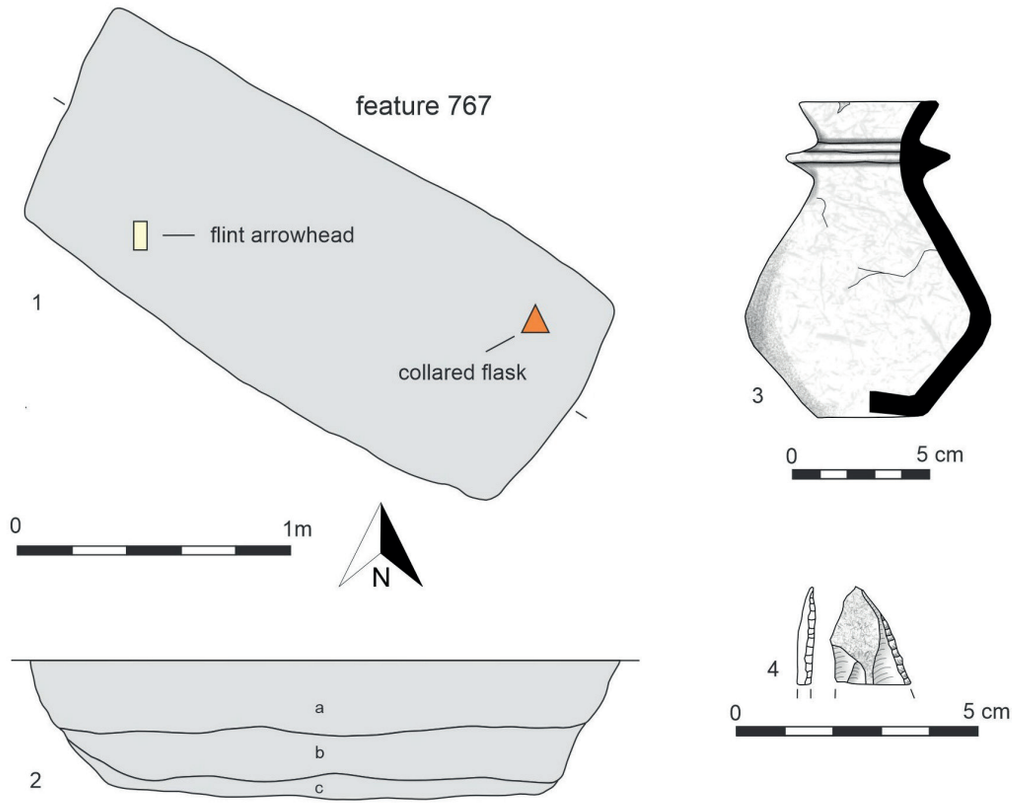

Fig. 6. Święte, site 11. Feature no. 767 and inventory.
1 – plan of the grave; 2 – cross-section of the grave; 3 – collared flask; 4 – flint arrowhead; a – dark grey humic soil; b – light grey humic soil mixed with loess; c – dark grey humic soil (drawn by Ł. Grusiecka and A. Olszewski; redrawn by K. Orczyk).

from the surrounding sediment. The western part of the grave was disturbed by a later intrusion. The fill consisted of dark grey humic soil. No human remains were preserved. No grave goods were recorded.

Feature 769. The grave was oriented E-W and measured approximately 200 × 103 cm, with a depth of 12 cm. The pit had a roughly rectangular shape with slightly rounded corners and was clearly distinguishable from the surrounding sediment. The western part of the grave was disturbed by a later intrusion. The fill consisted of dark grey humic soil. No human remains were preserved. No grave goods were recorded.

Feature 770. The grave was oriented E-W and measured 170 × 78 cm, with a depth of 30 cm. The pit had a roughly oval shape and was clearly distinguishable from the surrounding sediment. The fill consisted of dark grey humic soil. In the western part of the grave, human teeth were discovered, belonging to an individual of at least Infans II age category. A small flint blade made of Volhynian raw material was also found in the western part of the grave.

Feature 770A. The grave was oriented E-W and measured approximately 98 × 48 cm, with a depth of 24 cm. The pit had a roughly rectangular shape and was clearly distinguishable from the surrounding sediment. The fill consisted of grey humic soil. No human remains were preserved. No grave goods were recorded.

Feature 771. The grave was oriented E-W with a slight deviation towards NE-SW and measured approximately 254 × 130 cm, with a depth of 16 cm. The pit had an irregular oval shape and was clearly distinguishable from the surrounding sediment. The fill consisted of grey humic soil. No human remains were preserved. No grave goods were recorded.

Feature 773. The grave was oriented E-W with a slight deviation towards SE-NW and measured 222 × 127 cm, with a depth of 16 cm. The pit had a roughly rectangular shape with rounded corners and was clearly distinguishable from the surrounding sediment. The fill consisted of dark grey humic soil. No human remains were preserved. No grave goods were recorded.

Feature 776. The grave was oriented E-W with a slight deviation towards NE-SW and measured 248 × 104 cm, with a depth of 24 cm. The pit had a slightly oval shape and was clearly distinguishable from the surrounding sediment. The fill consisted of dark grey humic soil. No human remains were preserved. No grave goods were recorded.

Feature 777. The grave was oriented E-W and measured 292 × 124 cm, with a depth of 30 cm. The pit had a roughly rectangular shape with slightly rounded corners and was clearly distinguishable from the surrounding sediment. The fill consisted of dark grey humic soil. In the western part of the grave, human teeth were discovered. No grave goods were recorded.

Feature 778. The grave was oriented E-W and measured 268 × 128 cm, with a depth of 22 cm. The pit had a roughly rectangular shape with slightly rounded corners and was clearly distinguishable from the surrounding sediment. The fill consisted of dark grey humic soil. No human remains were preserved. No grave goods were recorded.

Feature 783. The grave was oriented E-W and measured 220 × 91 cm, with a depth of 19 cm. The pit had a roughly rectangular shape with rounded corners and was clearly distinguishable from the surrounding sediment. The fill consisted of dark grey humic soil. No human remains were preserved. No grave goods were recorded.

Feature 788. The grave was oriented E-W and measured 140 × 62 cm, with a depth of 12 cm. The pit had a roughly rectangular shape with slightly rounded corners and was clearly distinguishable from the surrounding sediment. The fill consisted of dark grey humic soil with inclusions of yellow loess. No human remains were preserved. No grave goods were recorded.

Feature 792. The grave was oriented E-W with a slight deviation towards NE-SW and measured 200 × 88 cm, with a depth of 26 cm. The pit had a roughly rectangular shape with rounded corners and was clearly distinguishable from the surrounding sediment. The fill consisted of dark grey humic soil mixed with loess. No human remains were preserved. No grave goods were recorded.

Feature 809. The grave was oriented SE-NW and measured 353 × 191 cm, with a depth of 49 cm (Fig. 7: 1–2). The pit had a roughly rectangular shape with rounded corners and was clearly distinguishable from the surrounding sediment (Fig. 7: 1). The fill consisted of three layers: the lower layer was composed of dark grey humus, while the upper layer was dark brown in color (Fig. 7: 2). No human remains were preserved. The central section of the feature was disturbed by a modern intrusion (Fig. 7: 1–2). A flint retouched

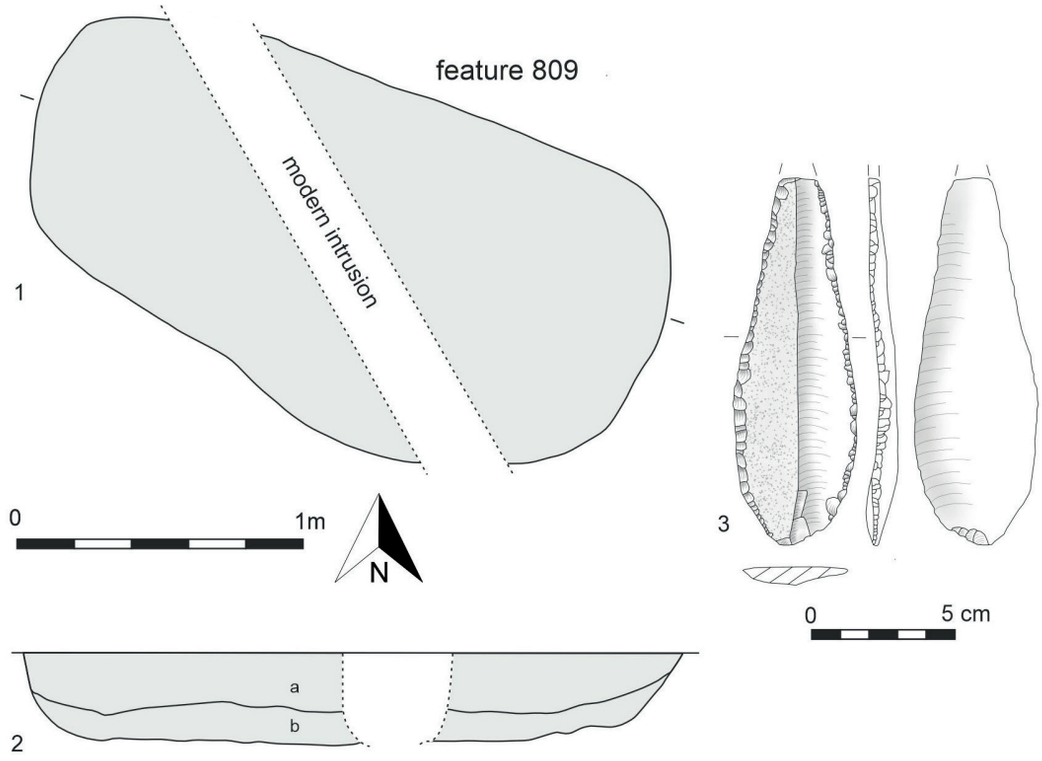

Fig. 7. Święte, site 11. Feature no. 809 and inventory.
1 – plan of the grave (unknown exact location of the inventory); 2 – cross-section of the grave; 3 – retouched flint blade; a – dark brown soil; b – dark grey humic soil (drawn by Ł. Grusiecka and A. Olszewski; redrawn by K. Orczyk).

blade made of Volhynian raw material was found in the central part of the grave (Fig. 7: 3).

Feature 819. The grave was oriented E-W with a slight deviation towards SE-NW and measured 201 × 95 cm, with a depth of 18 cm. The pit had a slightly oval shape and was clearly distinguishable from the surrounding sediment. The fill consisted of dark grey humic soil. No human remains were preserved. No grave goods were recorded.

Feature 862. The grave was oriented E-W and measured 258 × 94 cm, with a depth of 42 cm. The pit had a roughly rectangular shape with rounded corners and was clearly distinguishable from the surrounding sediment. The fill consisted of dark grey humic soil. No human remains were preserved. No grave goods were recorded.

Feature 1102. The grave was oriented E-W and measured 207 × 118 cm, with a depth of 21 cm. The pit had a roughly rectangular shape with rounded corners and was clearly distinguishable from the surrounding sediment. The fill consisted of dark grey humic soil mixed with loess inclusions. No human remains were preserved. No grave goods were recorded.

Feature 1106. The grave was oriented E-W with a slight deviation towards SE-NW and measured 136 × 72 cm, with a depth of 12 cm. The pit had a roughly oval shape and was clearly distinguishable from the surrounding sediment. The fill consisted of grey humic soil. No human remains were preserved. No grave goods were recorded.

Feature 1113. The grave was oriented E-W and measured 302 × 153 cm, with a depth of 40 cm. The pit had a roughly rectangular shape with rounded corners and was clearly distinguishable from the surrounding sediment. The fill consisted of grey humic soil. No human remains were preserved. No grave goods were recorded.

Feature 1144. The grave was oriented E-W with a slight deviation towards NE-SW and measured 242 × 160 cm, with a depth of 20 cm. The pit had a roughly oval shape and was clearly distinguishable from the surrounding sediment. The fill consisted of grey humic soil. No human remains were preserved. No grave goods were recorded.

Feature 1145. The grave was oriented E-W and measured 190 × 88 cm, with a depth of 36 cm. The pit

had a roughly rectangular shape with rounded corners and was clearly distinguishable from the surrounding sediment. The fill consisted of grey humic soil. No human remains were preserved. No grave goods were recorded.

Feature 1146. The grave was oriented E-W with a slight deviation towards SE-NW and measured 238 × 110 cm, with a depth of 16 cm. The pit had a roughly oval shape and was clearly distinguishable from the surrounding sediment. The fill consisted of grey humic soil. No human remains were preserved. No grave goods were recorded.

Feature 1167. The grave was oriented E–W with a slight deviation towards SE-NW and measured 205 × 102 cm, with a depth of 42 cm. The pit had a roughly rectangular shape with rounded corners and was clearly distinguishable from the surrounding sediment. The fill consisted of grey humic soil. No human remains were preserved. No grave goods were recorded.

Feature 1172. The grave was oriented E–W and measured 205 × 102 cm, with a depth of 42 cm. The pit had a roughly rectangular shape with rounded corners and was clearly distinguishable from the surrounding sediment. The fill consisted of grey humic soil. No human remains were preserved. No grave goods were recorded.

Feature 1175. The grave was oriented SE-NW and measured 180 × 86 cm, with a depth of 32 cm. The pit had a roughly rectangular shape with rounded corners and was clearly distinguishable from the surrounding sediment. The fill consisted of light grey humic soil, with darker grey humic soil present at the bottom. The grave pit was disturbed on the southern side by younger feature. In the north-western part of the grave, human teeth were discovered, belonging to an individual of at least Infans II age category. A small flint flake made of Volhynian raw material was also found in the central part of the grave.

Feature 1176. The grave was oriented E-W and measured 240 × 72 cm, with a depth of 26 cm. The pit had a roughly rectangular shape with rounded corners and was clearly distinguishable from the surrounding sediment. The fill consisted of grey humic soil. No human remains were preserved. No grave goods were recorded.

Feature 1178. The grave was oriented E-W with a slight deviation towards SE-NW and measured 180 × 90 cm, with a depth of 12 cm. The pit had a roughly rectangular shape with rounded corners and was clearly distinguishable from the surrounding sediment. The fill consisted of grey humic soil. No human remains were preserved. No grave goods were recorded.

Feature 1179. The grave was oriented SE-NW and measured 198 × 80 cm, with a depth of 40 cm. The pit had a roughly oval shape and was clearly distinguishable from the surrounding sediment. The fill consisted of light grey humic soil. In the north-western part of the grave, human teeth were discovered, belonging to an individual older than the Juvenis age category. No grave goods were recorded.

Feature 1187. The grave was oriented E-W and measured 218 × 98 cm, with a depth of 50 cm (Fig. 8: 1–2). The pit had a roughly rectangular shape with rounded corners and was clearly distinguishable from the surrounding sediment. (Fig. 8: 1). The fill consisted of four layers: At the bottom of the feature, a layer of light grey humic soil was recorded, located in the corners of the pit. Above it, there was a layer of black humic soil, approximately 10 cm thick. The next level consisted of black humic soil mixed with loess, with a thickness of about 20 cm. The uppermost layer was composed of light grey humic soil (Fig. 8: 2). No human remains were preserved. A collared flask was found in the western part of the grave (Fig. 8: 3).

Feature 1189. The grave was oriented SE-NW and measured 206 × 98 cm, with a depth of 30 cm (Fig. 9: 1–2). The pit had a roughly rectangular shape with rounded corners and was clearly distinguishable from the surrounding sediment (Fig. 9: 1). The fill consisted of light grey humic soil (Fig. 9: 2). In the northwestern part of the grave, human teeth were discovered, belonging to an individual of at least Infans II age category (Fig. 9: 1). Two artefacts were recorded: a collared flask located in the south-eastern part of the grave, and a flint flake made of Volhynian raw material found in the same part (Fig. 9: 1, 3–4).

Feature 1192. The grave was oriented E-W and measured 200 × 172 cm, with a depth of 18 cm. The pit had a roughly rectangular shape with rounded corners and was clearly distinguishable from the surrounding sediment. The fill consisted of grey humic soil. No human remains were preserved. No grave goods were recorded.

Feature 1196. The grave was oriented E-W and measured 180 × 62 cm, with a depth of 40 cm. The pit had a roughly rectangular shape with rounded corners and was clearly distinguishable from the surrounding

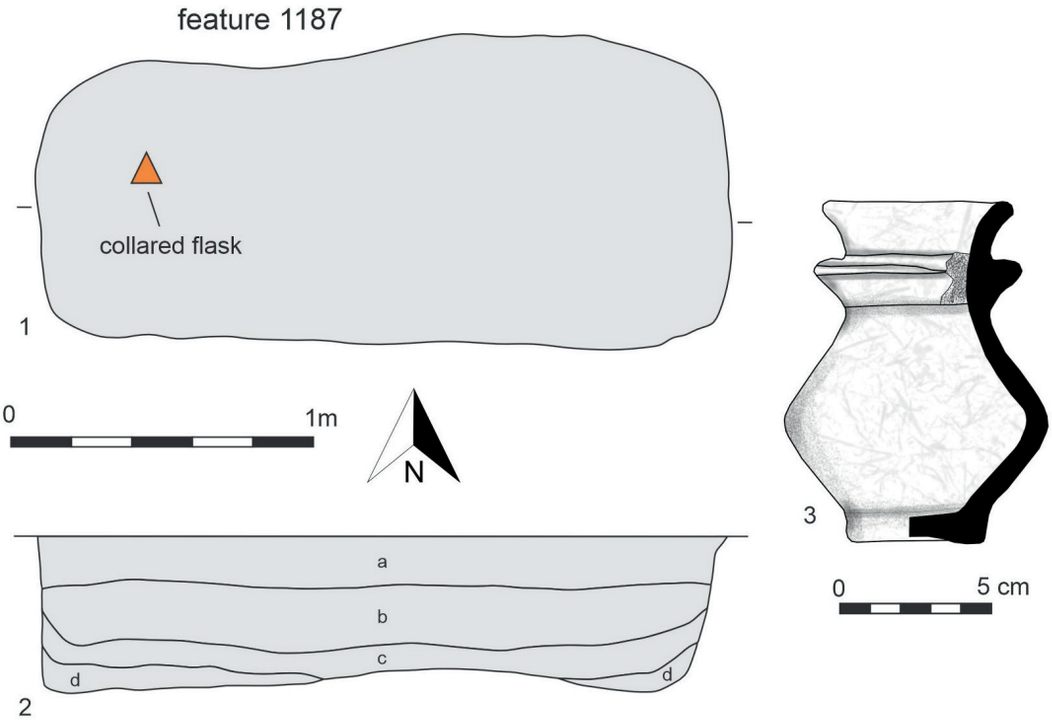

Fig. 8. Święte, site 11. Feature no. 1187 and inventory.
1 – plan of the grave; 2 – cross-section of the grave; 3 – collared flask; a – light grey humic soil; b – black humic soil mixed with loess; c – black humic soil; d – light grey humic soil (drawn by Ł. Grusiecka and A. Olszewski; redrawn by K. Orczyk).

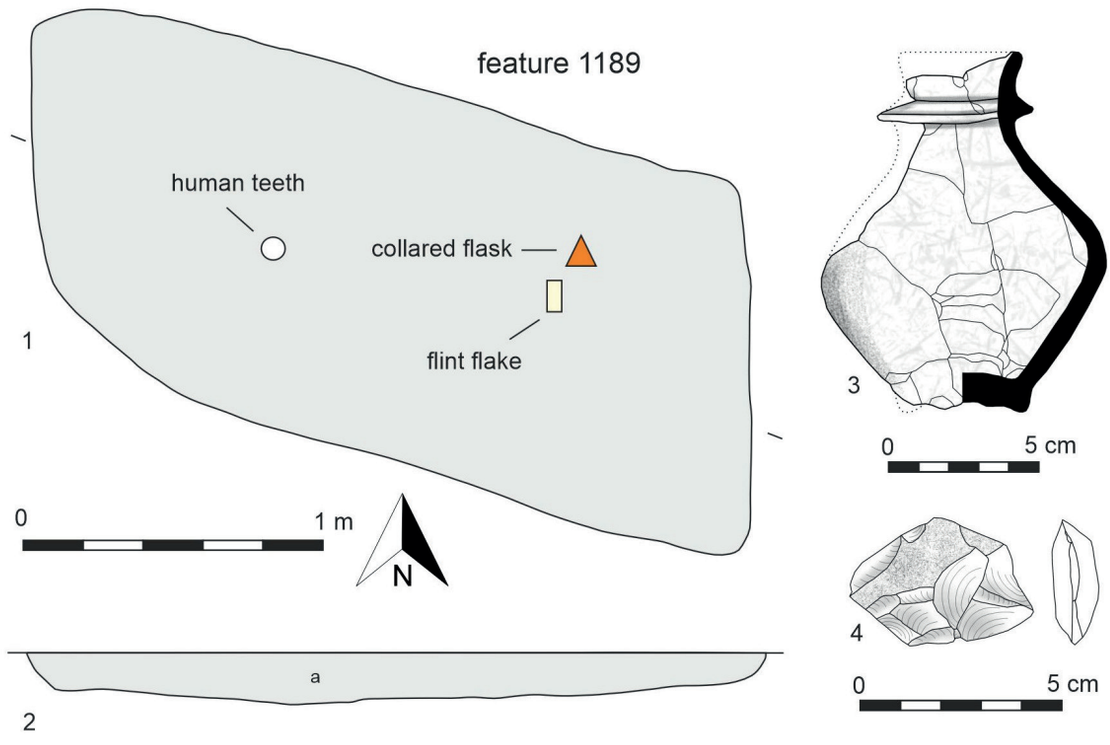

Fig. 9. Święte, site 11. Feature no. 1189 and inventory.
1 – plan of the grave; 2 – cross-section of the grave; 3 – collared flask; 4 – flint flake; a – light grey humic soil (drawn by Ł. Grusiecka and A. Olszewski; redrawn by K. Orczyk).

sediment. The fill consisted of light grey humic soil. In the western part of the grave, human teeth were discovered. No grave goods were recorded.

Feature 1197. The grave was oriented E-W and measured 100 × 72 cm, with a depth of 20 cm. The pit had a roughly oval shape with rounded corners and was clearly distinguishable from the surrounding sediment. The fill consisted of grey humic soil. In the western part of the grave, human teeth were discovered. No grave goods were recorded.

Feature 1199. The grave was oriented SE-NW and measured 188 × 90 cm, with a depth of 16 cm. The pit had a roughly rectangular shape with rounded corners and was clearly distinguishable from the surrounding sediment. The fill consisted of dark grey humic soil. No human remains were preserved. No grave goods were recorded.

Feature 1200. The grave was oriented E-W with a slight deviation towards NE-SW and measured 212 × 84 cm, with a depth of 28 cm. The pit had a roughly rectangular shape with slightly rounded corners and was clearly distinguishable from the surrounding sediment. The fill consisted of dark grey humic soil. In the grave, human teeth were discovered, belonging to an individual of at least Infans II age category. No grave goods were recorded.

Feature 1403. The grave was oriented E-W wand measured 154 × 72 cm, with a depth of 19 cm. The pit had a roughly oval shape and was clearly distinguishable from the surrounding sediment. The fill consisted of dark grey humic soil. The grave pit was disturbed on the western side by a 20th-century intrusion. No human remains were preserved. No grave goods were recorded.

Feature 1405. The grave was oriented E-W and measured 203 x 124 cm, with a depth of 8 cm (Fig. 10: 1–2). The pit had an oval shape and was clearly distinguishable from the surrounding sediment. (Fig. 10: 1). The fill consisted of brown humic soil (Fig. 10: 2). No human remains were preserved. A collared flask was found in the western part of the grave (Fig. 10: 1, 3).

Feature 1407. The grave was oriented E-W and measured 254 x 103 cm, with a depth of 31 cm. The pit had a roughly rectangular shape with slightly rounded corners and was clearly distinguishable from the surrounding sediment. The fill consisted of grey humic soil. No human remains were preserved. No grave goods were recorded.

Feature 1848. The grave was oriented E-W and measured 260 x 61 cm, with a depth of 10 cm. The pit had a roughly rectangular shape with slightly rounded and was clearly distinguishable from the surrounding sediment. The fill consisted of dark brown soil

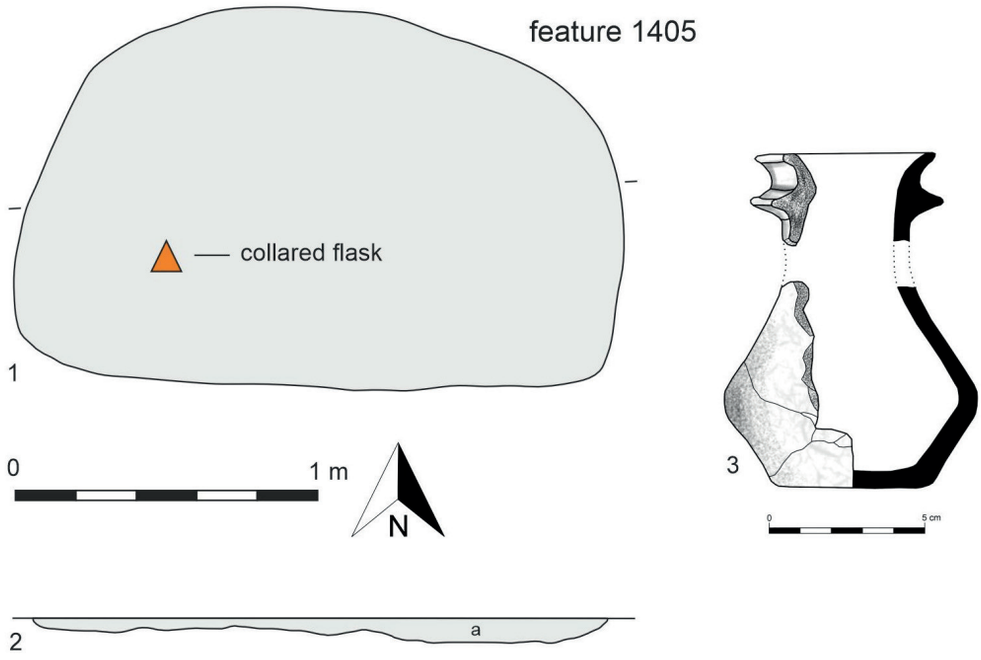

Fig. 10. Święte, site 11. Feature no. 1405 and inventory.
1 – plan of the grave; 2 – cross-section of the grave; 3 – collared flask; a – brown humic soil
(drawn by Ł. Grusiecka and A. Olszewski; redrawn by K. Orczyk).

mixed with loess. No human remains were preserved. A whetstones made of sandstone was found in grave.

Feature 1849. The grave was oriented E-W and measured 230 x 72 cm, with a depth of 14 cm. The pit had a roughly rectangular shape with slightly rounded and was clearly distinguishable from the surrounding sediment. The fill consisted of dark brown soil mixed with loess. No human remains were preserved. A whetstones made of sandstone was found in grave.

4. Analysis of graves

4.1. Morphometric characteristics

At Święte, site 11 a total of 49 burial features were identified. The vast majority of the graves (82%) were generally oriented along an east-west axis. Among them, 28 features (57.1%) were aligned precisely along this axis, while 15 exhibited varying degrees of deviation toward a southeast-northwest or northeast-southwest orientation (Fig. 2). The first group is represented, among others, by graves nos. 761 (Fig. 4: 1), 762 (Fig 5: 1), 770, 1187 (Fig. 8: 1), 1196, 1405 (Fig. 10: 1), 1848, and 1849. Features exhibiting a deviated orientation include, for instance, nos. 758 and 1200 (Fig. 2, 3). Several graves were oriented directly along the southeast-northwest axis, such as nos. 767 and 1189 (Fig. 9), whereas none were aligned along the northeast-southwest axis (Fig. 2).

In terms of dimensions, the lengths of the burial pits ranged from 98 cm (no. 770A) to 353 cm (no. 809; Fig. 7: 1–2), with most features falling within 200–260 cm. Widths varied from 61 cm (no. 1848) to 191 cm (no. 809; Fig. 7: 1–2), with an average width of approximately 100–110 cm. Depths exhibited substantial variability: the shallowest pit measured 8 cm (no. 1405), while the deepest reached 58 cm (no. 767; Fig. 6: 1–2). The majority of the burial pits had depths within the 20–40 cm interval.

Morphologically, pit forms approximating rectangles with variably rounded corners predominated (85%). This configuration was recorded, among others, in graves nos. 755–757, 759, 761 (Fig. 4: 1), 762 (Fig, 5: 1), 766–770A, 773, 776–778, 783, 792, 809 (Fig. 7: 1), 819, 862, 1102, 1113, 1145, 1146, 1167, 1172, 1175, 1176, 1178, 1187 (Fig. 8: 1), 1189 (Fig. 9: 1), 1192, 1196, 1199, 1200, 1407, 1848, and 1849. Oval-shaped pits were identified in graves nos. 770, 771, 1106, 1144, 1179, 1403, and 1405 (Fig. 10: 1). Several features also exhibited minor concavities (e.g., no. 766, which presented an indentation of the northern wall). In all instances, the grave cuts were clearly distinguishable from the surrounding loess background.

The characteristics of the grave fills exhibit a high degree of overall homogeneity, with localized microstratigraphic variability. Multilayered fills – comprising more than one sedimentary layer – were recorded in six graves, accounting for approximately 13% of all features. The most commonly encountered form was a dark grey, humus-rich soil with a uniform structure, which constituted the primary infill in over 80% of cases.

4.2. Anthropological remains

The preservation of human remains at the FBC cemetery is generally poor. Out of 49 documented graves, 11 contained preserved or identifiable anthropological material (Fig. 2), primarily in the form of isolated teeth or small, non-diagnostic bone fragments, e.g., graves nos. 756, 761, 762 (Fig. 5: 1), 770, 777, 1175, 1179, 1189 (Fig. 9: 1), 1196, 1197, and 1200. The remaining graves yielded no skeletal remains.

The preserved material allows for a limited assessment of age categories. Most identifiable individuals belong to the Infans II category (graves nos. 762, 770, 1175, 1189, 1200), and one individual is older than the Juvenis category (grave no. 1179). Some graves show evidence of modern disturbances, for instance nos. 756, 762 (Fig. 5: 1–2), and 809 (Fig. 7: 1–2).

4.3. Grave goods

Grave inventories at Święte, site 11 were relatively modest. Ceramics were primarily represented by collared flasks, found in graves nos. 758 (Fig. 3: 3), 761 (Fig. 4: 3), 762 (Fig. 5: 3), 767 (Fig. 6: 3), 1187 (Fig. 8: 3), 1189 (Fig. 9: 3), and 1405 (Fig. 10: 3). These vessels differed slightly in their proportions. Their height ranged from 9.6 to 11.7 cm; rim diameter measured 5.1–5.8 cm, body diameter 8.9–10.3 cm, and base diameter 3.9–4.1 cm. Some vessels were strongly profiled, with a distinct inflection at the point of maximum body diameter, a feature particularly well visible in the specimen from grave no. 761 (Fig. 4: 3). In one case (grave no. 1189), the presence of characteristic small footmarks on the vessel base was observed (Fig. 9: 3). Collared flasks were typically located in the western part of the graves.

Lithic artefacts include flint flakes, blades and retouched blades made from Volhynian raw material were found in graves nos. 757, 759, 760, 761 (Fig. 4: 4), 770, 809 (Fig. 7: 3), 1175, and 1189 (Fig. 9: 4). One grave (no. 767) contained a flint arrowhead (Fig. 6: 4).

Sandstone whetstones were documented in graves nos. 1848 and 1849.

Most graves contained a single vessel or a single lithic artefact. Graves with multiple or more complex assemblages are rare, primarily represented by graves nos. 758, 761, 767, and 1189, which contained both a ceramic vessel (collared flask) and several lithic items – including blades, flakes, or an arrowhead – distinguishing them from the majority of graves that contained only a single artefact (Fig. 3: 3–4; 4: 3–4; 9: 3–4).

4.4. Spatial organization

The distribution of FBC graves at the Święte, site 11 cemetery reveals a complex pattern, clearly visible on the density map generated in a GIS environment using Kernel Density Estimation (KDE) and the Delaunay Triangulation functions (DT) (Fig. 11). The dominant feature of the site is a central concentration of burials extending along a southwest-northeast axis. Within this concentration, three compact clusters and one transitional zone can be distinguished (Fig. 11).

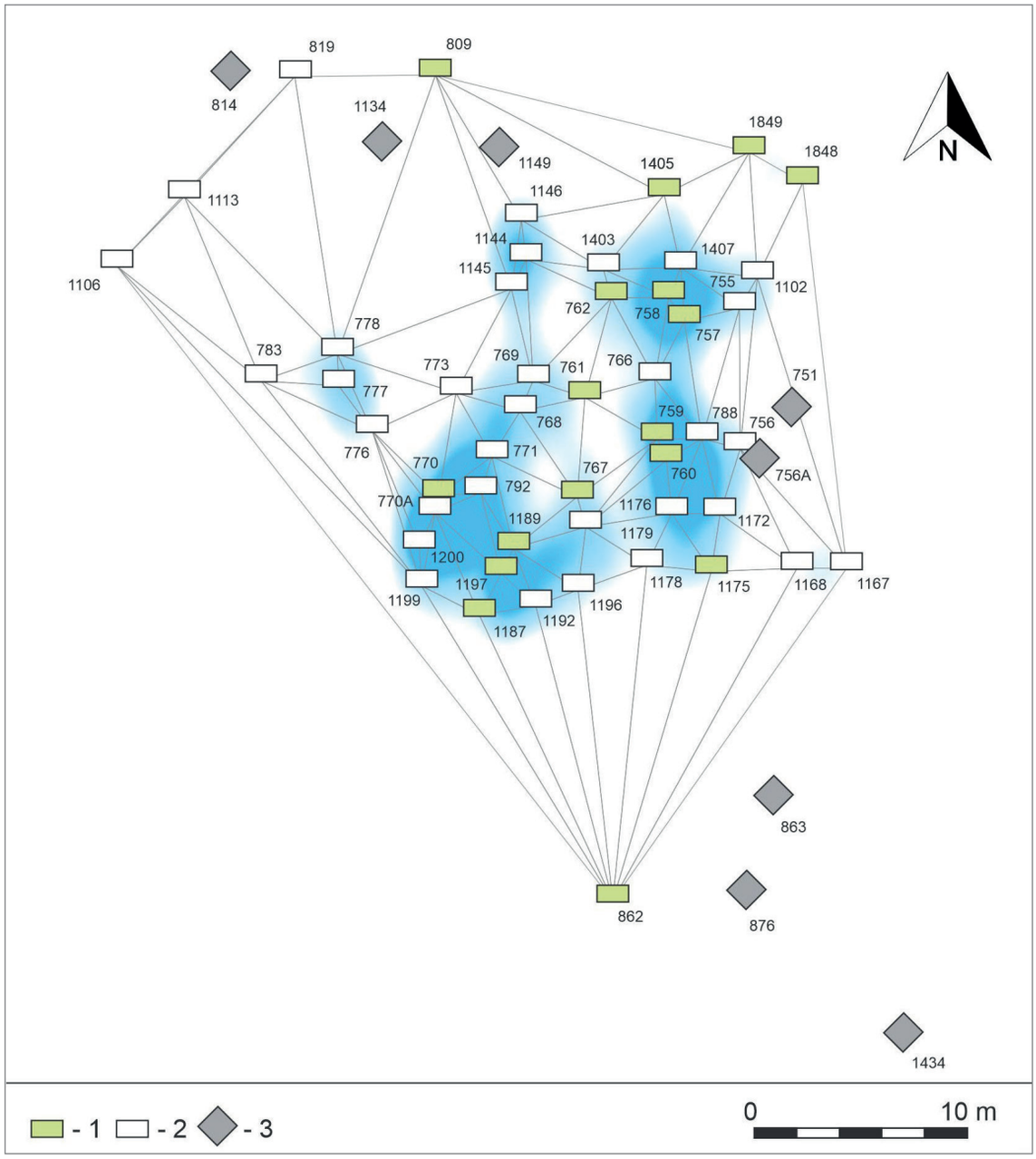

Fig. 11. Święte, site 11. KDE and TD analysis of the FBC graves distribution.
1 – FBC graves with inventory; 2 – FBC graves without inventory; 3 – FBC graves with human remains; 4 – CWC graves (edited by D. Król).

The first cluster, located in the southwestern part of the site, includes graves nos. 770, 770A, 792, 1189, 1196, 1197, 1192, and 1200. This cluster displays the highest density on the map and forms the core of the cemetery. To its northeast lies an elongated transitional zone centered around graves nos. 769, 771, 781, 761, 762, and 767. This zone links the southwestern cluster with the eastern part of the cemetery and is less compact than the other concentrations.

In the southeastern sector, a second distinct cluster is formed by graves nos. 755, 756, 758, 759, and 760 (Fig. 11). On the density map it appears as a separate maximum, clearly differentiated from the transitional zone. Another, smaller cluster is situated in the northeastern part of the site, comprising graves nos. 768, 1407, and 1102. Despite the smaller number of features, its isolated character is clearly marked on the heatmap (Fig. 11).

Beyond the central complex, peripheral burials occur in areas of low density (Fig. 11). In the northwestern part of the site these include graves 1106, 1113, 783, and 778. In the southeastern sector, graves nos. 1175, 1178, 1179, and 1167 are present, while in the southern zone a single, isolated burial (no. 862) was recorded. On the northeastern periphery two further graves (nos. 1848 and 1849) were documented.

Equipped graves occur both within the main clusters and on the margins of the cemetery (Fig. 2, 11). In the southwestern cluster, they include graves nos. 770, 1189, and 1200; in the transitional zone – nos. 761, 762, and 767; in the southeastern cluster – nos. 758, 759, and 760; and in the northeastern cluster – nos. 768 and 1405. On the periphery, equipped graves also appear in features nos. 1848, 1849, and 809.

The majority of the assemblage consists of unequipped burials (Fig. 2, 11), which fill the main clusters and form their background. In some areas they occur in short alignments, such as the sequence nos. 1144-1145-1146-1403 in the northeastern part of the site. On the periphery they appear singly or in small, dispersed groups.

In summary, the FBC cemetery at Święte, site 11 is characterized by a central complex composed of three compact clusters (southwestern, southeastern, and northeastern) and one transitional zone (around grave no. 769), complemented by looser peripheral burials (Fig. 11). No stratigraphic relationships between the FBC graves were observed, indicating that there was a clear awareness of the locations of earlier burials when constructing subsequent ones.

4.4.1. Relations between FBC and CWC graves

More than ten CWC graves were recorded at the site (Olszewski and Włodarczak 2018). With the exception of two clearly separated features, the majority were dug in direct association with the FBC cemetery (Fig. 2, 11; Olszewski and Włodarczak 2018). The CWC burial features were located in the northern (nos. 809, 914, and 819) and southern parts (nos. 862, 863, and 876) of the earlier Eneolithic burial ground, effectively on the margins of the dense central concentration of FBC graves (Fig. 11). The only stratigraphic overlap between the two cultural groups was observed in the case of feature no. 756 (Fig. 2). The eastern part of this FBC grave was cut by a niche grave (no. 756A) associated with the CWC (Olszewski and Włodarczak 2018, 13).

5. Discussion

Considering the number of graves, the FBC cemetery at Święte, site 11 belongs to the largest known in the eastern and southeastern zone of the FBC (Król 2021). As emphasized in the Introduction, no direct traces of monumental structures – such as foundation ditches or postholes that would clearly indicate long barrows – were recorded at this site (Fig. 2). At first glance, this might encourage its interpretation as a non-monumental funerary space. Indeed, varied spatial arrangements of FBC graves not accompanied by monumental features are frequently regarded as flat cemeteries, in contrast to monumental ("megalithic") ones. Examples of such flat burial grounds, where no traces of long barrows – whether with stone kerbs or timber frames – have been identified, are numerous. In the Polish Lowlands (particularly Kujawy), these include Czamaninek, site 2A; Sarnowo, site 1A (cf. Kapica 1986); Stary Brześć, site 1 (Jażdżewski 1936; Grygiel 2016); Pikutkowo, site 5 (Grygiel 2016); and Popowice, site 3 (Cofta-Broniewska and Kośko 1982). From southeastern Poland, Łubcze, site 25 (Bagińska 2006) and Wojciechowice, site 1 (Bąbel 2000) may be cited. The question therefore arises: does the absence of material remains of long barrows at Święte, site 11 truly constitute evidence of their original absence?

When examining the funerary landscape of the loess uplands and plateaus of southeastern Poland in the 4th millennium BC, one cannot fail to notice numerous "complete" FBC cemeteries. These were characterized by the presence of different types of long barrows – sometimes constructed with timber frames,

in other cases with stone settings – accompanied by burials placed both within these monuments and outside them. This is well illustrated, for instance, by the cemeteries at Karmanowice, site 35 (Nogaj-Chachaj 1987; 1989; 1990; 1996; 2001); Malice Kościelne, site 1 (Bargieł and Florek 2006a); Pawłów, site 3 (Bargieł and Florek 2006b); and Słonowice, site 5 (Tunia 2006; Przybyła and Tunia 2013), as well as by the geographically closest cemeteries at Skołoszów, site 7 (Król *et al.* 2012; 2014a; Cwaliński *et al.* 2017; cf. Król and Sznajdrowska-Pondel 2022) and Szczytna, site 6 (Król *et al.* 2014b; cf. Olszewski and Włodarczak 2018; Król and Sznajdrowska-Pondel 2022). Despite morphological differences in the construction of these long barrows, the overall spatial organization of the cemeteries tends to be broadly comparable (Król 2021).

Highlighting the considerable diversity of long barrows in the southeastern zone of the FBC is particularly important. Apart from those whose main structural component was a stone frame traces of many monuments originally built with biodegradable wooden elements have also survived into modern

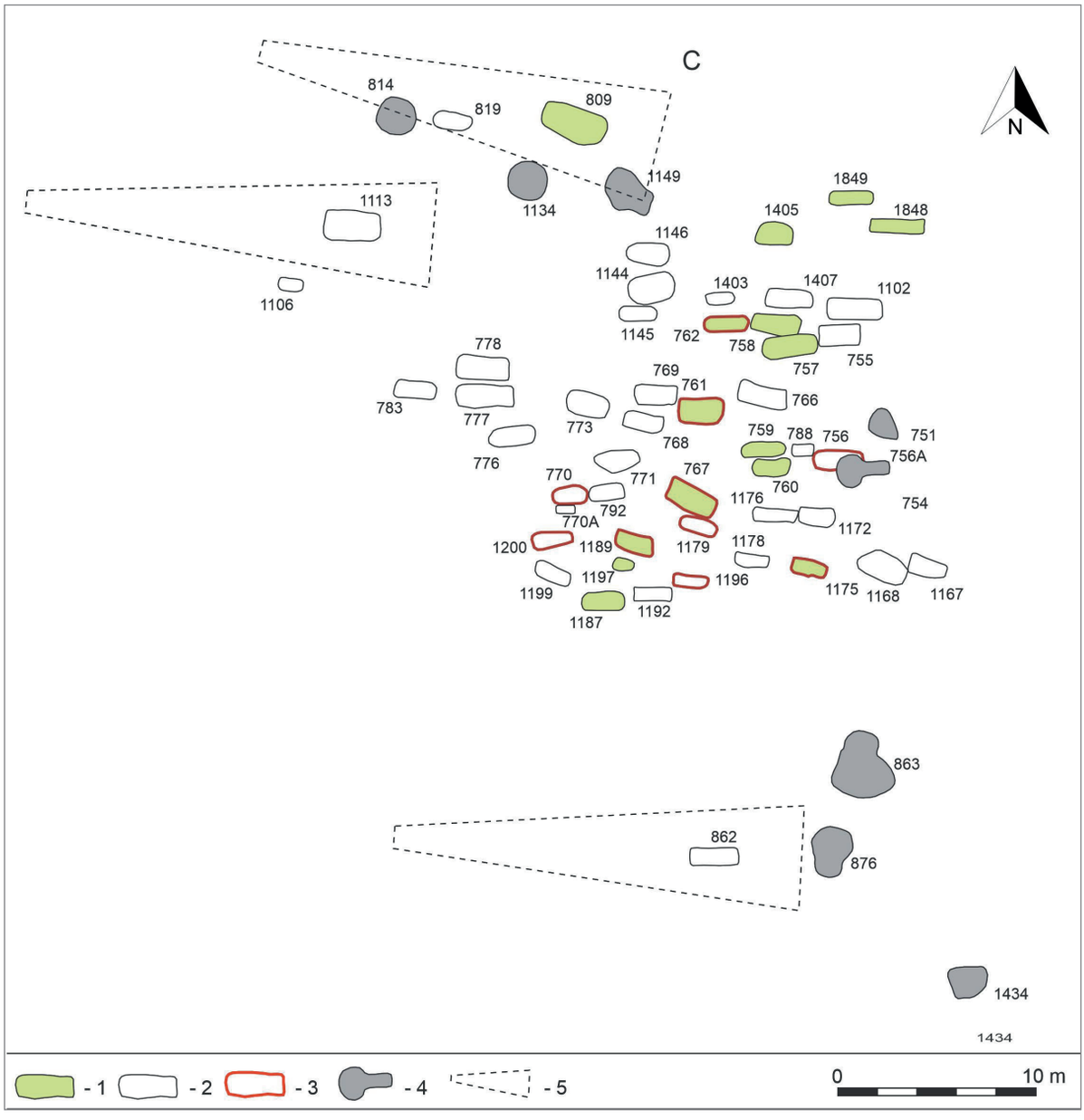

Fig. 12. Święte, site 11. Plan of the FBC cemetery with CWC graves.
1 – FBC graves with inventory; 2 – FBC graves without inventory; 3 – FBC graves with human remains; 4 – CWC graves; 5 – putative FBC long barrows (edited by D. Król).

times. As field studies have shown, these timber constructions were themselves highly diverse (Rzepecki 2011; Król 2011; 2021; Jarosz *et al.* 2020). The cemetery at Słonowice, site 5, provides an excellent example: alongside "classic" timber long barrows, some over 100 m long and attested by clear foundation ditches with postholes, researchers also uncovered less conspicuous, "reduced" forms (Przybyła and Tunia 2013). The most extreme examples of such reduction are long barrows nos. 9 and 10, where only rectangular features marking the line of their front sections survived (Przybyła and Tunia 2013). Similar "simplified" monuments have also been documented at Malżyce, sites 30 and 31 (Jarosz *et al.* 2013a; 2013b), Ostrów (Jarosz *et al.* 2020), Czaple Wielkie, site 14, and Giebułtów, site 15 (unpublished research by M. M. Przybyła). According to some scholars, such constructions (referred to as the Malżyce type) may represent a younger horizon of monuments within the southeastern FBC (Jarosz *et al.* 2020, 329).

How might these observations apply to the Święte, site 11 cemetery? In contrast to the reduced long barrows at Słonowice, site 5 (Przybyła and Tunia 2013), or the enigmatic structures at the nearby site of Szczytna, site 6 (Król and Sznajdrowska-Pondel 2022), no features have been identified at Święte that would even hint at the presence of frontal wall of long barrows (Fig. 2). Still, could indirect evidence suggest their former existence?

Numerous examples demonstrate that CWC graves were frequently established in the areas of earlier FBC long barrows (Włodarczak 2006, 48–50). Such practices are attested at several multicultural sites in the Kraków-Sandomierz loess region, including Malice Kościelne, site 1 (Bargieł and Florek 2006a), and Zagaje Stradowski, site "Mogiła Stradowska" (Burchard 1998; 2006). Comparable sequences have also been recorded in the Subcarpathian Loess Region, at Szczytna, site 6, and Skołoszów, site 7 (Król *et al.* 2012; 2014a; 2014b; cf. Olszewski and Włodarczak 2018; Król and Sznajdrowska-Pondel 2022). By analogy, this raises the possibility that FBC long barrows once existed at Święte, site 11 as well (cf. Olszewski and Włodarczak 2018; Król and Sznajdrowska-Pondel 2022).

Within the FBC cemetery at Święte, site 11, several CWC graves were documented, most of them situated on the northern and southern margins (Fig. 2). With the exception of two burial features (nos. 751 and 751A), their distribution corresponds spatially with the isolated FBC graves. This encourages the cautious suggestion that hypothetical "hidden" monuments may have existed precisely in association with those burials lying apart from the compact central cluster (Fig. 12). Grave no. 862 provides a telling example: situated on the eastern margin of the cemetery, with three CWC burial features immediately to its east, it may once have lain beneath a long barrow (Fig. 12) that subsequently became a landmark for CWC activity (cf. Król and Sznajdrowska-Pondel 2022). A similarly tentative interpretation might be applied to FBC graves nos. 809 and 1113, which could represent central burials of larger monumental structures (Fig. 12). By contrast, the location of long barrows over the dense concentration of central FBC graves appears less likely.

To sum up, the absence of direct evidence for FBC long barrows at Święte, site 11 should not be regarded as proof of their original absence. On the contrary, the spatial pattern of the graves, their relationship with CWC burial features, and parallels from other FBC cemeteries in the region suggest that monumental constructions may originally have been present within this burial ground, although their material traces have not survived (Fig. 2). It also seems that CWC communities were aware of the older funerary landscape and deliberately referenced it, thereby perpetuating its symbolic significance.

6. Conclusion

Święte, site 11 is among the largest FBC cemeteries in the eastern and southeastern zones of the FBC. A total of 49 graves were recorded, most of them oriented along an east-west axis (Fig. 2). The burial pits were generally homogeneous in form and fill. Human remains were poorly preserved – only in some features was it possible to identify material (mainly teeth) suitable for anthropological assessment. Grave inventories were modest, usually limited to a single ceramic vessel (a collared flask) or a flint artefact; only in a few cases were richer assemblages recorded (Fig. 4: 3–4; 6: 3–4; 9: 3–4). Spatial analyses using KDE and DT revealed the presence of a central concentration of graves, divided into three compact clusters and a transitional zone, complemented by looser peripheral burials (Fig. 12). The avoidance of overlapping grave cuts seems to indicate a strong awareness of the locations of earlier burials and an orderly use of the cemetery.

Despite the lack of direct traces of long-barrow constructions, the spatial arrangement of graves and analogies to nearby cemeteries – such as Skołoszów, site 7, and Szczytna, site 6 – suggest that such struc-

tures may once have existed at Święte, site 11 (perhaps in a reduced, Malżyce-type form) but have not survived to the present (Fig. 12). The spatial relationships between CWC graves and FBC burial features further strengthen the hypothesis of the long-term symbolic significance of this place and of a conscious reference by later communities to the earlier funerary landscape.

The cemetery at Święte, site 11 should therefore not be regarded simply as a flat burial ground, but rather as a complex sepulchral space in which the material traces of monumental elements may have been completely erased. The analysis of this site is thus not only important for understanding the funerary rituals of FBC communities in the Subcarpathian Loess Region, but also has broader significance for studies of the formation and transformation of Eneolithic funerary landscapes in this part of Europe during the 4th and 3rd millennia BC.

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A Complex of Prehistoric Fortifications in the Moldavian Subcarpathians (Eastern Romania). Contributions to the Understanding of the Middle Bronze Age

Abstract

Diaconu V., Gerea A., Tătaru D., Năstase E., Cerbu B., Sava G., Gâză O., Ilie M. 2025. A Complex of Prehistoric Fortifications in the Moldavian Subcarpathians (Eastern Romania). Contributions to the Understanding of the Middle Bronze Age. *Analecta Archaeologica Ressoviensia* 20, 99–113

This paper discusses three recently discovered fortified sites located in the Subcarpathian area of eastern Romania, investigated through LiDAR scanning and intrusive archaeological research. Chronologically, the fortifications analysed in this study date to the Middle Bronze Age and are attributed to the Costișa culture. The sites are situated in close proximity to one another and may have formed part of a wider defensive system marking the territorial limits of this cultural environment. At the same time, they appear to have held strategic local importance by controlling access routes to areas rich in salt resources. Excavations conducted at one of the sites provided absolute chronological data ranging between 2143–1531 cal BC, correlating well with previously obtained radiocarbon dates for the Costișa culture.

Keywords: fortifications, defensive system, Middle Bronze Age, eastern Romania, LiDAR, radiocarbon dating

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Introduction

Over the past decade, systematic field surveys have led to the discovery of several prehistoric fortifications within the Subcarpathian area of eastern Romania. Most were initially identified on the basis of well-known toponyms, such as *Cetate* (Eng. fortress) or *Cetățuie* (Eng. small fortress), traditionally indicating the presence of ancient defensive structures (Matasă 1968; Ursulescu 2018; 2019; Diaconu 2019a). Because the majority of these sites are located in densely forested areas, their documentation required a complex, multidisciplinary approach, aimed both at accurately recording topographic features and atestablishing their chronological framework.

Geographically, the area belongs to the submontane zone along the eastern flank of the Carpathians, characterized by a succession of depressions, including the Tazlău-Cașin, Cracău-Bistrița, and Neamț depressions (Tufescu 1966).

The need for precise representation of these fortified sites led to their inclusion in the broader research initiative *For Tum – Geophysical Investigations in Archaeological Sites with Social Significance from Neamț County*, with the main objective of documenting prehistoric fortifications through LiDAR scanning. Complementary intrusive investigations aimed to obtain data regarding the cultural and chronological attribution of these sites.

This article focuses on a cluster of three fortified sites concentrated within a small geographic area in north-eastern Neamț County (Fig. 1: 1), located within the administrative boundaries of the communes of Păstrăveni and Țibucani. These fortifications were selected for detailed analysis because they share the same chronological horizon, lie in close proximity to one another, occupy distinct topographic settings, and exhibit different types of defensive systems.

Chronologically, the sites belong to the Middle Bronze Age. During this period, the Subcarpathian region was inhabited by communities associated with three cultural environments: the Costișa culture (in the central Subcarpathian zone), the Komarów culture (on the Suceava Plateau), and the Monteoru culture (in the southern Subcarpathians) (Fig. 1: 2). Archaeological contexts and radiocarbon data indicate partial synchronisms between these three cultural manifestations (see Munteanu 2010; Bolohan *et al.* 2015).

Material and method

Field surveys conducted between 2021 and 2023 identified three sites with traces of defensive structures near Rădeni village (Păstrăveni commune). Two were in forested areas, and one was located on a gentle hillslope (Diaconu *et al.* 2024; 2025) (Fig. 2: 1).

Airborne LiDAR (Light Detection and Ranging) has transformed archaeological prospection, especially in areas where dense vegetation limits traditional survey. In tropical environments, LiDAR has been used to map extensive urban and hydraulic landscapes at sites such as Caracol in the Maya lowlands and Angkor in Cambodia, revealing settlement layouts and infrastructure that were previously invisible beneath the forest canopy (Chase *et al.* 2011; Evans *et al.* 2013). In temperate forested regions of Europe, digital terrain models resulted from LiDAR data are now routinely used to detect low earthworks and fortification systems. Full-waveform airborne laser scanning in Austrian woodland, for example, has revealed complex assemblages of prehistoric and historic earthworks, hollow-ways and cultivation features beneath dense forest (Doneus *et al.* 2008; Doneus and Briese 2011). Under mixed deciduous woodland in Britain, LiDAR has demonstrated its potential to detect barrows, banks and ditches obscured by tree cover (Devereux *et al.* 2005; 2008). Large-scale LiDAR programmes have also been used to systematically map hillfort landscapes in Italy and across Europe, substantially expanding the known inventories of fortified sites (Fontana 2022; Landauer *et al.* 2025). Comparable work in the Slovenian Kras Plateau has documented Late Bronze and Iron Age hillforts and associated agropastoral features within an overgrown Mediterranean karst landscape (Lozić and Štular 2024). Together, these examples underline the particular suitability of LiDAR for identifying and characterising fortifications and other earthworks in densely vegetated terrain, such as the forested ridges of the Moldavian Subcarpathians.

LiDAR scanning was carried out to accurately document the topographic features of the three sites (Fig. 2: 2) by a team from the National Institute for Earth Physics. Each site was analysed individually using a Yellow Scan Mapper + LiDAR sensor, operating at a wavelength of 905 nm, with a precision of 25 mm and an accuracy of 30 mm. The scanner had a 70.4° horizontal and 4.5° vertical field of view, a pulse emission rate of 240,000 pulses per second, and up to three returns per pulse. The sensor was equipped with a Sony camera for imagery to facilitate point-cloud colourisation. The LiDAR unit was mounted on a DJI Matrice 300 RTK drone, with a DJI D-RTK2 GNSS base station providing real-time positional corrections.

Data processing was performed with POS Pac and Yellow Scan Cloud Station. In a first step, flight

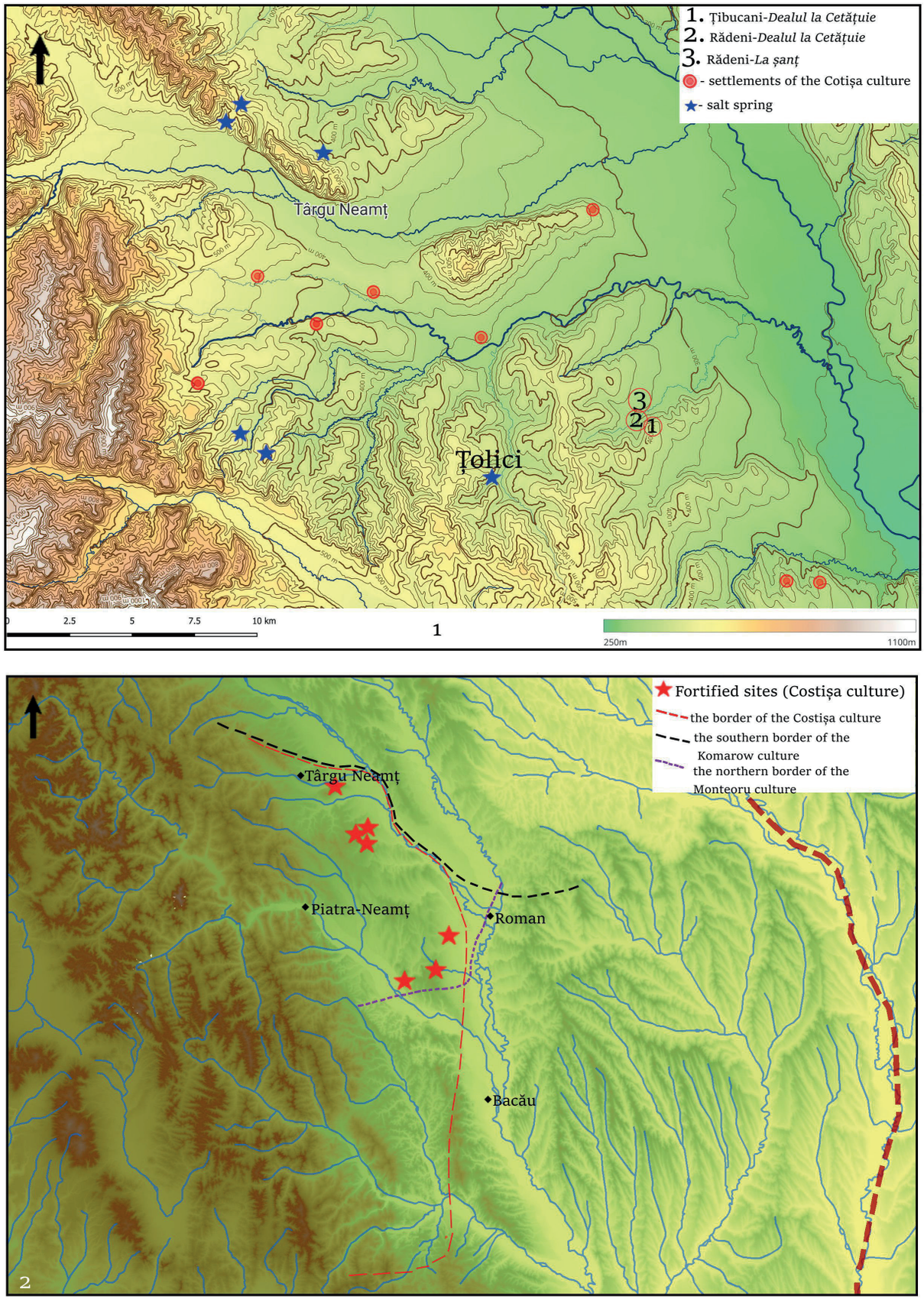

Fig. 1. Geographical and cultural context.
1 – Neamț Depression and the distribution of sites attributed to the Costișa culture; 2 – cultural manifestations of the Middle Bronze Age in the Subcarpathian region of Moldova (edited by V. Diaconu).

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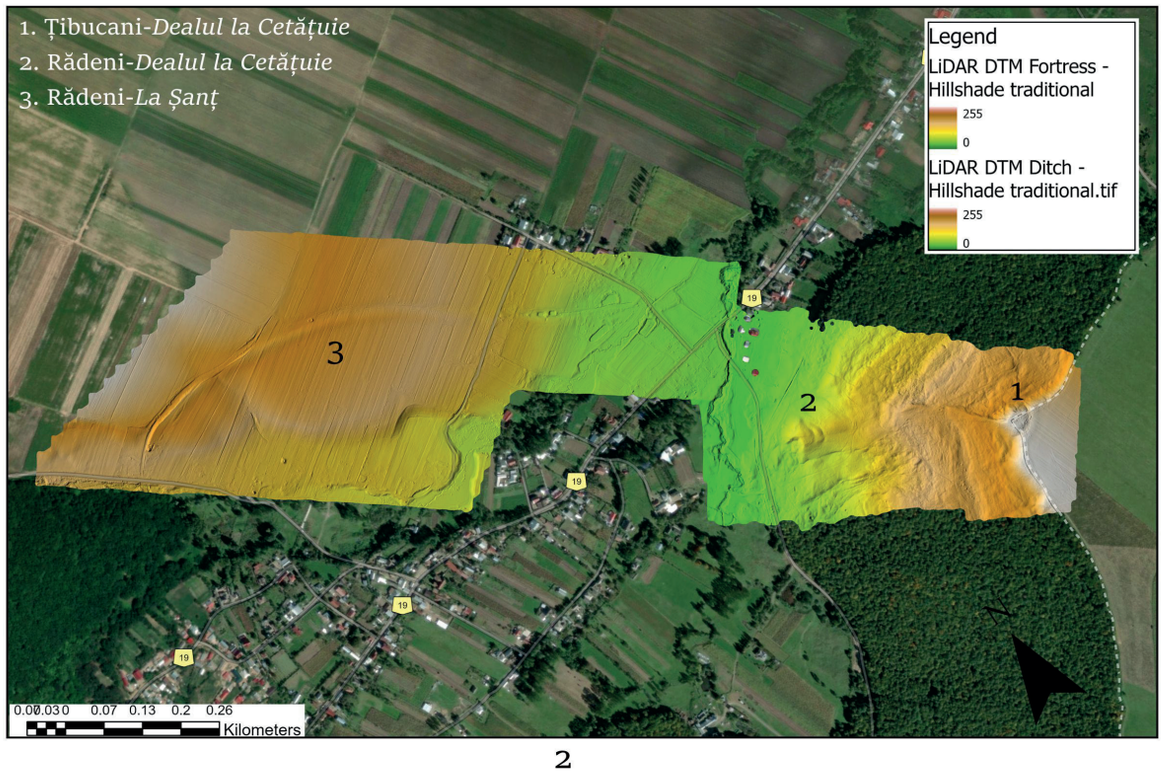

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Fig. 2. Fortified sites in the Țibucani-Rădeni microzone.
1 – location of the fortifications at Țibucani-*Dealul la Cetățuie* and Rădeni-*Dealul la Cetățuie*;
2 – distribution of fortified sites (photo by INFP).

trajectories were adjusted to ensure correct spatial positioning. Wethen generated the point cloud and applied a simple two-classification (ground / non-ground). These data were interpolated to produce Digital Surface Models (DSM) and Digital Terrain Models (DTM). The DSM reflects the elevation of all surface objects (vegetation, buildings, terrain), while the DTM approximatesbare-earthelevationsafterremovingabove-groundobjects. DTMs and DSMs were interpolated on regular grids with cell sizes between 0.20 × 0.20 m and 0.30 × 0.30 m (0.30 m at Rădeni Cetățuia, 0.20 m at the remaining sites), chosen to match the nominal point spacing of the LiDAR data. The LiDAR survey produced dense point clouds, with an average total point density of approximately 920 points/m². At the 0.20–0.30 m raster resolution used for the DSM/DTM, this corresponds to several dozen returns per grid cell, even in forested areas. Finally, the raster outputs (.tif) were colour-ramped by elevation and slope to emphasise the relief of the features of interest (e.g., ditches, banks, subtle micro-topography). Visualisation and additional manipulation were carried out in ArcGIS Pro. Intrusive excavations at one fortification aimed to determine its cultural and chronological attribution and to collect samples for absolute dating.

The interpretation of the LiDAR data was carried out on the DTM, using a combination of visualisations (multi-directional hillshade, slope, local relief) in ArcGIS Pro. The entire area covered by the LiDAR acquisition was systematically inspected at multiple scales (1:50–1:1500) in order to identify linear and curvilinear breaks of slope compatible with ditches, banks and scarps. Potential anthropogenic features were identified on the DTM's and cross-checked using topographic profiles extracted perpendicular and parallel to the presumed earthworks. Particular attention was paid to distinguishing continuous, morphologically coherent features from natural erosional forms and forestry tracks.

Results

Below, we present the most important details regarding the three sites with defensive systems, in order to later discuss the possible meanings and functions of these fortifications.

1. Țibucani-*Dealul la Cetățuie*. Located in northern Țibucani commune near Rădeni, this small fortification (395 m altitude) is partially forested and overlooks the Moldova River valley. LiDAR scanning indicates an enclosed area of approximately 700 m², demarcated by a shallow curving ditch connecting the steep western and northern slopes (8–10 m wide, 1.5 m deep) (Fig. 3).

Three small trenches, inside and outside the ditch, provided stratigraphic data. Trench 1 (8 × 1 m) sectioned part of the ditch's talus and the enclosure it delimits. At −0.15 m below the surface, a burnt horizon with charcoal flecks was exposed, 0.10–0.15 m thick. Beneath it lay a compact brown layer (~0.30 m thick) with sporadic charcoal, followed from −0.60 m by a clayey, archaeologically sterile level (Fig. 4: 1–3). Finds from this trench were scarce: a few small, atypical ceramic fragments, a sandstone core, and several flint flakes.

In the 2 × 2 m trenches opened outside the ditch, stratigraphy was simple: at −0.15 m a brownish-grey clay level (~10 cm thick) contained corroded ceramics and sporadic faunal remains; this was overlain by a very compact brown clay layer (~20 cm), above archaeologically sterile subsoil (Fig. 4: 4).

Ceramics typical of the Middle Bronze Age Costișa culture include open, truncated-conical vessels, amphorae, and small amphorae, decorated with alveolar bands, hatch-marked triangles, or irregular striations (known as "Besenstrich") (Fig. 5).

Based on bone samples taken from ceramic agglomerations identified in external test trenches, two absolute dates were obtained: (RoAMS-2766.89) 3673±35 BP calibrated to 2143–1949 calBC (2σ) and (RoAMS-3369.89) 3356 ±41 BP calibrated to 1743–1531 calBC (2σ) (Fig. 6).

2. Rădeni-*Dealul la Cetățuie*. About 300 m northwest of the previous site, a small fortification on a wooded promontory (340 m a.s.l.) is enclosed by two slightly curved ditches set 8 m apart, defining an area of ~800 m² (Fig. 7). The ditches are up to 10 m wide and 1.5 m deep. According to LiDAR data, the south-western part of the enclosure has been affected by a substantial landslide. Dense vegetation prevented conclusive excavation, though scattered sherds suggest a Middle Bronze Age date.

3. Rădeni-*La Șanț*. On the western side of the village, on the left bank of the Rădeni stream and near the forest edge, were recorded a large anthropic defensive structure consisting of a ditch and rampart, ~800 m in length, enclosing ~18 ha (altitude 340 m). The ditch and rampart follow a slightly curved course that begins and ends on the banks of the Rădeni stream. The ditch is ~10–12 m wide at the top and 1–1.5 m deep (Fig. 8; 9: 1); the rampart is 8–10 m wide and up to 1 m high but has been flattened by intensive agricultural activity. At its eastern extremity, the defensive

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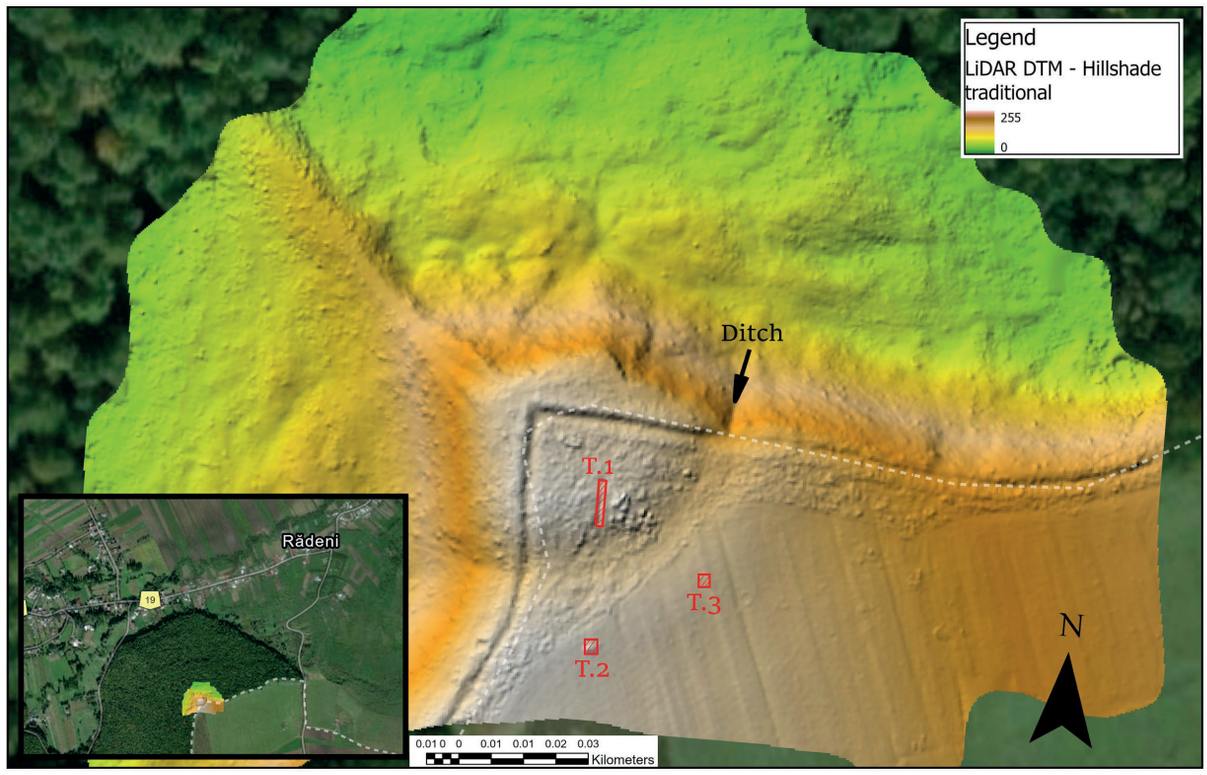

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Fig. 3. The fortification at Țibucani-*Dealul la Cetățuie*.
1 – view of the defensive system (photo by V. Diaconu); 2 – LiDAR scan and location of the researched areas (edited by INFP).

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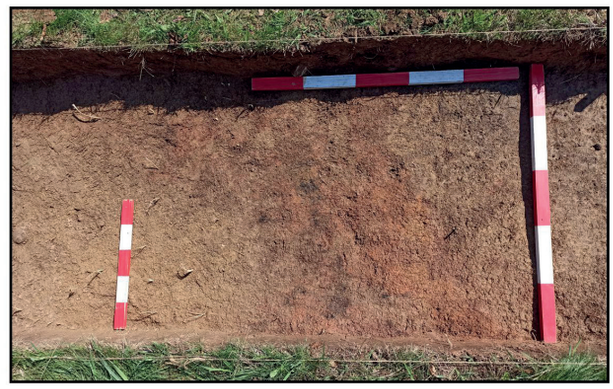

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Fig. 4. Aspects of the excavations at Țibucani-*Dealul la Cetățuie* (photo by V. Diaconu).

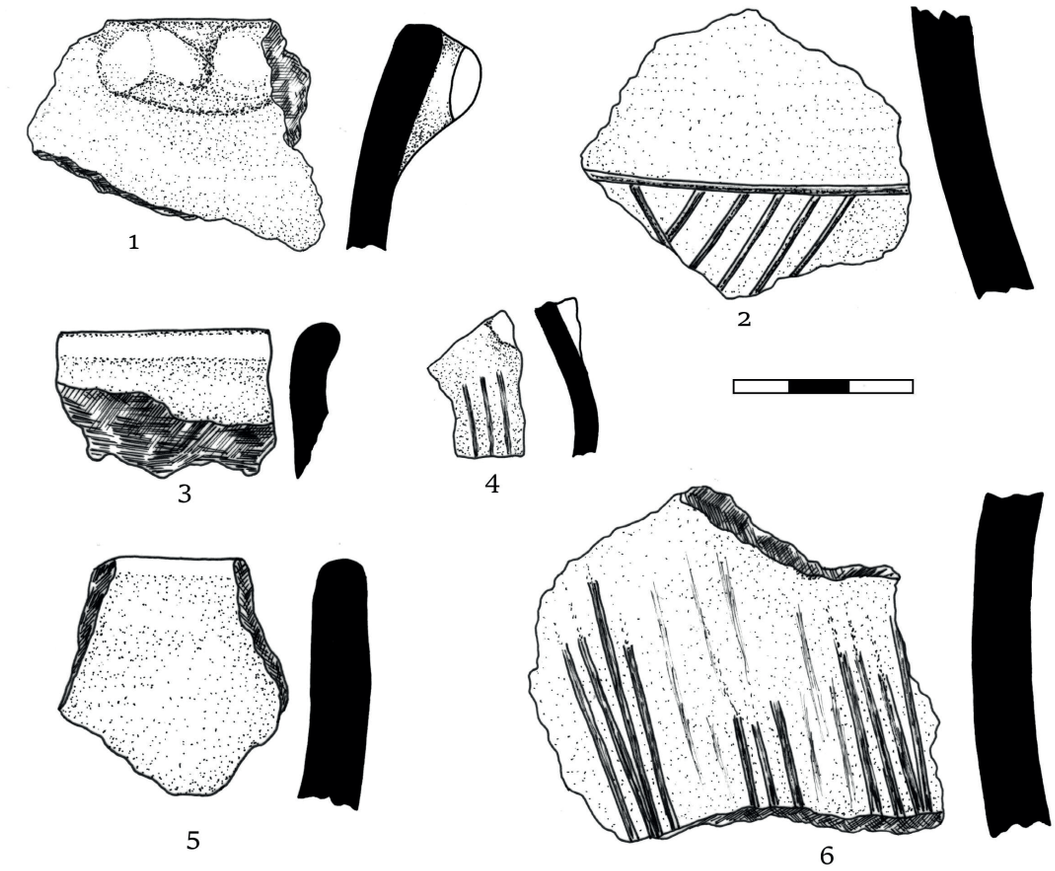


Fig. 5. Pottery from Țibucani-*Dealul la Cetățuie* (drawn by V. Diaconu).

line is overlain and disturbed by recent buildings. Occupation traces in the south-eastern part of the enclosure are attributed to the Costișa culture (20th–17th c. BC), including large bowls and amphorae decorated with hatch-marked triangles and irregular striations (Fig. 9: 2–6).

Discussion

Within the territories of Țibucani and Rădeni, where the three sites were identified, several Bronze Age archaeological discoveries are already known (Petrescu-Dîmbovița 1953, 465; Cucoș 1977, 34; 1985, 492; 1992, 56; Vulpe and Zamoșteanu 1982; Dumitroaia 1985, 468; 1992, 137–138; Munteanu 2012; Diaconu 2014, 421–422; 2019b; 2021), yet to date no extensive investigations have been undertaken in this area.

The presence of these three fortifications within a limited territory, all belonging to the same chronological horizon, warrants detailed discussion, both regarding their relationship with contemporary remains in the region and their potential role within a broader network of fortifications known from the Subcarpathian area.

The sites are situated along the upper course of the Rădeanca stream, a tributary of the Topolița River. Topographically, only one of the fortifications provided substantial potential for controlling a wide geographic area. We should mention here that the site at Țibucani-*Dealul la Cetățuie* has a relative altitude of approximately 80 m and occupies a high plateau, while the other two fortifications have relative altitudes of up to 20 m and are located in low-lying areas with limited visibility over the surrounding geographical area.

Despite their small footprint, intrusive investigations at the fortified site of Țibucani-*Dealul la Cetățuie* revealed that occupation within the enclosure was brief, with the Bronze Age community or communities primarily utilising the open areas of the settlement. Under these circumstances, it can be inferred that such a fortification had a preventive or deterrent function, constructed not in response to an immediate threat but rather to guard against a potential attack from neighbouring communities.

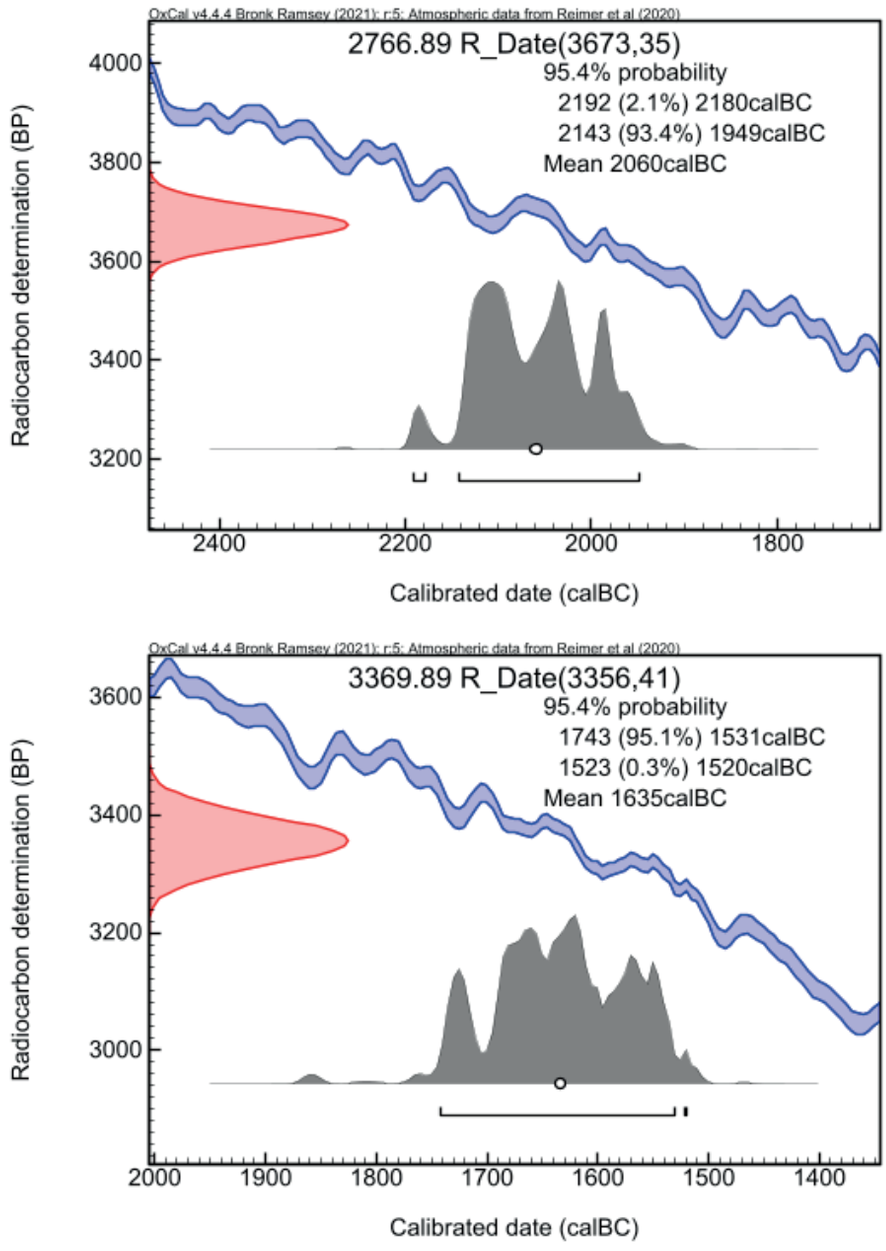


Fig. 6. Absolute data from the site Țibucani-*Dealul la Cetățuie*.

Building upon this interpretation, it may be suggested that the nearby site of Rădeni-*Dealul la Cetățuie*, where no substantial traces of occupation were found, functioned as an outpost for a Bronze Age community.

Regarding the fortification at Rădeni-*La Șanț*, the size of the enclosure and the complexity of its defensive system indicate that it was likely designed to provide refuge for a large community.

The presence of this complex of fortifications raises questions concerning the rationale behind their construction in this location. Considering that the nearest Middle Bronze Age settlements were located 8–10 km away, one must ask: what exactly were these fortifications protecting? Any answer must take into account the settlement dynamics of the Middle Bronze Age in the Subcarpathian region, particularly the communities associated with the Costișa culture.

Over the seven decades of research on the Costișa culture, numerous sites have been identified in the peripheral Subcarpathian zone, including both fortified sites and open settlements. Most are situated in marginal depressions east of the Carpathians (Cracău-Bistrița Depression and Neamț Depression) (Cavruc and Dumitroaia 2001, 14–15; Munteanu 2010, fig. 2).

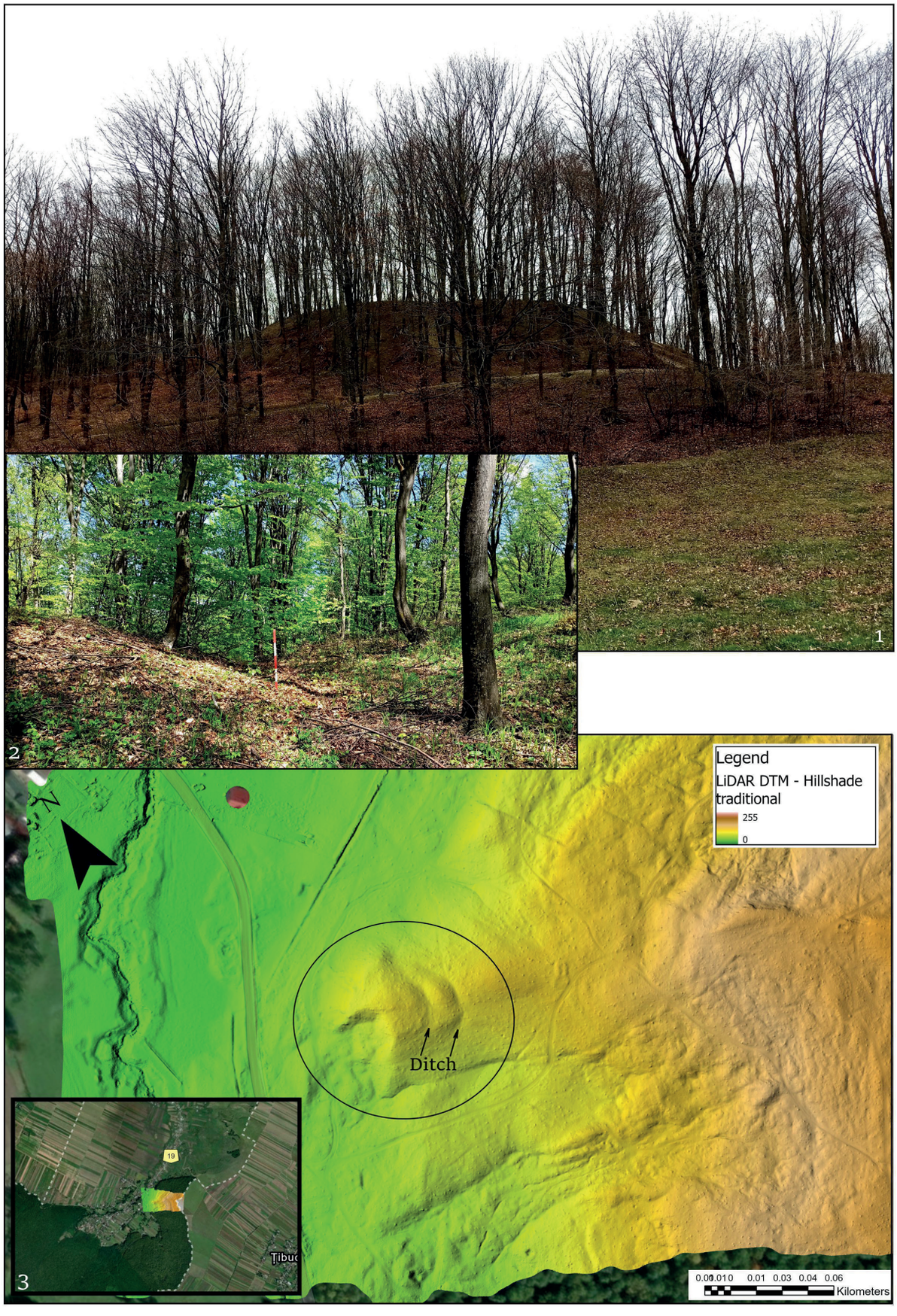
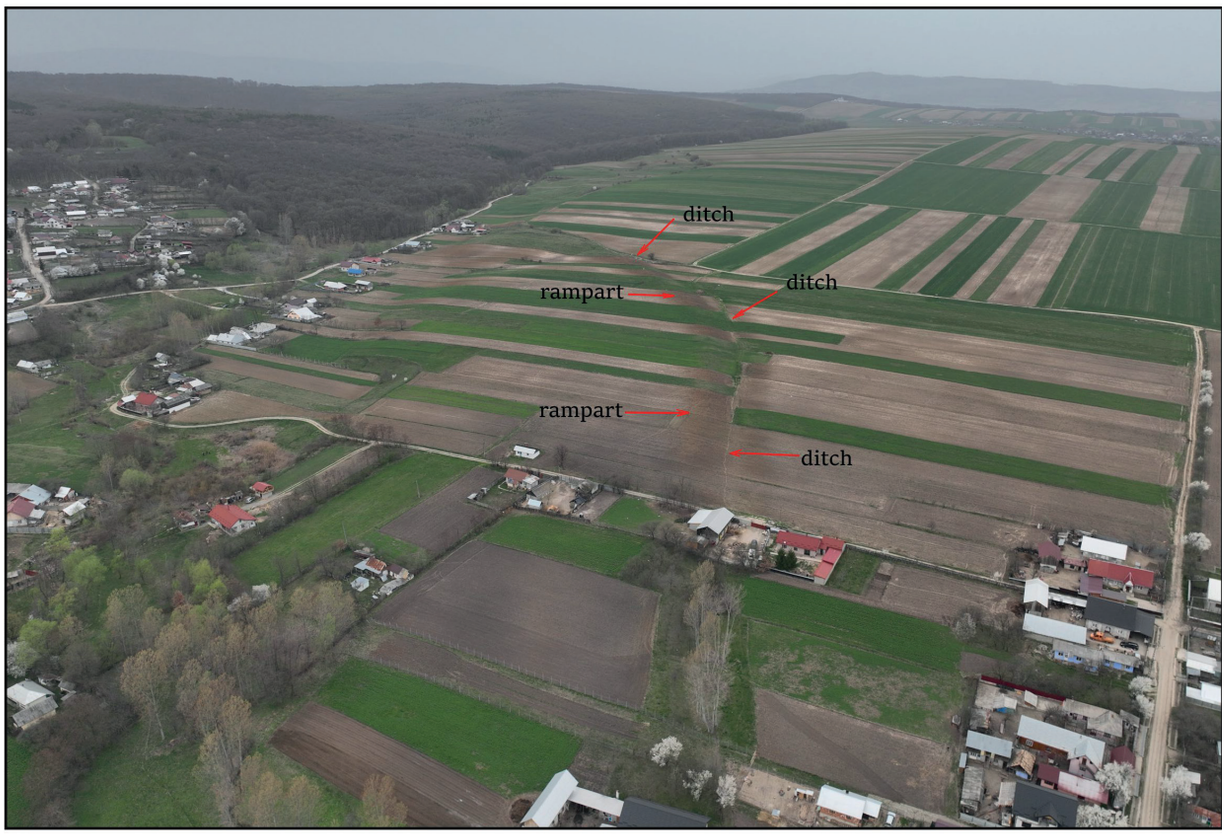


Fig. 7. The fortification at Rădeni-*Dealul la Cetățuie.*
1, 2 – images of the fortification and defensive system (photo by V. Diaconu); 3 – LiDAR scan of the site (edited by INFP).



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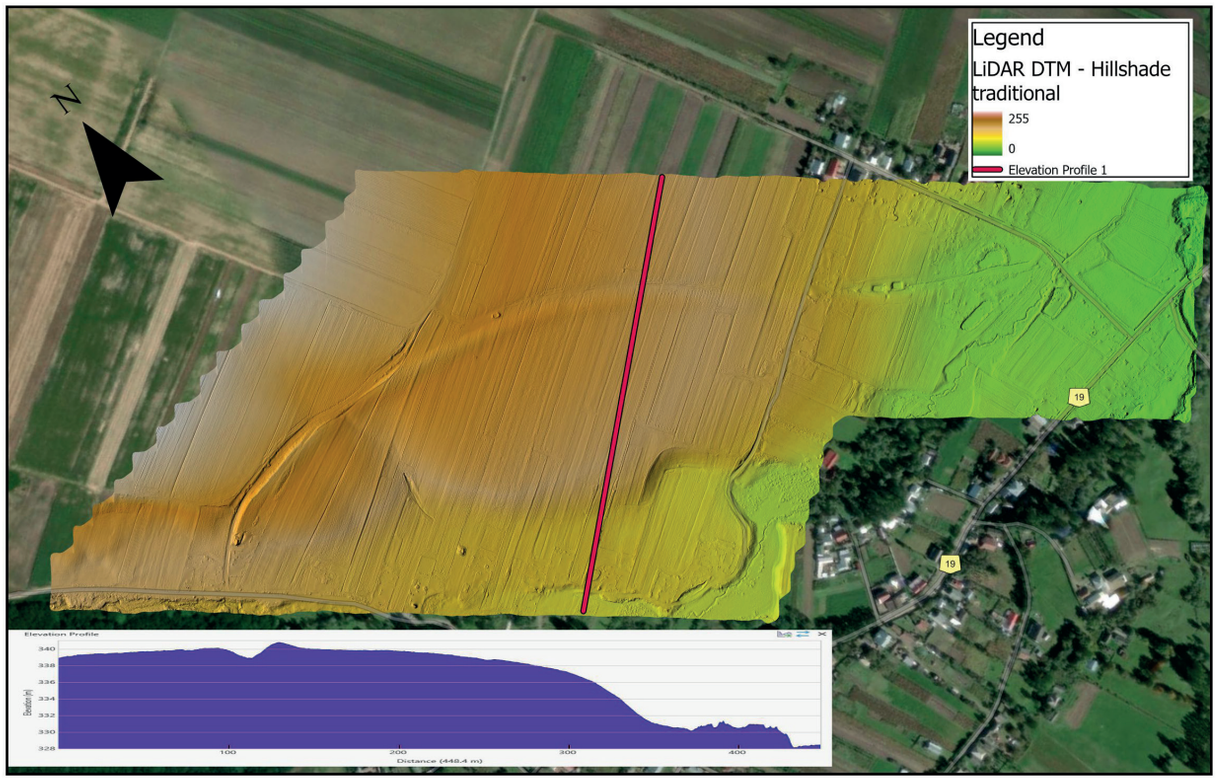

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Fig. 8. The site at Rădeni-*La Șanț*.
1 – aerial view of the site; 2 – LiDAR scan of the site (edited by INFP).

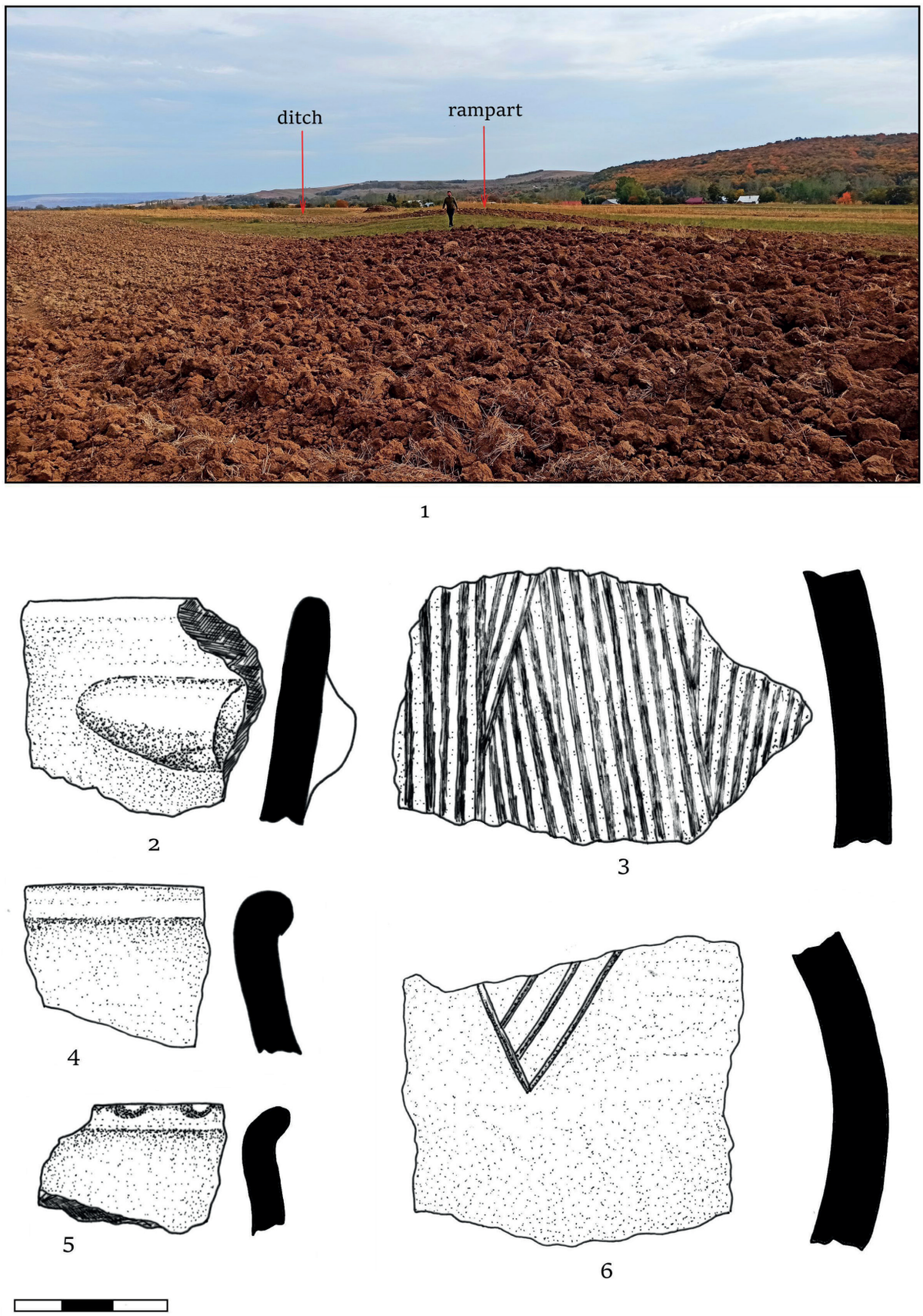

Fig. 9. The site at Rădeni-*La Șanț*.
1 – view of the defensive system (photo by V. Diaconu); 2–6 – pottery (drawn by V. Diaconu).

The situation differs markedly in the contact area between the Subcarpathians and the plateau, where open settlements are extremely rare. In contrast, several fortifications in this area appear to have marked the eastern boundary of the territory occupied by the Costișa culture (Fig. 1: 2), including Siliștea-*Pe Cetățuie* (Bolohan 2005), Văleni-*Dealul Cetății* (Gafincu and Diaconu 2021) Petricani-*Dealul Cetățuia* (Diaconu *et al.* 2021), in addition to the three defended sites at Țibucani and Rădeni. In this context, it can be inferred that these fortifications functioned primarily as control and defence points for Costișa communities inhabiting the Subcarpathian zone (Fig. 1: 2).

Furthermore, the group of fortifications at Țibucani and Rădeni, strategically located along a secondary watercourse at the interface between the depression and the Moldova river corridor within a narrow valley, may indicate control over a route leading to significant salt sources, located only 7 km to the west in the territory of Țolicivillage (Fig. 1: 1).

A separate discussion is warranted concerning the two absolute dates obtained from the Țibucani-*Dealul la Cetățuie* site. Previously, only a few absolute dates were available for the Costișa culture east of the Carpathians, deriving from the eponymous site (Popescu 2013) and the fortification at Siliștea-*Pe Cetățuie* (Bolohan 2010). These broadly fall between 1977–1619 cal BC (2σ) (Diaconu 2016, 96–97), whereas the Țibucani dates range from 2143–1531 cal BC (2σ). One sample from Țibucani-*Dealul la Cetățuie* appears to represent the earliest known date for the Costișa area east of the Carpathians (2143–1949 cal BC, mean 2046), almost a century earlier than the earliest dates from the eponymous site (1977–1879 cal BC) and Siliștea-*Pe Cetățuie* (1956–1862 cal BC).

Notably, this earliest date partially overlaps with the Ciomortan settlement at Păuleni-*Dâmbul Cetății*, considered a regional variant of the Costișa culture in south-eastern Transylvania (Kavruk *et al.* 2022, 106–107, fig. 2).

The second Țibucani date (1743–1531 cal BC, mean 1637) closely aligns with the latest dates from Costișa and Siliștea sites. It is also partially contemporaneous with absolute dates from the Komarów cultural sphere, recorded at Lunca-*Poiana Slatinei* (Weller and Dumitroaia 2005, fig. 5) and Adâncata-*Imaș* (Niculică 2015, 259).

Finally, the two Țibucani dates suggest that the fortification was inhabited over a period of nearly four centuries. Nevertheless, the limited intensity of archaeological remains indicates low-intensity, periodic occupation.

Conclusions

The *For Tum* project successfully produced LiDAR data for forested fortified sites, providing detailed topographic models that clarify the complexity of defensive systems and the social effort required to construct them.

The identification of three Middle Bronze Age fortifications in the Țibucani – Rădeni micro-region significantly enhances understanding of local defensive strategies. Beyond their potential role in a regional defensive network, these sites also functioned as control points for key access routes to natural resources, particularly salt.

The absolute dates obtained for Țibucani complement the limited chronological dataset for the Costișa culture, refining the temporal framework of Middle Bronze Age communities in the Subcarpathian region of Moldavia.

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On Two Newly Discovered "Scythian" Arrowheads from the Sandomierz Upland

Abstract

Rajpold W. 2025. On Two Newly Discovered "Scythian" Arrowheads from the Sandomierz Upland. *Analecta Archaeologica Ressoviensia* 20, 115–125

During the Late Bronze Age and Early Iron Age, the Sandomierz Upland was inhabited by communities of the so-called Tarnobrzeg Lusatian culture, which incorporated a range of cultural traits inspired by the Scythians which can be discerned in their ornaments, ceramics, and weaponry. Until recently, evidence of these eastern influences had been scarce and largely incidental. The recent discovery of two arrowheads – from Zawichost and Wyszmontów – clearly associated with the Scythian cultural sphere, significantly expands the available evidence for such contacts in the region. This paper offers a formal and typological analysis of these artefacts and considers the possible routes by which they may have reached the Sandomierz Upland.

Keywords: Bronze Age, Early Iron Age, Scythians, weaponry, arrowheads, Sandomierz Upland, eastern influences, Tarnobrzeg Lusatian culture

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Introduction

Artefacts of eastern cultural provenance associated with the Scythian world and dating from the Late Bronze Age and Early Iron Age are well documented in the Lublin region (Kłosińska 2005a; 2007; 2013) and in Subcarpathia (Czopek 2007). The most characteristic finds are weapons: arrowheads (Fig. 1; Czopek *et al*. 2015), an akinakes from Rozbórz, Przeworsk county (Czopek 1995), and iron battle-axes from Żuklin, Przeworsk county (Chochorowski and Gawlik 1997), Werchrata, Lubaczów county (Kłosińska 2001), and an unidentified site in the Lublin region (Sadowski 2012). Military artefacts linked to traces of Scythian incursions via the Moravian Gate have also been recorded in western Poland (Dąbrowski 2009, 126–130; Chochorowski 2014, 32–43).

It appears, however, that in the case of eastern and south-eastern Poland, this military context has a different character than in the west. One argument for this is the discovery in these areas of numerous vessels with "eastern" stylistic features. Examples include bowls with *žemčuzinas*, vases decorated with incised triangles and herringbone motifs, vessels with impressions of spiral disks, and cups with hollow stems (Kłosińska 2005a, 183; cf. Trybała-Zawiślak 2019, 211–212, table 9, further references therein). Also noteworthy are pot-shaped vessels with slanting plastic ribs, and vases with gently biconical belly profiles and outwardly flared rims, reminiscent of materials classified as Scytho-Thracian (cf. Trybała-Zawiślak 2019, 224, 238, further references therein).

These forms appear in both funerary and settlement contexts. In addition to ceramics, ornaments are also represented, including glass beads (Czopek 2011), nail-headed earrings (Gawlik 2007), Kłyżów-type earrings (Kowalski-Bilokrylyy 2014), and pins with spiral or nail-shaped heads (Adamik-Proksa and Ocadryga-Tokarczyk 2021; Czopek *et al*. 2024a, 183–190, with further references).

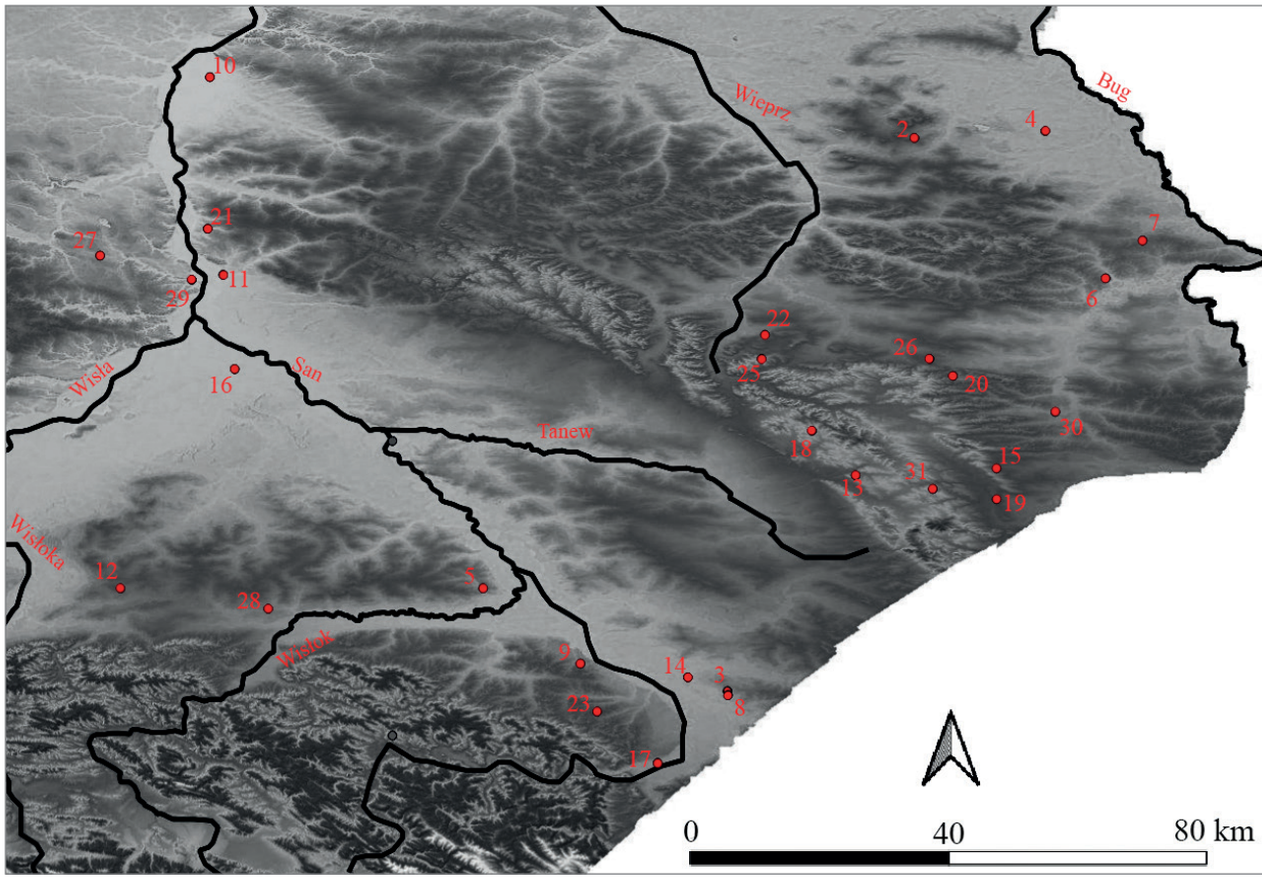

Fig. 1. Locations where "Scythian" arrowheads have been discovered in southeastern Poland (based on Czopek 2015 and Czopek *et al.* 2015, fig. 4, with updates by the author).

1. Bachórz, Rzeszów county; 2. Chełm, Chełm county; 3. Chotyniec, Jarosław county; 4. Dorohusk, Chełm county; 5. Grodzisko Dolne, Leżajsk county; 6. Gródek nad Bugiem, Hrubieszów county; 7. Hrebenne, Hrubieszów county; 8. Hruszowice, Jarosław county; 9. Jarosław, Jarosław county; 10. Kłodnica, Opole Lubelskie county; 11. Kosin, Kraśnik county; 12. Kozodrza, Ropczyce-Sędziszów county; 13. Maziły, Tomaszów Lubelski county; 14. Nienowice, Jarosław county; 15. Nowosiółki Kardynalskie, Tomaszów Lubelski county; 16. Obojnia-Zaosie, Stalowa Wola county; 17. Przemyśl, Przemyśl county; 18. Róża, Tomaszów Lubelski county; 19. Stary Machnów, Tomaszów Lubelski county; 20. Swaryczów, Zamość county; 21. Świeciechów Duży, Kraśnik county; 22. Topornica, Zamość county; 23. Trójczyce, Przemyśl county; 24. Ulanów, Nisko county; 25. Wieprzec, Zamość county; 26. Wolica Śniatycka, Zamość county; 27. Wyszmontów, Opatów county; 28. Zaczernie, Rzeszów county; 29. Zawichost-Trójca, Sandomierz county; 30. Żulice, Tomaszów Lubelski county; 31. Żyłka, Tomaszów Lubelski county (source of map: Geoportal).

The hillfort discovered a few years ago in Chotyniec, Jarosław county, supports this interpretation of the evidence (Czopek *et al.* 2017; Czopek 2020), along with the entire agglomeration of surrounding settlements (Czopek 2019; Czopek *et al.* 2024b), including the settlement in Hruszowice, site 2, Przemyśl county (Adamik-Proksa *et al.* 2022). From this direction, via the San River valley, eastern influences could have spread, with the hillfort acting as a gateway for their diffusion.

However, the Sandomierz Upland shows little evidence of eastern cultural influence. This is somewhat surprising, as the area was inhabited by the so-called Tarnobrzeg Lusatian Culture (further in the text of the TLC) community, which was strongly exposed to influences from the Chotyniec hillfort and readily adopted them.

From the Sandomierz Upland, only a mold for casting nail-headed earrings from Połaniec, Staszów county (Michalski 1982; Chomentowska 1989, pl. I,6,7: 334) is known. Also found here are fragments of bowls with "pearls" from the settlement at Okalina-Wieś, site 2, Opatów county (Niedźwiedź *et al.* 2025). Recently, this list was expanded by two arrowheads from Zawichost, site 17, Sandomierz county, and Wyszmontów, site 106, Opatów county. Both specimens clearly belong to the Scythian cultural sphere. In the following text, we will discuss these latest finds in more detail and consider the possible routes of their arrival in the region.

Materials

The first specimen was discovered on 2 December 2024 by members of the Annopol Commune Residents Association "Szansa" during metal detector surveys near the Holy Trinity Church in Zawichost, Sandomierz county (Fig. 4, 5). The arrowhead (Fig. 2, 3) is cast bronze, trilobate in form (length 2.1 cm; width 0.7 cm at midsection, 0.5 cm at the socket) and weighs just 2.1 g. The socket is short, all three blades are heavily damaged, and the tip is broken. A small hole in the socket likely resulted from a casting flaw. Metallographic analysis is recommended due to its unusual silvery hue, which may indicate an atypical bronze alloy, possibly with high lead content.

The Zawichost-Trójca site occupies a field next to the Holy Trinity Church in Zawichost, near the valley of the small Czyżówka River, which joins the Vistula here. It is situated on the edge of a plateau with considerable exposure. The site lies at the junction of six physiographic units: the Sandomierz Upland, the Iłża Foreland, the Biłgoraj Plain, the Urzędów Hills, the Vistula Lowland, and the Lesser Poland Gorge of the Vistula (Kondracki 2002). This strategic location, combined with the terrain and the latitudinal course of the early section of the Lesser Poland Gorge, favored the existence of a convenient river crossing.

In the early Middle Ages (10th–13th centuries), the crossing was heavily used (Wąsowicz 1967; Hoczyk-Siwkowa 1996). Two major routes intersected here: one from Europe to Rus, and another from the Hungarian Basin, via the Vistula and Carpathian passes, to both the Baltic and the Adriatic (Florek 2022b, 88). In 1205, Prince Roman of Halych crossed here into the Sandomierz Land, where he was defeated by the knights of Lesser Poland (Słupecki 2018). This crossing was also part of the routes taken during the Mongol invasions (Chochorowski 2014, 47–48, fig. 31).

The second arrowhead (Fig. 6, 7) was discovered on 5 April 2025 by twelve-year-old Filip Nawrocki while playing near a stream in the village of Wyszmontów (Fig. 8, 9). It is a well-preserved bronze, bilobate form, asymmetrical (one blade wider), with distinctly defined and slightly flattened edges. A small hole is visible near the socket – likely the result of a casting defect, as is the case with the specimen from Zawichost. The dark green patina suggests long-term

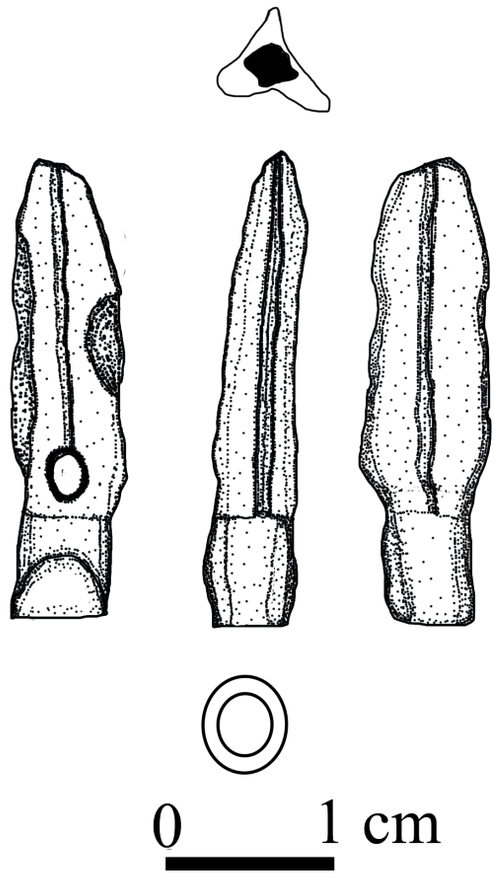

Fig. 2. Photographic representation of the arrowhead discovered in Zawichost-Trójca, site 17, Sandomierz county (photo by W. Rajpold).

Fig. 3. Drawing of the arrowhead discovered in Zawichost-Trójca, site 17, Sandomierz county (drawn by W. Rajpold).

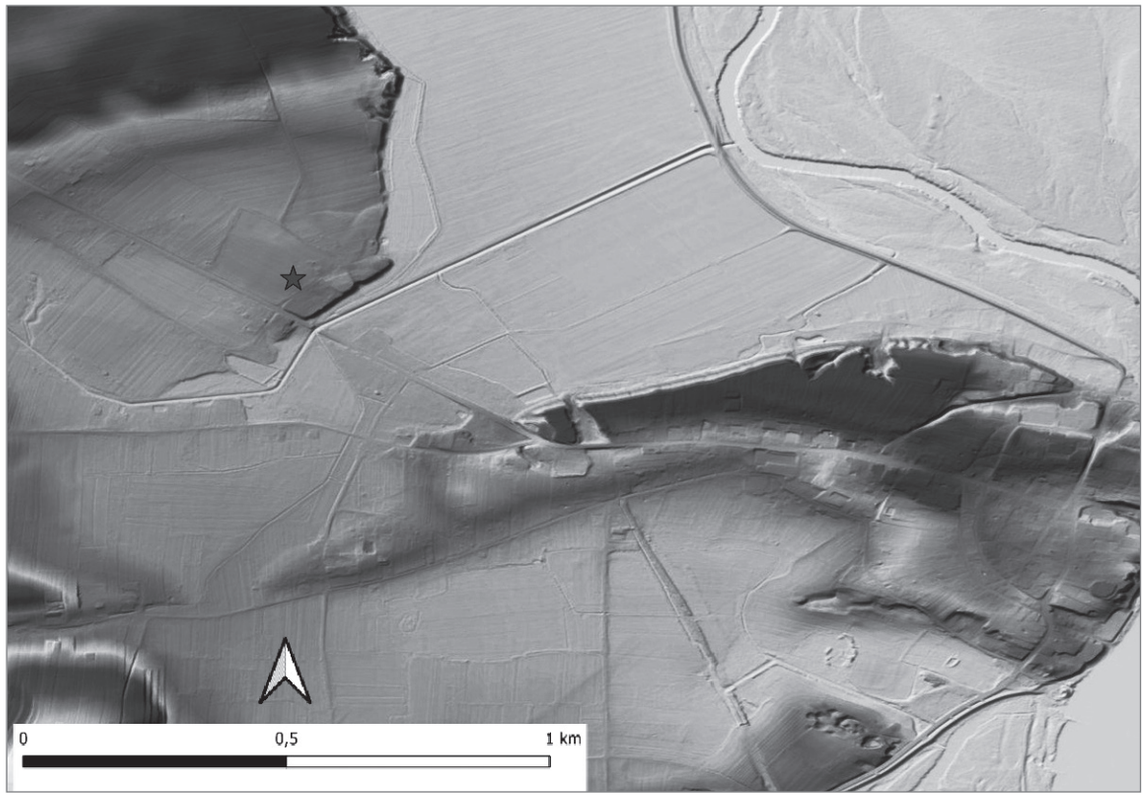

Fig. 4. Location of the arrowhead findspot in Zawichost-Trójca, site 17, Sandomierz county, on a hypsometric map (source of map: Geoportal).

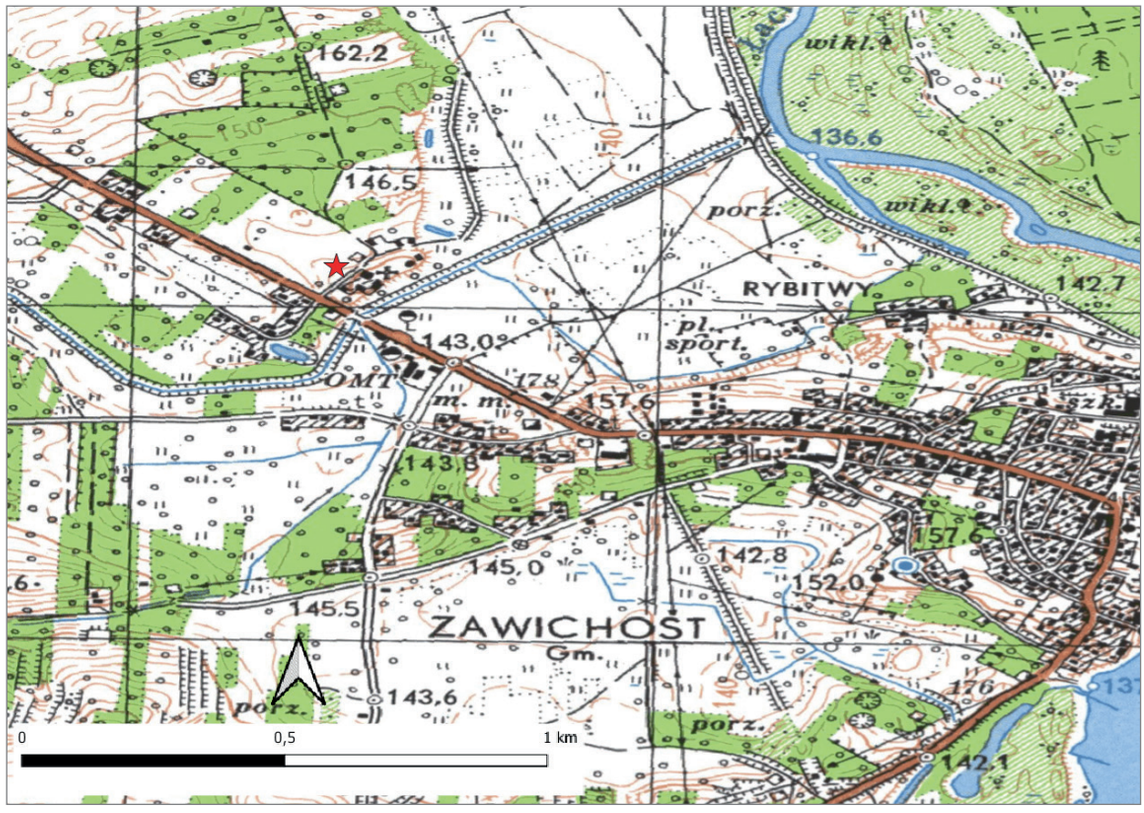

Fig. 5. Location of the arrowhead findspot in Zawichost-Trójca, site 17, Sandomierz county, on a topographic map (source of map: Geoportal).

deposition in a wet environment. Dimensions: height 2.91 cm; max width 1.16 cm; socket diameter 0.6 cm.

The site is located on the border of the Sandomierz Upland and the Iłża Foothills (Kondracki 1988, 358–361). The former has very good soil conditions, dominated by chernozems, while the latter is characterized by poorer-quality soils – mainly podzolic and lessive – developed on chalk substrate. This difference is reflected in potential vegetation data (Matuszkiewicz 2008). The Sandomierz Upland was likely covered by fertile hornbeam forests, indicating high agricultural potential (Kruk and Przywara 1983, 25–26, 35). The Iłża Foothills were probably dominated by pine and pine-oak forests, typical of mineral-poor soils (Kruk and Przywara 1983, 27, 36–37).

The archaeological context is poor, as no other finds were recorded at the site. However, two sites – Wyszmontów 5 and 6 (AZP 85-73/167 and 168) – lie 600–700 m to the east, separated by the same stream. Dispersed TLC materials over several hectares suggest a large settlement or cemetery. The Wyszmontów site 4 (AZP 85-73/166), covering over 5 ha, is located approx. 700 m to the north-east. Settlement traces to the west are scarce. The site forms part of a chain of TLC settlements along the stream. Their recognition is poor, with no excavations beyond AZP survey, and no TLC cemetery has yet been discovered in the area.

Analysis

The Zawichost arrowhead (Fig. 2, 3) is too damaged for a precise classification. In Anna I. Melŭkova's typology, trilobate arrowheads with pointed blades and distinct sockets fall into type II/2 (Melŭkova 1964, 19, fig. 1). In Anja Hellmuth's system, it corresponds to type II, most likely variant IIB3 with a short socket and narrow blades undercut at the base. Due to the poor preservation of the blades and the missing tip, variant IIA3 with an almond-shaped blade is also possible (Hellmuth 2010, 57).

A similar example from Poland comes from Hruszowice, site 2 (Adamik *et al*. 2022, pl. LXXXIV), which had a longer socket and wings merging more gently into it. From the Chotyniec hillfort, eight trilobate arrowheads are known, divided by Marcin Burgardt (2020, 337) into two types (with or without barbs) and four subtypes by blade shape. The present piece is closest to type II-2-a (Burgardt 2020, 337, fig. 7: 10; Czopek *et al*. 2024a, 179, fig. 5.8: 7), though with a slightly longer socket. Similar forms are also recorded at the Wicina settlement, Żary county (Chochorowski 1974, pl. II:O: 13–14).

Fig. 6. Photographic representation of the arrowhead discovered in Wyszmontów, Opatów county (photo by W. Rajpold).

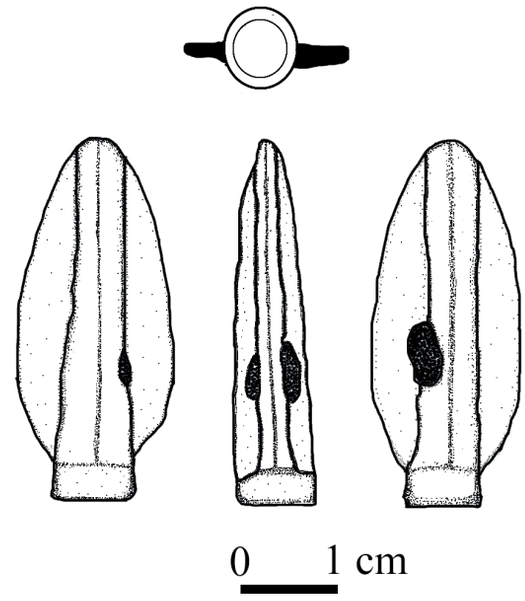

Fig. 7. Drawing of the arrowhead discovered in Wyszmontów, Opatów county (drawn by W. Rajpold).

In the Scythian world, IIA and IIB types were widespread (Hellmuth 2010, 58, 63, fig. 73, 80). Type IIB occurs in both early and later assemblages (Hellmuth 2010, 271–281), making it a weak chronological marker, dated broadly from the mid-7th to the 5th/4th centuries BC. The condition of the blade does not rule out variant IIA, which appeared around the late 8th/early 7th century BC, peaked in the 7th century, and was thought to have fallen out of use thereafter (Hellmuth 2010, 271), though it may have persisted into the 1st half of the 6th century BC (Melŭkova 1964, 18; Grechko 2020, 15).

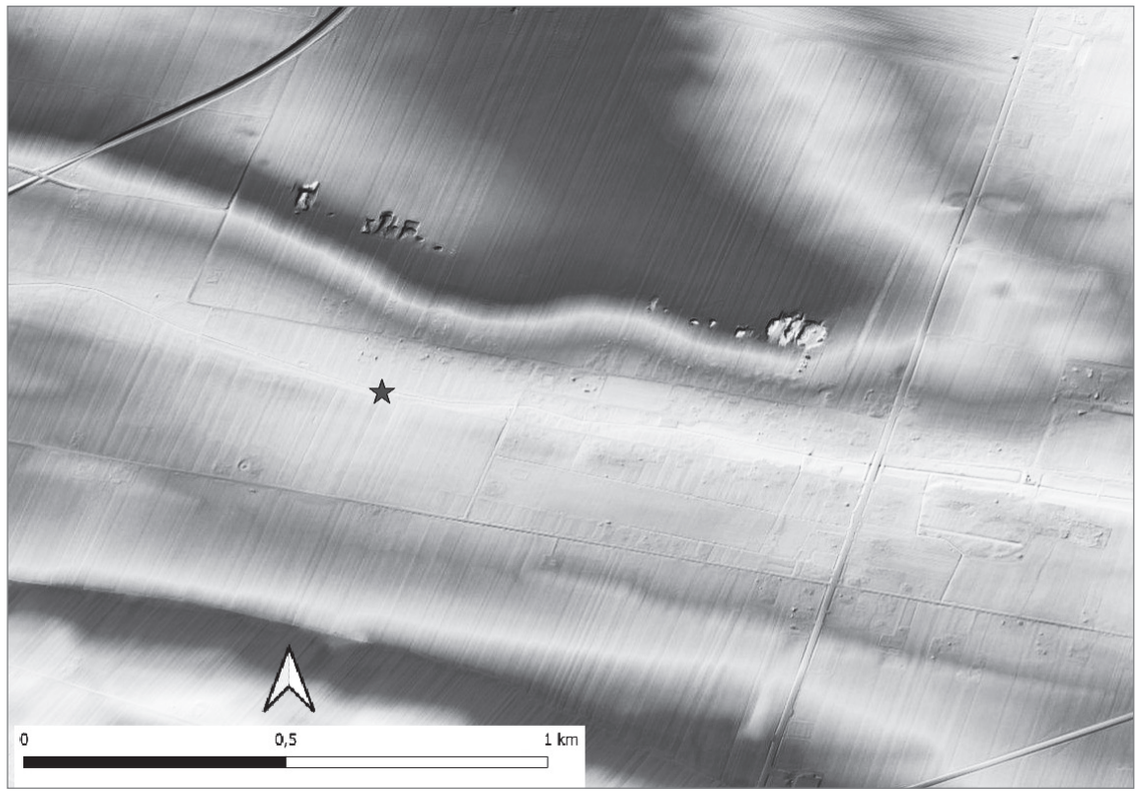

Fig. 8. Location of the arrowhead findspot in Wyszmontów, Opatów county, on a hypsometric map (source of map: Geoportal).

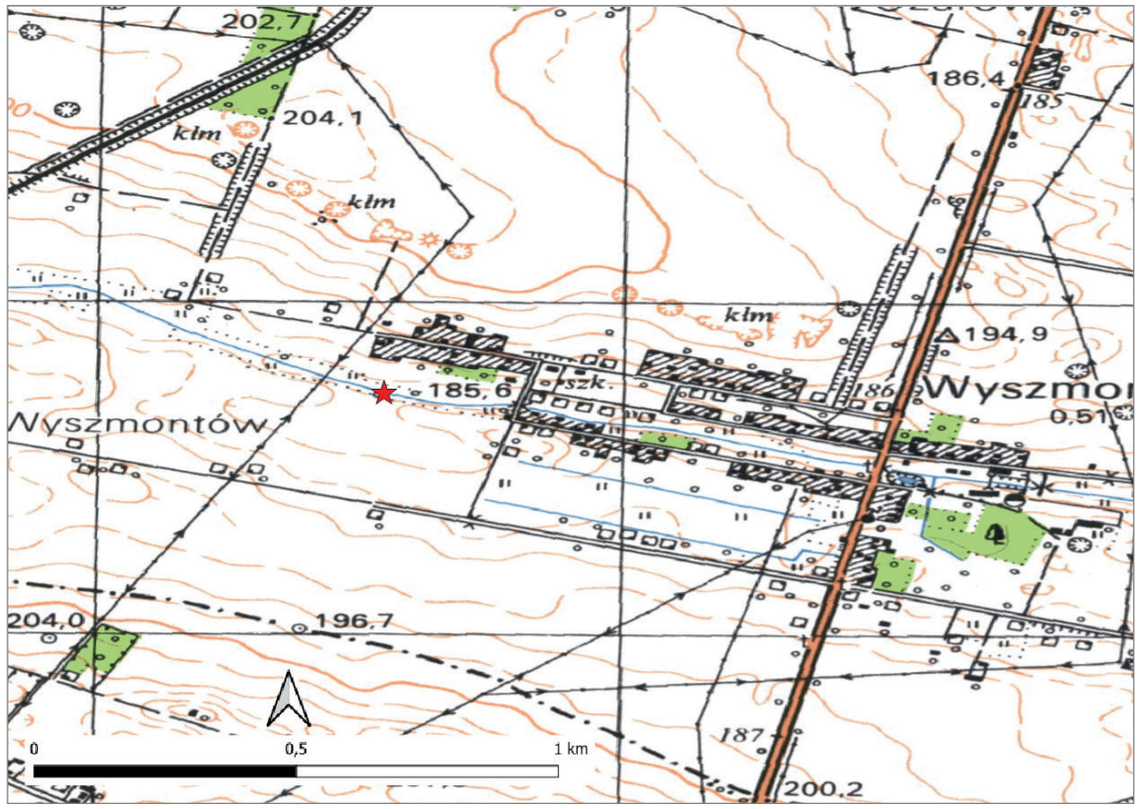

Fig. 9. Location of the arrowhead findspot in Wyszmontów, Opatów county, on a topographic map (source of map: Geoportal).

Given the heavy damage and lack of associated finds, precise dating is not possible. The closest match is form IIB-3, which has a broad range. A cautious date would be the 7th–5th century BC, with a likely concentration in the 7th–6th centuries BC, in line with most parallels.

The Wyszmontów arrowhead (Fig. 6, 7) is a bilobate type I/2/2 in Anna I. Melŭkova's typology (1964, 18, fig. 1). In Anja Hellmuth's system, it is variant I/A/4, with a short socket and a laurel-shaped blade (Hellmuth 2006, fig. 2; 2010, 17). This variant is also known as the "Kelemér type", distinguished by its characteristic blade shape (Czopek *et al*. 2025a, 175).

The closest parallels include five bilobate arrowheads from Chotyniec (variants I/A/2 and I/A/3, with longer sockets). Comparable forms are recorded in the Lublin region, e.g., at Kłodnica, Wieprzec, and Stary Machnów (Kłosińska 2013, 356–357, fig. 4: 13–17), where variants I/A/2 and I/A/3 also prevail. The Stary Machnów specimen is the nearest to subtype I/A/4; its socket was damaged and may originally have been longer. Arrowheads of this subtype are also reported from the destroyed Wicina hillfort (Chochorowski 1974, pl. II:O: 1–3).

Kelemér-type bilobate arrowheads were distributed across the Scythian world, most densely along the upper Don, the middle Dnieper, and in the Caucasus (Hellmuth 2010, fig. 12, 13). They are generally dated to the 7th–mid-6th centuries BC (Meluŭkova 1964, 18; Grechko 2020, 14), though an earlier origin, in the late 8th century BC, is also possible (Hellmuth 2010, 203–204).

Discussion

As noted above, artefacts of eastern origin are relatively rare in the Sandomierz Upland. However, comparable finds occur in adjacent areas, with the Vistula River serving as a natural boundary. Notable examples include the Kosina cemetery, site II, Kraśnik district, which yielded arrowheads, nail-shaped earrings, and pottery with eastern-style decoration (Miśkiewicz and Węgrzynowicz 1974; Kłosińska 2005b, 274–277) – one of the cemeteries showing the strongest Chornolis influences. Another case is a nail-shaped earring from Opoczek Mały, site 1, Kraśnik district (Kłosińska 2005b, 277–278, fig. 6). Further south, at the Tarnobrzeg-Zakrzów, site 1 settlement of the Tarnobrzeg Lusatian Culture, finds include pots with applied strips below the rim and a vessel bearing the impression of a twisted bronze wire (Podgórska-Czopek and Czopek 1991, 102). From site 5 in Tarnobrzeg comes a hollow-footed bowl (Rajpold 2022, 113).

Funerary contexts are equally important. The Tarnobrzeg-Mokrzyszów, site 2 cemetery produced bowls with spiral boss impressions, hollow-footed bowls, and knobbed vessels (Trybała-Zawiślak 2012, 254, 256–257). From Tarnobrzeg, site 1, come knobbed vessels with stamped ornamentation (Ligoda 2004, 117–118), and from Machów, site 20 (Tarnobrzeg district), a nail-shaped earring (Poradyło 2022, fig. 12, 78). Particularly noteworthy are a figure-eight button – associated with the Cimmerians – and a vessel decorated with punctures forming triangles, evoking Scytho-Thracian designs, found at the Knapy, site 6 cemetery (Tarnobrzeg district) (Czopek 2004, 74, 82).

Numerous other examples could be cited, but the pattern is clear: east of the Vistula, eastern cultural influences are strongly represented, unlike on the west bank.

These arrowheads are of particular interest as the first finds of their kind from the Sandomierz Upland, although their archaeological context remains uncertain. The Zawichost specimen was recovered during detectorist surveys, carrying the concomitant risk of the loss of contextual data (e.g. spatial relationships) (Barford 2000, 444–445). However, the "Szansa" Association from Annopol works closely with Dr. Marek Florek (Provincial Office of Monument Preservation – Delegation in Sandomierz) and Monika Bajka (archaeological company "Trzy Epoki"), making it likely that the context has been preserved (Kutyło *et al*. 2023). This collaboration has produced significant results, including two hoards of medieval coins (Nakielski 2022) supplementing interwar finds (Różańska 1960; 1962), numerous early medieval weapons, ornaments, and ceramics (Florek 2022a; 2022b), and material linked to the Przeworsk Culture (Krupka 2024, 20–23). Yet, no other artefacts from the Bronze or Early Iron Age have been found in Zawichost. The Wyszmontów arrowhead is also an incidental find, with only poorly recognized traces of Bronze and Early Iron Age settlement in its vicinity.

Both finds therefore share an isolated nature and the absence of related material nearby. They likely represent accidental loss or discarded projectiles, offering too little evidence to reconstruct broader patterns of eastern influence in the region.

A second issue is chronology. The Wyszmontów piece dates to the 7th – mid-6th century BC, while the Zawichost example has a broader range (7th–5th century BC), reducing its precision as a chronological

marker. For comparison, finds from Kosina date to the late 6th and 5th centuries BC (Czopek *et al*. 2015, table 1), making the Wyszmontów arrowhead at least a century earlier. Given this early date, the Wyszmontów arrowhead – and possibly the Zawichost one – may represent some of the earliest eastern influences in the Sandomierz Upland. They could be synchronized with the earliest phases of the Chotyniec hillfort and with the wave of Scythian incursions into western Poland, recalling similar forms from the Wicina hillfort.

While their isolated nature limits functional interpretation, the location of both sites points to a potential role for the Zawichost river crossing as a conduit for such objects. This remains a hypothesis requiring further evidence. Historically, this crossing served multiple communities: the Mongol invasion route ran from the upper Bug through the Lublin region to the Sandomierz area, while another route, from Przemyśl to Lesser Poland, used it for the return journey (Chochorowski 2014, 47–48, fig. 31). Although this analogy is distant in time, and current evidence does not confirm Scythian raids into eastern Poland, it is notable that both the Scythians and later Mongols were nomadic groups for whom river valleys and crossings were central to mobility and spatial organization since prehistory. As for the direction of arrival, eastern-style finds occur in Subcarpathia, also inhabited by the Tarnobrzeg Lusatian Culture, which extended into the Sandomierz Upland. The Chotyniec hillfort and its south-eastern route are key points of interest (Czopek *et al*. 2024b), while numerous finds along the Roztocze range in the Lublin region (Kłosińska 2007) suggest an alternative or complementary route. It is plausible that both operated in parallel, making it difficult to determine definitively which brought the arrowheads here.

The final question is whether a Scythian arrowhead necessarily signals Scythian presence. Probably not. The Scythians were ethnically diverse. Herodotus describes the Neuri – a people with Scythian customs but not Scythians proper (*Dzieje* 2020, IV: 105) – who, a generation before Darius' campaign (before 512 BC), left their homelands and settled among the Budini. The Chotyniec hillfort is sometimes linked with the Neuri (Czopek 2020, 82, 102), and their migration has been invoked to explain population growth in the HaC–D phases within TLC territory (Rajpold 2013, 46).

It is also possible that the arrowheads are local products imitating eastern prototypes. A mold for casting nail-shaped earrings from the TLC settlement in Zawada supports this possibility (Michalski 1982; Chomentowska 1989, pl. I,6,7: 334). Unfortunately, no metallurgical analyses have been carried out on the arrowheads presented here, although such studies would be valuable. Similar work on "Scythian" arrowheads from Kuyavia and Chełmno Land suggests local production. At Kamieniec (Toruń district), evidence of metallurgy was found alongside a "Scythian" arrowhead in a pit. The comparison with another from a burnt layer revealed technological differences but a similar chemical composition to other metallurgical artefacts (Gackowski *et al*. 2018, 333–334).

Summary

In summary, these finds raise several questions:

1. Do they reflect sustained contact with the Scythian world or merely sporadic interactions?
2. Is their relatively early chronology – compared to Kosina – typical?
3. Did they arrive exclusively via the "Chotyniec" route along the San, or also by other paths such as the Zawichost crossing?
4. Are they imports from the east or local imitations?

Answering these requires further fieldwork and metallurgical analysis. For now, the arrowheads remain isolated "swallows" that may foreshadow future finds, allowing for a fuller cultural and chronological framework.

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DISCUSSIONS AND REVIEWS

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(review) Simon Radchenko. *Portable and Parietal Art of Kamyana Mohyla, Ukraine* (= *BAR International Series* 3143). Oxford 2023: BAR Publishing, 228 pages, illustrated throughout in black & white, and colour, links to collection of 15 3D models.

Certain locations exert a natural pull on the human mind. In the monotonous vastness of the Steppe, even the slightest elevation or distinct feature stands out like an island in a boundless sea of grass, where most places blur into one another. Without a marker, leaving behind something as small as a bag can mean losing it forever in the uniform landscape. For millennia, an enormous hill made of massive stone blocks resting on fine river sand has served as such an island for Steppe dwellers and visitors alike. This is the Kam'âna Mogila [Kamyana Mohyla] site. The sandstone slabs that form the hill were created millions of years ago, but they have drawn human attention since at least the Upper Paleolithic. Evidence of this long-standing human presence includes the usual material remains – with over 30 sites scattered around the hill – but more strikingly, it appears in the many intentional modifications made to the rock surfaces. These alterations, which we conventionally label as "rock art", vary in form and intent. It would be reductive to assume every mark was made for the same reason. Yet collectively, they form a complex, enduring record of human interaction with this place – a rock-art site visited and revisited across countless generations.

The research history of the Kam'âna Mogila site mirrors the complex and often turbulent path of Ukrainian archaeology. Initially "discovered" by a 19th-century scholar-traveler in a recently annexed and still exotic landscape of the Russian Empire (Nikolaj Veselovskij), the site remained largely unexplored until a local inhabitant became educated enough to begin studying it (Valentin Danilenko). Even then, his efforts were overseen and guided by a scientist (Otto Bader) from the distant regions of a new empire – the Soviet Union. Later, the site faced the threat of destruction during yet another of the USSR's grand construction projects – a "strojka komunizma" aimed at building a bright future while disregarding a shadowy and inconvenient past. In a hasty and ultimately unsuccessful attempt to rescue something before the bulldozers arrived, parts of the site suffered irreversible damage. The researcher who probably conducted the most thorough, scientific exploration of the site (Mihajlo Rudinskij) did it on his return fighting with declining health after he was persecuted, exiled from Ukraine, and forcibly relocated to northern Russia. Later on, V. Danilenko returned to the site, already being a recognized researcher. Although he undertook an enormous amount of research, the documentation he left behind is sparse and often contradictory.

In the decades that followed, the site became a magnet for speculation. Groundless theories emerged, linking it to various national origin myths, interpreting its carvings as illustrations of Rigvedic texts in search of an Indo-European homeland, or attributing to it extraordinary sacred significance – often with little regard for archaeological evidence. That is why Kam'âna Mogila acquired something of a notorious reputation within the Ukrainian archaeological community. Working on the site often carried a burden of connotations, and researchers risked being viewed with suspicion – as if their interest hinted at

pseudo-scientific motives. This, then, is the site at the center of Simon Radchenko's monograph. His work reflects a modern, state-of-the-art approach – combining digital photogrammetry with careful, informed interpretation of the evidence. He also undertakes a critical deconstruction of myths and poorly founded narratives that have long obscured a proper, evidence-based understanding of Kam'âna Mogila. Unfortunately, Simon Radchenko's work was interrupted by the Russian invasion and the site now lies in occupied territory. The site museum was looted, and its collections were transferred to Crimea. Given the current circumstances, it is difficult to see how someone could resume their research there in the foreseeable future.

The book in question (228 pages, richly illustrated, with links to 3D models) is the first comprehensive digital-era studies of Ukraine's largest prehistoric rock-art site, Kam'âna Mogila, located in Zaporìžžâ Region, and positioned at the western fringe of the Eurasian Steppe belt. The story unfolds in three parts, further divided into eight chapters.

Part 1, *Kamyana Mohyla in the Eyes of Many*, introduces the site, the author of the book, and previous researchers who have worked there, laying the foundation for the research questions that follow. It consists of three chapters. Chapter 1 – *Genius Loci: How Did We Get to Where We Are?* refers to the author's journey and fieldwork experience at the Kam'âna Mogila site. A personal and very touching narrative recounting how Simon Radchenko came to study Kam'âna Mogila in person. It touches on the challenges of working at a remote site, especially amid logistical constraints from COVID-19 and geopolitical tensions. The chapter offers an engaging, human lens through which the field work is told as an adventure of a human mind. Chapter 2 – *Prehistory and History of Kamyana Mohyla* is centered around geology, geomorphology and archaeological context. This chapter provides a detailed backdrop – from the sandstone island within the Moločna River valley, through its formation, to the stratigraphic and chronological framework spanning from the Upper Paleolithic into medieval times. This sets the stage for understanding both the material and cultural layering of the site. Chapter 3 – *Recent History of The Site: Research and Challenges Along the Way* tells the history of archaeological research on the site. Here, the author explores past investigations – from 19th-century antiquarian efforts to later Soviet-era excavations led by Valentin Danilenko, Boris Mihajlov, and others. It traces evolving interpretations and research styles over time.

Part 2, *Rock Art Research: A [Re]Construction of Knowledge*, contains the material-based research on several instances of rock-art from Kam'âna Mogila. The selection of case-studies is rather dictated by organizational constraints, accessibility of sites and insurmountable circumstances (presented in Chapter 1). However, luckily, they cover most of the timespan of prehistoric rock-art activities at the hill. Namely, Chapter 4 – *The Wizard Cave: The Metaxis of Kamyana Mohyla's Upper Paleolithic Art* focuses on "Wizard Cave", one of the key grottoes with petroglyphs. Simon Radchenko critically engages with earlier interpretations by Valentin Danilenko and Boris Mihajlov and presents his own, placing the cave's engravings in broader intellectual and political contexts. Chapter 5 – *The Dragon Cave, the Churinga Cave, and the Goat Cave: A Mesolithic Rock Art Assemblage With Additional Bronze Age Material* takes on the challenging task of attributing non-figurative portable rock-art pieces – which lack clear stratigraphic context or direct dating – to the Mesolithic period. The argument draws on several lines of evidence: the riverine economy of Late Mesolithic groups associated with the site, the resemblance of certain shapes in the portable art to various fish species, and the discovery of two similar rock-art pieces at the nearby stratified Mesolithic site, Kam'âna Mogila 1, where the enclosing sediments were datable and have been analyzed. Chapter 6 – *The Bull Cave: Interpretative Scaffolding of Eneolithic Rock Art* presents a convincing argument for assigning the "Rain Bull" petroglyph to the Eneolithic period. While the contours of this interpretation were previously proposed by Boris Zemlâkov (1939), and later developed by M. Rudinskij and B. Mihajlov, the author strengthens their case by identifying numerous analogies that firmly place the petroglyph – along with the associated rock-art complex – in the fourth millennium BCE. Among these is a recently discovered stela from a burial structure, which provides a clear and supportive parallel, making the proposed dating of the composition more robust.

In the chapters of Part 2, each cave is presented as a locus of competing narratives: Valentin Danilenko's and Boris Mihajlov's traditional readings and Simon Radchenko's reinterpretations using digital imagery. Themes include layered engravings, potential ritual meanings, and the multilingual art heritage embedded in each grotto.

Part 3, *Complex Entanglement at Kamyana Mohyla*, aims to develop theoretical generalizations based on the material evidence from Kam'âna Mogila. Chapter 7 – *Rock Art Localities as a Core Element of the*

Cultural Landscape proposes interpretation of rock-art practice in the surrounding landscape, finding evidence of acquaintance with Kam'âna Mogila and its stones on the numerous archaeological sites around. The study would benefit from petrographic examination of supposed imports, however the Kam'âna Mogila sandstone is characteristic enough in the region to be recognized by macroscopic examination. The chapter makes the case for an instance of cultural landscape around Kam'âna Mogila being linked by networks of practice and complex entanglements between human and non-human agents. It delivers a broader interpretation: Kam'âna Mogila wasn't isolated. It served as a catalyst for symbolic exchange, linking communities across Eurasian steppe circuits. Chapter 8 – *Human –Non-Human Interactions at Kamyana Mohyla* tries to look at the materiality of Kam'âna Mogila's rock art from point of view of multiple ontologies, new materialism, speculative realism, posthumanism and object-oriented ontology. The meanings of the engravings are not recoverable; however, the author is able to propose the typical life-cycle of portable art object and provide patterns of human interaction with these pieces.

The book concludes with reflections on the site's endangered status amid conflict. Simon Radchenko highlights plans for future scientific analyses (e.g. red ochre pigment analyses), settlement excavations near the site, and creation of virtual representations to preserve and share Kam'âna Mogila digitally. All plans have been cancelled or postponed due to the war and occupation – underscoring another important dimension of this book: its role as a digital and theoretical effort to preserve Kam'âna Mogila for scientific inquiry as it existed prior to the invasion. The 3D photogrammetry work by Simon Radchenko has resulted in detailed digital models of the site, petroglyphs and artefacts, now accessible online to anyone interested. These models offer an invaluable resource, especially given the looming possibility that the original artifacts may be lost forever.

Moreover, the book in question reclaims the Kam'âna Mogila site for modern scientific discourse, freeing it from the connotations often associated with pseudo- and para-scientific theories. To achieve this, the author adopts a rigorously self-critical approach, choosing to state only what can be substantiated by the current state of evidence. This commitment to avoiding over-interpretation runs as a consistent thread throughout the book, guiding the reader through the intellectual discipline required to restrain imagination in the face of such remarkable prehistoric discoveries.

The book serves as an important stepping stone in re-framing the prehistory of Ukraine within the context of contemporary discourse on human prehistory. It is thought-provoking, initiating numerous lines of inquiry that warrant further exploration and raise many as-yet unanswered research questions. In particular, the Mesolithic chronology proposed for the rock art in the Churinga, Goat, and Dragon grottos permits a relatively broad interpretation. The author appears inclined to narrow this timeframe to the Late Mesolithic, drawing on the discovery of portable rock art objects within the Late Mesolithic layers at the nearby site of Kam'âna Mogila 1. However, one cannot ignore that Holocene hunter-gatherers persisted in the North Pontic Steppe far longer than in many other parts of Europe (Kiosak *et al*. 2021). Ceramic-using hunter-gatherer groups are well documented in the vicinity of the site as well as in neighboring regions. Despite their use of pottery, these communities remained primarily reliant on hunting, fishing, and gathering. Sites from the Dnieper Rapids area, for example, have yielded a rich assemblage of fishing tools and ichthyological remains, supporting the notion that a fishing-oriented economy was not limited to the "classic" Late Mesolithic, but extended into later periods (Kotova *et al*. 2021). Furthermore, the stratigraphic sequence at the Kam'âna Mogila 1 site is complex enough to warrant reconsideration of some Late Mesolithic material culture, potentially re-attributing it to earlier Mesolithic phases (Kiosak *et al*. 2023). Taken together, these factors blur the chronological precision of the proposed rock-art attributions. In reality, these petroglyphs could have been created by any Holocene hunter-gatherer group – as early as the Preboreal and as late as the early fourth millennium BCE, just before the first reliable signs of agriculture appear in the Steppe (Motuzaite Matuzeviciute 2020).

Another aspect of the book that raises important theoretical implications and a range of unresolved methodological questions is the author's insistence on framing his study within a metamodern perspective (Radchenko 2024). The book indeed carries a substantial philosophical weight – one of its clear strengths. However, engaging with archaeological material is something archaeologists have done for centuries; it is not inherently tied to object-oriented ontology. Similarly, evaluating interpretations by weighing arguments for and against is a standard methodological practice, not necessarily an instance of "bootstrapping and scaffolding"; critiquing earlier scholars does not by default constitute deconstruction. In fact, much of the research presented could be adequately described within the more modest methodological frameworks of, for example, processual archaeology. Nonetheless, the author

chooses to situate his methodological inspiration within metamodern and post-anthropocentric theoretical paradigms – and that is, of course, his prerogative.

That said, one must also consider the broader context of Ukrainian archaeology, where theoretical development has long been hindered by dogmatic Marxism and intellectual provincialism (Anthony 1995). The reception of processual archaeology is still incomplete, let alone any widespread engagement with post-processual or post-humanist approaches. From a discipline that, in some ways, remains not far beyond the nationalist paradigms of Kossinna, it is questionable whether we can meaningfully leap into ultra-contemporary metamodern theory. Perhaps we should try – but it is fair to ask whether our field is yet at a stage where such a leap is methodologically grounded. This unfinished theoretical evolution may explain why the author incorporates into his metamodern framework elements that could be fully coherent within processual or post-processual thought.

Summing up, the book makes a valuable contribution to the field of prehistoric art studies, offering original insights into the interpretation and chronology of rock art at Kam'âna Mogila. The author presents complex archaeological material in a clear and accessible way, making the study of rock art approachable to both specialists and general readers. By situating Ukrainian rock art within wider prehistoric contexts, the book helps integrate Eastern European sites into global discussions of symbolic behavior and early art. Moreover, the book sets a new standard for scholarly thought, skillfully linking empirical research with methodological reflection – something rarely encountered in Ukrainian archaeology until now. In doing so, it prompts a re-examination of entire branches of regional prehistory, raises challenging questions, and clearly exposes the limitations of earlier approaches to rock art – and to archaeology more broadly.

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(review) Dmytro Kiosak. *Modelling the Rhythm of Neolithisation Between the Carpathians and the Dnieper River* (= *Antichistica* 41). Venezia 2024: Edizioni Ca' Foscari, 270 pages, 68 figures.

The publication of new studies in Neolithic archaeology, especially on such an exotic subject for English-language literature, is always noteworthy, as such contributions not only expand our understanding of ancient cultures but also invigorate academic discourse. This is especially true when these studies employ advanced modern analytical methods, ensuring the rigorous examination of materials, and when the author's interpretations offer fresh perspectives that are both innovative and well-grounded in evidence. Such works significantly enhance the field by challenging existing paradigms and fostering new lines of inquiry. This is also a positive in the case when the author of the book has conducted his own research in this area for many years, making many interesting discoveries.

The book provides the author's comprehensive exploration of Neolithization in the easternmost region of early farming expansion, referred to by the author as *the region between the Carpathians and the Dnieper*. It integrates the latest archaeological discoveries and scholarly debates, using chronological modeling of radiocarbon dates to guide readers through the complex and often contentious archaeology of this area.

Notably, the book challenges the long-held assumption that southern Eastern European hunter-gatherers adopted agriculture immediately upon its arrival in the region. Its clear and logical structure, aligned with archaeological periodization, ensures that each chapter builds seamlessly on the last, allowing readers to follow the progression of the author's arguments with ease.

It is worth emphasizing what we find particularly interesting: the author's assertion that modeling the rhythm of Neolithization between the Carpathians and the Dnieper suggests that stylistic groups in ceramic decoration do not necessarily align with the chronological positions of the respective sites. Instead, these stylistic variations may reflect complex social processes and might have coexisted over extended periods. In fact, this coexistence and interaction has already attracted the attention of researchers (Burdo 2001).

The author further concludes that early farmers and their hunter-gatherer neighbors utilized space differently. Consequently, early farmers and hunter-gatherers could coexist within the same region without engaging in significant interactions, as their economic strategies were fundamentally distinct. Even different groups of farmers may have had different strategies, depending on the natural features of the region, as, for example, in the Linear Pottery Culture (Bickle and Whittle (eds.) 2013)

Particular attention in our opinion is given to the well-founded concept of deconstructing the Buh-Dniester culture. The author critically reviews the historiography of this culture, reexamining its economic and cultural framework while addressing the longstanding debate over the existence or absence of agriculture in this context. The study meticulously describes sites traditionally attributed to the Buh-Dniester culture, analyzes stratigraphic layers, and incorporates radiocarbon dating to support its findings. This rigorous approach lends the author's conclusions both logic and credibility, even though they may face resistance from proponents of traditional perspectives on the status of the Buh-Dniester culture.

Another significant thesis presented by the author is the need to reconceptualize the Chalcolithic period. Copper artefacts, which first appear in the

Late Neolithic, do not necessarily mark a transformative milestone for the Eneolithic era. Instead, the focus shifts to the hypothesis of new social dynamics during the Chalcolithic, characterized by a greater emphasis on social hierarchies than in earlier periods. This shift represents a profound change, with the spread of copper artefacts serving as just one expression of how material culture was manipulated to assert and maintain elevated social status. At the same time, there is no attempt to truly assess the consequences of the development of metallurgy and metalworking in the Eneolithic, even at the level already covered in historiography (Černyh 1978; Todorova 1982; Mares 2012).

The author engages deeply with contemporary debates, presenting a balanced discussion of competing theories on the Neolithization of southern Eastern Europe. Furthermore, its reflections on sustainable practices in ancient societies hold relevance for addressing modern environmental challenges.

On the one hand, it is worth understanding that this book is not a collection of all of the available information regarding this era between the Carpathians and the Dnieper. On the other hand, the inclusion of high-quality artefact photographs significantly enriches the reader's experience, while numerous detailed site maps effectively illustrate the geographic scope of the research.

However, certain aspects may not always be accepted without reservation. While the book is rich in detail, its use of dense academic jargon may present challenges for non-specialist readers. Some sections resemble lists of radiocarbon date calibrations and stratigraphic descriptions written as prose, which might have been clearer if presented in tables. At times, the language becomes metaphorical (e.g., "cradle of Neolithization" or "steel of prehistory"), which arguably enhances readability but may strike some readers as inconsistent in tone. In the last decade, solving all problems based mainly on isotopic dates has become widespread and popular. It would be good if these dates were obtained as a result of systematic selection of large series of samples. It is no longer realistic to attribute the identified discrepancies to the quality of laboratory work, as is done with the Kyiv one. It is possible to continue playing with the selection of convenient dates and mathematical methods, but this is a path to nowhere. And this is perfectly visible from the content of the reviewed publication.

Perhaps the result would have looked better and would have been more convincing if the author had studied both Neolithic and Precucuteni-Cucuteni Trypillya pottery at the same level as he did with the dates.

After providing an overall assessment of the book, we would like to delve deeper into several topics it addresses, which, in my opinion, merit further open discussion.

1. "Discontinuous model of Neolithization".

The author highlights gaps in radiocarbon dates for early farming sites. He proposes to explain the existing "stepped" picture of total calibrations by temporary retreats of early farmers from the region to refugia on its borders – in the Carpathians or eastern Central Europe. The picture he paints of the abandonment of fields and cultural landscapes is perhaps too dramatic. Although periods of demographic growth and decline did indeed alternate in prehistory, it isn't easy to imagine a complete depopulation of a fertile and habitable region. However, a look at the maps in the monograph shows the unevenness in the archaeological study of the territories and all the "gaps" and "discontinuities" are simply unfilled gaps in our knowledge. Which is actually proven by the discovery by the author of the book of monuments of the LBC Culture on the Southern Bug. On the other hand, many "gaps" can be filled even now, if we take into account the already available information about the sites, for example, Precucuteni-Trypillia A (Bodean 2001).

While the temporary loss of identity may be vivid, it does not equate to the physical extinction of a population. The population could endure in "simpler forms of existence" lacking many superstructural frameworks, markers of previous collective identity, and still serve as the foundation for future, vibrant cultural developments. For instance, the Tatareuca Noua 15 settlement, mentioned by the author, has yielded local ceramics as well as ceramics from the Linear Pottery Culture. The latter exhibits signs of degeneration, indicating a loss of cultural tradition. Radiocarbon dating places the site in the early 5th millennium BCE. The site has been interpreted by the excavator, Olga Larina, as a settlement of former Linear Pottery Culture people who were in the process of losing their cultural identity (Larina 2006). Regarding Precucuteni-Trypillia A, existing studies on the formation of a diverse ceramic complex of this cultural phenomenon have not been taken into account. And they precisely testify to the presence of features of both "disappeared" and neighboring archaeological cultures (Burdo 2001; 2003; 2005; Papusoi 2008).

Therefore, it is no coincidence that paleogenetic studies on the transition from the Eneolithic to the Bronze Age in the North Pontic Steppe highlight

a mix of genetic continuity and transformative cultural shifts. Research reveals that populations in this region experienced significant migrations and interactions with other groups, influencing their genetic makeup while retaining some ancestral characteristics, thus making the picture much more complex than a suggested complete replacement (repeated replacements?) of the initial settlers (Ivanova 2023; Nikitin *et al*. 2025).

2. The division between the world of hunter-gatherers and that of farmers makes many feel uneasy – just as does the distinction between cattle breeders and farmers during the Eneolithic and Bronze Age. After all, hunting and gathering remained significant not only for Neolithic societies but well beyond. For example, this is evidenced by osteological materials from the settlements of Precucuteni-Trypillia A, which remained unknown to the author (Žuravlev 2008). Even in the Middle Ages, these activities were more than mere pastimes. Groups of diverse origins could adopt new activities based on their choices, shaped by unique environmental conditions or external pressures. It is reasonable to envision early farmers engaging in hunting within newly colonized territories – much like the region under discussion.

Rather than separating early farmers from their contemporaneous hunter-gatherers, it would be more productive to view them as part of a complex system, a network of interrelated groups. Populations of different origins cooperated in the shared exploitation of a single region for centuries (Reingruber 2016). The focus should be on the nature and archaeological visibility of their interactions, rather than emphasizing exaggerated differences between these groups.

Moreover, the choice to label the ceramic hunter-gatherers of 6th–5th millenium BCE as "para-Neolithic" is far from being obvious. The term "para-Neolithic" is sometimes used in archaeology to describe societies that exhibit certain characteristics of Neolithic cultures – such as pottery, basic agriculture, or settled lifestyles – without fully embracing the complete Neolithic package, which typically includes domesticated plants and animals, permanent villages, and advanced tools. However, the necessity and utility of the term can be debated. Existing terms like "incipient Neolithic," or "final Mesolithic" can convey the same meaning without adding another layer of terminology. "Para-Neolithic" is not universally defined, leading to confusion or inconsistent application. Some may use it to describe transitional groups, while others might apply it to societies that resist Neolithic characteristics altogether. In some areas, the Neolithic "package" was adopted piecemeal or modified, making it unnecessary to apply a new term rather than studying these variations within the broader Neolithic framework.

3. By labeling the onset of the Steppe Eneolithic as "the end of Neolithization" the author seemingly attributes changes within early farming societies to external factors, which had minimal relevance to the Neolithization of Northern Ukraine. This process occurred during the later phases of the Cucuteni-Trypillian cultural complex. The author appears to implicitly support the hypothesis of a militaristic dynamic in the interactions between the steppe's mobile pastoralists and the Trypillians. While this hypothesis has faced sustained and often severe criticism over the years, it continues to appear in contemporary literature, though it is far from dominant (Videiko 1994). Consequently, when considering the influence of pastoralists on the spread of early farming settlements, it is essential to engage with this long-standing and ongoing debate, which includes a well-developed system of arguments from both perspectives. Given the fact that the "end of Neolithization" in the steppe belt actually coincided with the crisis of farmers in Southeastern Europe caused by climate change, it is possible to consider the displacement of the steppe population as a wave of relatively few refugees, rather than cruel conquerors (Videjko and Burdo 2020).

It is generally accepted that the spread of Cucuteni-Trypillian groups in Northern Ukraine occurred with significant delays, often lasting several centuries, without any apparent reasons. This phenomenon can be observed and explained without invoking Steppe invasions.

Moreover, the Eneolithic and Bronze Age are traditionally grouped together as the Paleometal Epoch. However, the author appears to combine Linear Pottery Culture groups, Trypillians, Neolithic and Eneolithic cultures under the broad label of early farmers. While this approach aligns with modern geneticist views on population history, it clearly contradicts the established archaeological periodization of the region. This radical reorganization is presented without sufficient discussion or justification.

Clarifying and discussing these aspects would enhance the integration of the book's ideas into the broader context of archaeological science. It would help elucidate the relationship between the proposed terminological innovations and previously established theories, while also providing a rationale for the selective emphasis on certain sites or cultural elements.

This work is an essential resource for students and professionals in archaeology, especially those interested in the eastern frontier of Neolithization. The book's adept use of a number of tools for chronological modeling provides valuable insights, making it particularly beneficial for archaeology students.

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Study *The rise and transformation of Bronze Age pastoralists in the Caucasus*, published in *Nature* in October 2024, delivers a groundbreaking synthesis of genomic, archaeological, and environmental datasets, offering new insights into population history across six millennia. The study provides one of the most detailed reconstructions to date of population dynamics in the Caucasus over six millennia, while offering critical insights into cultural hybridity, mobility, and regional interaction zones in prehistoric Eurasia.

The paper is the product of two major European Research Council (ERC) projects conducted under the Horizon 2020 framework: *MICROSCOPE* (grant no. 803147, PI: Cosimo Posth, 2019–2024) and *PALEoRIDER* (grant no. 771234, PI: Johannes Krause, 2018–2024). Both projects have been instrumental in advancing ancient genomic research in Eurasia, particularly through large-scale sampling, methodological innovation, and interdisciplinary integration. It is worth noting that one of the co-authors of this article, Prof. Svend Hansen, is also leading an ERC-funded project related to the archaeology of the Caucasus (grant no. 834616, *ARCHCAUCASUS – Technological and social innovations in the Caucasus: between the Eurasian steppe and the earliest cities in the 4th and 3rd millennium BC*). Therefore, we can expect new and potentially important data to emerge from this research in the near future.

The current paper addresses a major "lacuna" in our understanding of Eurasian prehistory: the role of the Caucasus not merely as a periphery of the steppe world but as an active mediator in the formation of early complex societies. The study situates its interpretation of long-term population structure in the Caucasus within a well-established framework of Mesolithic zones. In the southern Caucasus, the authors draw upon earlier genomic findings from key highland cave sites, particularly Kotias Klde (Imereti region, western Georgia) and Satsurblia Cave (also in Imereti, near the village of Ortvala). These sites have yielded Mesolithic individuals dated to approximately 13000–9500 BP, whose genetic signatures are typically associated with the so-called "Caucasus Hunter-Gatherer" (CHG) ancestry. This lineage forms the core of later southern Caucasian populations and made substantial contributions to the gene pools of Neolithic populations in both Iran and Anatolia, underpinning major westward and southward demographic processes.

By contrast, the northern Caucasus reflects a genetically distinct Mesolithic lineage, although securely dated and published individuals from this region remain comparatively scarce. This northern ancestry is understood to derive from steppe and piedmont forager groups, partially represented by early individuals recovered from the North Caucasus piedmont zone, including sites near Kumušanskaâ Cave (Stavropol Krai, southwestern Russia). Although not a primary focus of the study, Ûžnyj Olenij Island (Karelia Republic, northwestern Russia) – more commonly associated with Eastern European hunter-gatherers – also features occasionally in comparative models of steppe-related genetic profiles. These northern lineages are particularly noteworthy for their apparent continuity into the Early Bronze Age, where they intersect with the formation of Âmnaâ [Yamnaya] and Steppe Majkop [Maykop] populations. Despite the relative geographical proximity between regions, the study underscores that southern and northern Mesolithic ancestries remained sharply distinct well into the 3th millennium BCE, framing the Caucasus as a zone of both long-term genetic separation and eventual integration.

At the heart of the study lies the argument that pastoralist networks in the Caucasus were neither static nor monolithic, but instead experienced multiple phases of transformation driven by both internal dynamics and external interactions. This claim is substantiated by genome-wide data from 131 individuals across 38 archaeological sites, spanning a chronological range from the 6th to the 1st millennium BCE. The research highlights the long-term genetic continuity of two deeply diverged Mesolithic populations in the North and South Caucasus, and how this structure persisted well into the Bronze Age despite extensive contact and exchange. This finding challenges simplistic migration-replacement models and supports more nuanced frameworks of demographic entanglement and cultural co-evolution.

A key methodological strength of the study is its combination of dense temporal and spatial sampling with a nuanced integration of ancient DNA evidence, archaeological typologies, and site-level contextual analysis. Radiocarbon dating, principal component analysis (PCA), ADMIXTURE modeling, and f-statistics are deployed judiciously, ensuring clarity and reproducibility. The authors also avoid a common pitfall in archaeogenetics – the overinterpretation of genetic data as cultural identity. Instead, they emphasize the multidimensionality of identity, migration, and exchange. They interpret genomic changes as one component of a broader tapestry that includes local traditions, ecological adaptations, and social strategies. A standout aspect of the study is the identification of the Majkop culture as a key vector in the movement and transformation of "steppe ancestry". By situating the Majkop within a dynamic flow of material culture, practices, and genes between Anatolia, the Iranian plateau, and the steppe, the authors bring to light a previously underestimated mediatory role of highland Caucasus societies in shaping the demographic and cultural landscape of the wider region.

The study's interpretive strength lies in its ability to explain complexity without collapsing it. Rather than framing the spread of pastoralism as a unidirectional process, the authors reconstruct a "braided stream" of interactions between settled agriculturalists, mountain herders, and mobile steppe populations. They argue convincingly that the Caucasus was not merely affected by external pressures but generated its own modes of cultural and biological adaptation. Such a view resonates strongly with current theoretical approaches in archaeology that emphasize complexity, interaction, decentralization, and polycentric societal development. Drawing on the concept of "contact zones" (Pratt 1991; Clifford 1997), the Caucasus is understood not as a marginal corridor between core civilizations, but as an active interface where distinct cultural, linguistic, and biological traditions were negotiated, hybridized, and redefined. Simultaneously, the study resonates with polycentric models of societal development (Kristiansen and Larsson 2005; Knappett 2011), which reject diffusionist hierarchies in favor of viewing early Bronze Age Eurasia as a mosaic of interacting centers, each contributing to processes of innovation and transformation. Finally, the authors' integration of diverse strands of evidence without reducing culture to biology echoes entanglement theory (Hodder 2012), which posits that social, technological, environmental, and biological domains are deeply interwoven in historically contingent relationships. Together, these theoretical frameworks reinforce the study's non-deterministic, network-oriented interpretation of prehistoric mobility and complexity in the Caucasus – a valuable reminder for scholars working at the intersection of bioarchaeology, archaeology, and material culture studies.

However, not even a *Nature* paper is without its limitations – and this study, despite its many strengths, is no exception. One area that deserves closer scrutiny is the asymmetry between northern and southern datasets: while the southern Caucasus is represented by well-contextualized and radiocarbon-dated individuals from sites such as Kotias Klde and Satsurblia,

the northern material is often less precisely dated and lacks strong integration with regional archaeological narratives. This imbalance may inadvertently influence interpretations of genetic continuity and interaction across the region. Equally, while the study excels in reconstructing genomic patterns and mobility, it offers little engagement with the symbolic and ideological dimensions of Bronze Age life – domains such as ritual, mortuary practice, and material expression of identity remain underexplored. In a similar vein, the paper does not fully address the potential of its dataset to explore gendered practices, kinship organization, or social stratification, despite the availability of genomic tools for such analysis. The near-absence of paleoenvironmental integration, including botanical and landscape data, also limits the ecological resolution of its pastoralist models. Finally, although the role of the Majkop culture is rightly foregrounded, the narrative tends at times toward a monolithic interpretation, with limited attention to internal variability, regional trajectories, or local adaptations. These are not fundamental flaws, but they do point to avenues where further synthesis – especially in collaboration with regional specialists – would enrich and refine an already outstanding contribution.

While the paper excels in its genomic interpretation, from the technical perspective there remain several areas where the integration of additional bioarchaeological proxies could have significantly deepened the conclusions. Stable isotope data ($\delta^{13}C$, $\delta^{15}N$, $^{87}Sr/^{86}Sr$), for instance, appear to be underutilized. Considering the study's strong emphasis on pastoralist societies, a more explicit analysis of dietary and mobility signatures would have enriched our understanding of subsistence strategies and seasonal movement patterns. Moreover, although the dataset is remarkably rich, the discussion of kinship and social organization is relatively brief. Employing fine-scale genomic approaches – such as runs of homozygosity (ROH) or identity-by-descent (IBD) analysis-could allow for more detailed reconstructions of household composition, lineage structures, and patterns of endogamy or exogamy. Finally, the environmental context, while acknowledged, is not explored in great depth. Given the pronounced ecological diversity of the Caucasus region, integrating paleoclimatic and palaeoecological data, including climate modelling, would offer a more robust framework for interpreting episodes of migration, adaptation, and societal transformation. These are not fundamental shortcomings, but rather promising avenues for future research and synthesis. The article nevertheless sets a high benchmark for interdisciplinary integration and theoretical sophistication.

Despite these limitations, this study remains a landmark contribution to the archaeology and bioarchaeology of prehistoric Eurasia. It sets a new standard for how large-scale genomic data can be meaningfully contextualized within archaeological, environmental, and historical frameworks. Through its thoughtful theoretical grounding, openness to complexity, and commitment to multi-scalar analysis, the research offers a compelling model for interdisciplinary scholarship. While certain interpretive and methodological aspects would benefit from further development – particularly regarding ritual, kinship, ecology, and regional variability – the overall achievement is substantial. This is a work of both analytical precision and conceptual breadth, one that will undoubtedly shape the direction of future research on mobility, identity, and interaction in the prehistoric Caucasus and beyond.

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A Trip to the 2025 International Conference on the Anthropology of Salt

This past March, I had the opportunity to attend the 2025 meeting of the International Conference on the Anthropology of Salt, organized by the University of Rzeszów, University of West Alabama, and the Cracow Saltworks Museum. It was my first experience with this conference, and a rare opportunity for me to spend time abroad. What follows are my reflections on my trip, put together at the request of the conference organizers. I am grateful for the opportunity to share my thoughts, as this was an illuminating experience that changed my appreciation for the field of the Anthropology of Salt.

I should state that, unlike most of the scholars who attended this conference, I would not consider myself to be someone deeply involved in salt-related archaeology, at least not yet. My background is in Historical Archaeology (or post-medieval archaeology, from a European standpoint), and my training is within an Americanist tradition, giving me the advantages and limitations that come with that. I found my way into this group by picking up an unfinished project on a Caddo (indigenous North American) salt site in western Arkansas (Drexler and Taylor 2019). I have benefited from the support and collegiality of several American scholars steeped in salt-related research, but I am a relative neophyte. So, what follows is an account of my travels to the conference and what I experienced there as an American archeologist new to the field and learning many things about global research on the archeology of salt and the community of scholars it draws in.

Traveling to Europe

I have not had the opportunity to go to Europe since the Society for Historical Archaeology met at Leicester, England, in 2013. I hear that, post-Brexit, that might not count anymore, so I would have to roll back that date to a visit to Switzerland in 1994, or a brief period of residence in Norway in 1992. In short, this was a rare opportunity for me to travel outside of the United States. Given that, I was fortunate to have the opportunity to add two side trips on the way to Rzeszów.

I left Magnolia, Arkansas, and drove down to the Dallas-Fort Worth airport, and then boarded a flight to Salzburg, Austria. This was a few days before the conference started, but my two side trips were best done on the way to the conference. In Salzburg, I caught a train to Hallstatt, home to the Hallstatt-Dachstein-Salzkammergut Cultural Landscape UNESCO World Heritage Site. This was a place of interest long before I took an interest in salt-related research. My professors introduced me to the Hallstatt Culture and history of archeological research at Hallstatt back in my undergraduate education, so seeing the place had been on my mind for a long time.

Seeing Hallstatt involved touring the salt mine, high up in the mountains, and the Weltgeschichte Museum and Hallstatt Charnel House, down in the city proper. The area owes its past to the presence of an evaporite salt deposit pushed high into the mountains due to the collision of the Eurasian and African plates. People have been using that deposit for the

past 7,000 years, continuing down to today (Kern *et al*. 2009). The tour took visitors into a mine that was still in operation, with conduits and pipes running through the tunnels and galleries supplying miners elsewhere in the facility (Fig. 1). It was intriguing to note that archeologists believe that the earliest stages of salt acquisition at Hallstatt used brine reduction, and it was not until the Bronze Age that true mining began there in earnest (Kern *et al*. 2009). It struck me that this was the same kind of salt reduction we see in North America, the only thing really separating the two areas technologically was the development of bronze and then using it to make mining tools. People here in North America had copper but did not develop the alloying process to it to make true bronze, as happened in Europe. I should note that the salt deposits that fed Hallstatt were only 30 m from the surface, with salt deposits here in the American southeast being much deeper, and only accessed directly through well-drilling, not mining.

I spent the day touring the mines there and taking in the interpretation of salt-related heritage in the town. I also thoroughly enjoyed touring the Weltgeschichte Museum and seeing the collection of artifacts recovered through archeological work dating back to 1846. Having read about the work at Hallstatt in my undergraduate courses and knowing a very little about the Hallstatt Culture based on them made this a special visit, encountering in person that which I had only read about. Seeing a statue to an archeologist (Johann George Ramseur) was astounding to me. We simply do not see those in the United States. Perhaps that needs to be a new personal goal.

I did as much as I could in Hallstatt in one day, but as time grew short, I took the ferryboat back across the lake and climbed aboard the train back north, and then east, heading into Poland. Given the train's route, I took the opportunity to make my second side trip, debarking from the train in Oświęcim, southeast of Kraków. I mentioned earlier that I am trained as a historical archeologist, and my real focus in that area has been in Conflict Archaeology (Drexler 2013). In addition to studying the actual sites associated with periods of conflict, I am fascinated by how we mark, preserve, and interpret those sites (Carlson-Drexler 2008). So, having the opportunity to tour the museum at Auschwitz-Birkenau was something not to be missed. It was a necessary, though obviously heartbreaking experience.

That is a story for another time, so I will gloss over it here. From Oświęcim, I got back on the train, headed to Rzeszów. I would like to note here that the orderly, regular, and expansive (at least in comparison to Amtrak) rail network across Austria and Poland was a very pleasant experience, and I wish we had something comparable here in the United States. The trains were by far the most comfortable and lowest-stress part of the travel in this trip.

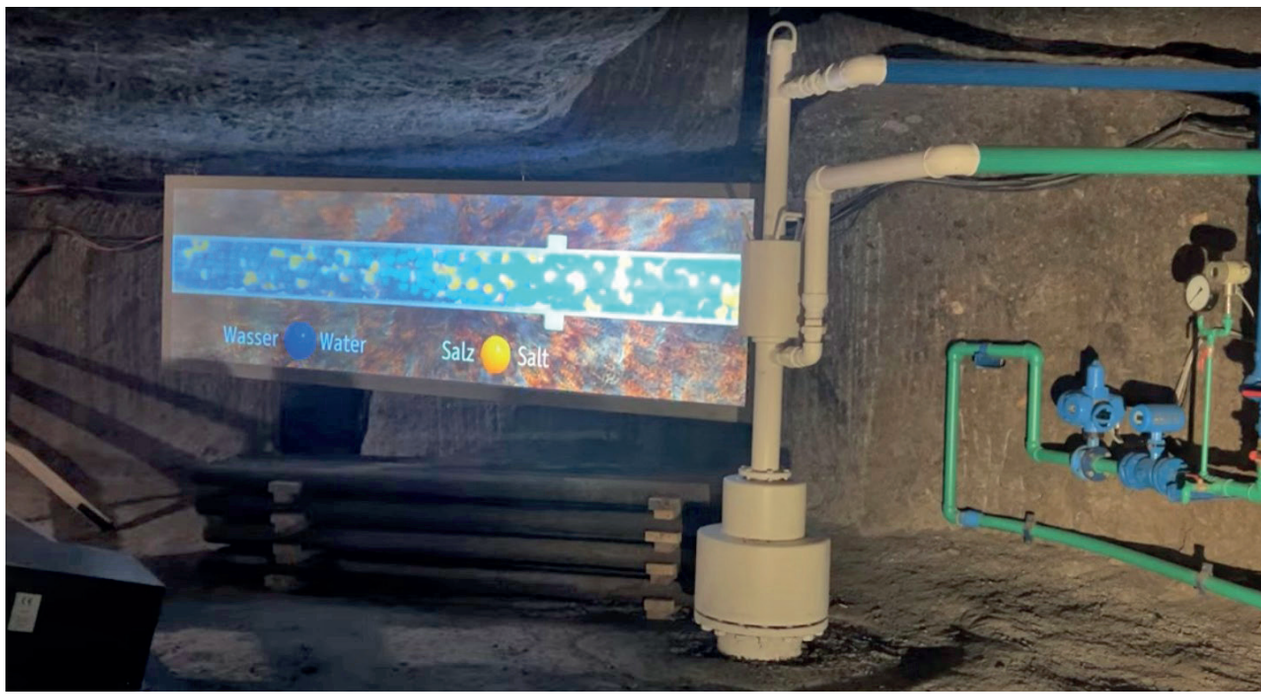

Fig. 1. Touring the salt mine at Hallstatt. The pipes are still in use by miners.

Being at the conference

I arrived at Rzeszów's train station the afternoon before the conference began, and was pleased to find it charming town, at least it appeared so on the walk between the train station and the apartment block where I was staying during the conference. For my own reference, it is about the size of Little Rock, capital of Arkansas, though it is about 500 years older and far more walkable (and, thankfully, flatter). I strolled past the old city cemetery, then crossed the Wisłok River on the Narutowicz Bridge and followed the greenway paths to the apartment I rented for the week. The area had numerous restaurants and a mall with a giant climbing wall and a train, both of which my son would have loved. Maybe he can come on the next trip.

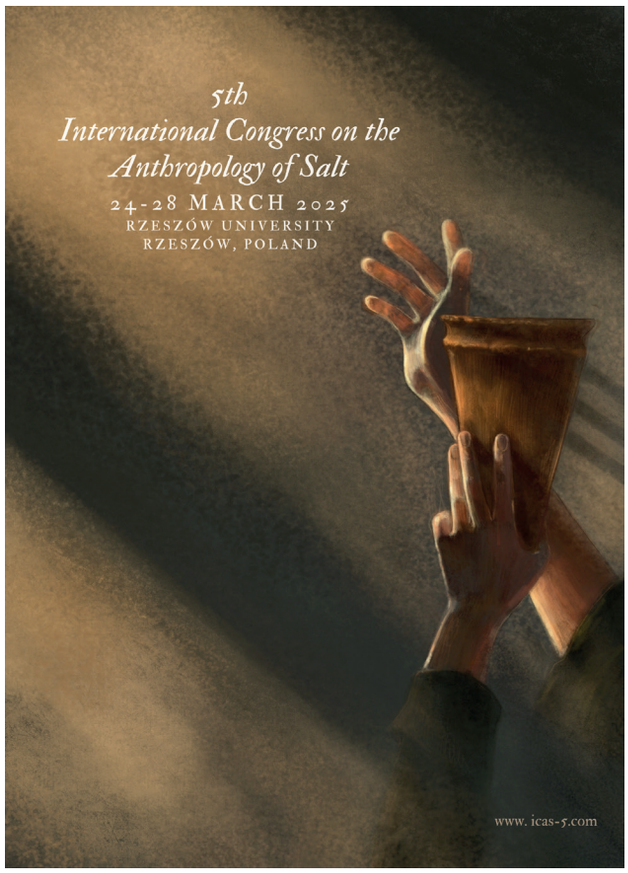

Fig. 2. Conference program cover and poster (designed by M. Szpond).

The following three days were focused on the research papers that were the core of the conference (Fig. 2). There were 55 on the schedule, including poster presentations, though there were a few that had to be cancelled for various reasons (Dumas and Dębiec (eds.) 2025). Each day had a keynote speaker dealing with some research or insight in longer form than what the regular paper contributors were allocated. There were papers focused on every populated continent excepting Australia, though it should be noted that the distribution was not even. European sites received by far the most attention, with Asian sites coming in behind. The Americas and Africa were minimally represented with only a few in the case of the former and a single paper focused on Egypt, in the case of the latter. This is unfortunate given the work being done there by various scholars in those regions (e.g. Dumas and Eubanks (eds.) 2021; Woldekiros 2023).

The first keynote was from Nikolov and Samichkova, focusing on the Provadia-Solnitsata site in northeast Bulgaria. I do not intend to go through each paper here, but I will take a few lines on this one as it really drove home one of the fundamental differences between scholars working in Europe and those in North America. The two speakers organized their paper around the cultural sequence of Neolithic – Chalcolithic – Bronze Age, which I am aware of from undergraduate classes, but with which I am not adept because it does not apply here. In the United States, we have no such shared sequence. The Eastern Woodlands have a sequence, the Great Plains another, the Southwest its own, and that only leaves the Great Basin, California, and a few others in the United States alone. Mexico's complex and fascinating history presents its own challenges. So, there is a bit of a regional disconnect between the European archeologists and the rest, and I was a step behind most of the others in the room almost at the outset as a result.

A second moment of realization came through both the next paper (the first non-plenary one) and by watching interactions among the scholars in the room. Here in the U.S., particularly working in the U.S. Southeast, the most influential work on salt production has been done by Ian W. Brown, whose major works (e.g. Brown 1980) are focused here and significantly influence the work of people like Eubanks and Dumas, the rising generation of scholars focused in this area. Marius Alexianu, shown through this conference to be the widely acknowledged don of the field, gets cited (e.g. Eubanks and Dumas 2021) but more attention goes to Brown at present, at least among scholars who, like me, are working on salt-related topics, but are not so deeply immersed in the subject yet as to be appropriately considered salt-focused archeologists in North America. Alexianu's paper, and his warm greetings to many of the speakers, shows both the extent of his influence on the scholars in the room

Fig. 3. Conference participants (photo by M. Święcicki).

and his thoughts about what the Anthropology of Salt is and should become (e.g. Alexianu 2015; 2023). Several subsequent scholars, such as Asăndulesei, made explicit comment on his well-earned place within the history of this research area.

I do not feel it my place to go through individual reactions to most of the papers, as that would approach the role of a discussant which is neither what I was asked to do with this paper nor something that I am the right person to act as. As stated above, I am a relative neophyte here, and not in a position to provide the kind of comment that would be of much help or insight. I will only offer that the fixation on 30 km as a maximal travel distance for brine procurement and distribution seemed to be taken as gospel by many working in vastly different contexts, but I do not yet fully understand why that distance is so well accepted. Perhaps I need greater instruction in this area, but I asked a friend as was (jokingly) told in no uncertain terms to refrain from questioning the radial model of salt supply.

While not offering the insight or criticism one would associate with a discussant, I do feel free to express my enthusiasm and awe for the range of topics and approaches brought together for the conference. I mentioned above the geographic spread of the papers, coming from all populated continents save Australia, and that mix is something rarely seen at conferences here in North America. The blend of archaeology, anthropology, history, and even theology was an added bit of diversity that, again, I rarely see in my usual spread of conferences (Fig. 3). This mix meant that papers focused on the Neolithic were given alongside others focused on living populations, drawing together peoples long separated by time but united in the production of salt through similar means.

Wieliczka

The last day of the conference took us to the Wieliczka Salt Mines, another UNESCO World Heritage Site. To be honest, I was unfamiliar with the place before this event, and it was a delight to get to experience it.

The trip started at the Saltworks Castle with a reception and collection of speakers who addressed the

geologic history of the area that gave rise to the mine, the history of salt production at Wieliczka, and various aspects of the lives of the miners and their families. Meeting in the well-appointed medieval space of the castle was a special experience, and I am grateful to the conference organizers and the Castle staff for arranging the event, which provided good context for the ensuing tour.

On the walk to the mine entrance, we passed a panel display about the Katyń Forest massacre, or "Crime of Katyń" as the display termed it. This was the massacre of Polish Army officers in the Katyń Forest by the Soviets in April and May of 1940. While I understand the historical and cultural significance of the event, making it reasonable to be foregrounded at a place where so many tourists come to learn about Polish heritage, I remark on it here in that the massacre in the Katyń Forest has an interesting place in the history of archaeology. One of the first examples of Forensic Archaeology took place there during the war, as German excavators exhumed the burials and documented the associated material culture to prove this was an atrocity attributable to the Soviets, not to them. This was one war crime of the period that was not of their making.

Our first stop around the mine complex was the Graduation Tower, a new addition to the landscape, completed around 2014. This is a massive tower and curtain wall composed of blackthorn branches. Brine from the mine is pumped up and flows through a sluice along the top of the wall, pouring down over the blackthorn, where wind and sun evaporate some of the water, creating a salty mist. Walking through this structure exposes visitors to that mist, which they hold is beneficial for those suffering from rhinitis, allergies, bronchitis, and other respiratory ailments as well as various skin diseases. This is, apparently, a significant new draw for tourists seeking relief from their various afflictions. I cannot think of seeing anything like it here in the United States.

We entered the Wieliczka mine proper through the Daniłowicz Shaft, walking down 52 flights of stairs to arrive at the true start of the tour. One hardy person among our group even did so cradling a baby. Unlike Hallstatt, Wieliczka is no longer a producing mine (it shut down mining operations in the 1990s), so it remains focused primarily on tourism. This also allows the mine to be set up differently from its Austrian parallel, with displays everywhere, and a much greater focus on artistry. The scale of its open chambers is also far different from what I saw in Hallstatt (Fig. 4). While Hallstatt had several large room-sized spaces which they used as theaters for educational films, they were much smaller than what Wieliczka presented.

Fig. 4. Inside the Wieliczka mine.

The fine sculpture work in the mine was astounding, showing the careful work of numerous hands over decades of work. Everything was carved from rock salt. The statuary commemorating Nicholas Copernicus's visit to the mine was one of the first we encountered, but the depiction of St. Kinga's founding of the mine was perhaps the most elaborate. Beyond that, the details of the walls and floors were all carved from the rock salt, imitating, in the case of the latter, flagstones. As we progressed through the mine, it felt like the artistry built like a crescendo, culminating in the celebrated St. Kinga's Chapel. This is a marvel of craftsmanship, having been carved by only three men, working in succession, over the span of sixty-six years. It marks key moments in the life of Jesus Christ, including depictions of the Flight into Egypt and the Last Supper on walls leading to the altar, which holds relics from both St. Kinga and Pope John Paul II. Everything was made from salt, down to the crystals on the chandeliers overhead. It is justly deserving of its reputation as a singular artistic accomplishment.

I mentioned it before, but the scale of open space underground at Wieliczka is truly impressive. The only reference I had for something being so spacious but below ground is from fantasy, as my mind went immediately to the depictions of the Mines of Moria in the *Lord of the Rings* books. One wonders if J. R. R. Tolkien ever drew inspiration from Wieliczka for depicting his dwarven realms.

That space was frequently supported by massive arrangements of wooden cribbing, some of which ap-

parently had been in place for nearly 600 years, preserved in part by the salty environment within the mine. Much of this was painted white, apparently as an aid to visibility before the addition of electric light, as white reflects better. Alongside this cribbing, wooden windlasses, winches, and other machinery used in the mines over the years was on full display, showing how much labor and muscle power was needed to move miners down and salt up through the mines.

Presenting salt mining in two places

Looking at both the Wieliczka and Hallstatt mines together underscores a few commonalities that play up a difference between North America and European salt production, and in the ways that salt mining was done in these two important mines.

The biggest distinction between these mines and what we see here in the United State is that, mostly North Americans did not do a lot of salt mining in the precontact period. Brine reduction was common, of course, but actually mining rock salt was not something we see evidence of taking place extensively. A lot of that has to do with how different groups were using metal at the time. North Americans had copper, but did not develop bronze or iron industries, and the tools resulting from them, which seem to have been crucially important to extensive mining. Hallstatt's narrative places mining as beginning in the Bronze Age. With Wieliczka, it apparently did not start until the Middle Ages, when iron tools had been available for centuries.

Despite this difference, the early emphasis on brine reduction binds together approaches to salt procurement in each of these areas. The interpretation of brine reduction operations at both Hallstatt and Wieliczka describe a process essentially identical to what we see in brine reduction facilities here in the Caddo homeland of Arkansas, Texas, Oklahoma, and Louisiana. Even the forms and decorations of the pottery looked quite similar. I think it fascinating that brine reduction remained the main production strategy at Wieliczka well after the arrival of bronze and iron in the region, with mining only beginning at the time of St. Kinga. Clearly, availability of tools does not mean an immediate move to actually mining.

Between the two mines, I felt like there were very different approaches to presenting the past to the public, revolving around a balance between beauty and historical data. This likely sounds a little nebulous, but it felt to me like Wieliczka forwarded the visual spectacle more than Hallstatt did, at least within the mine. Wieliczka's statuary, the St. Kinga Chapel, and other elaborately decorated spaces within the mine present a unique, and astonishing, visual buffet for the visitor. There is plenty of historical information presented around and in support, but I left Wieliczka fundamentally with a sense of awe at what I had just seen.

Hallstatt, at least the mine, was very different. It felt less like it was trying to overwhelm the eyes than it was trying to stimulate the brain by leading with historical and technical information. Lacking many of the vast open chambers that Wieliczka has, perhaps it would be hard to produce that same sense of overwhelm. That could be reserved for the town and the valley outside of the mine, which were truly special. Still, Hallstatt left me with a sense, not of awe, but with a sense of being educated, but also something of a cold feeling about the place. I mean that not to imply that anyone was unkind or that the town itself was not welcoming, charming, etc. I think, rather, it has to do with the way the mining has been organized at the two places. The interpretation at Hallstatt gave some background on the lives of the miners who worked the deposit high up in the mountainside. Apparently, they lived in the mine complex six days out of the week, only going down to town to see their wives and families on Sundays. By comparison, miners at Wieliczka went home every night. That distancing of miners from their families in service to the profit-making of the mine felt distasteful and bred a certain sadness for the sacrifices demanded of the men who worked the mines at Hallstatt.

I want to close with something that stuck out to me at both places, that was jarring to me as an archeologist trained in the United States after the 1990s. It has to do with the frank and unquestioned display of human remains. Hallstatt had a small interpretive building on the path from the funicular railway up to the main mine tour building that contained a burial laid out for anyone to see. Wieliczka had a set of human remains in the space used during the event as a cloak room. Photographs of human remains were present in several displays. I am not saying this is in any way wrong, but it is dramatically different from what most museums in the United States would do today. Bones are now almost never put on public display, and many places opt for drawings over actual photographs. This is entirely related to the efforts by Native American groups to regain sovereignty over their community members and to have their cultural standards regarding interactions with the dead respected. These are most visibly enshrined within the Native American Graves Protection and Repatriation Act of 1990, but

also in things like the evolving publication standards of journals like *Southeastern Archaeology*.

Of course, this is tied to the legacy of human remains recovered by archeologists being more "ours" in Europe versus "theirs" in the United States, and all the attendant contestations of power that result from that down through the years. I think North America's changing approach to these issues is primarily beneficial, and the reason these differences noted above would stuck out is that there has been significant change.

Concluding thoughts

To wrap this travelogue up, I will reflect a little on what I learned during the trip, how my perspectives on this area of research have changed, and where I think there is some room for the Anthropology of Salt to grow in the coming years. I would reiterate that these are the musings of a relative newcomer to the field, and one whose background is substantially different from many of the scholars present.

Maybe that difference is a good place to start. I have been part of many conferences in my career, several of which see themselves as international organizations. What "international" means in those contexts usually works out as scholars from the United States, United Kingdom, Ireland, Australia, South Africa, and Canada, with a growing number of Finns, with reference to the Society for Historical Archaeology. "International" usually means "anglophone". The ICAS conference was something very different. Though the papers were given in English, the mix of scholars was much less uniform, and bringing together Central and Eastern European academics along with some South American and Asian researchers gave this meeting a much greater diversity of backgrounds, approaches, and context than many similar conferences. This was a great thing. I firmly believe that such differences can be intellectually stimulating and impart needed cause for reflection and innovation among all involved. Bringing together so many different people around one basic subject was a special experience. The conversations outside of the papers, such as at the exceptional concluding dinner in Wieliczka, helped underscore this kaleidoscope of backgrounds.

Second, despite this variety of paths taken to the conference, many of the approaches to salt production described from contexts around the world parallelled each other quite closely. Reductive brine boiling appears all over Europe, North America, and Asia in much the same process. I would add that it's basically the same thing as sorghum reduction, sugar cane juice reduction, and a host of other technologies that focus around eliminating water from solutions containing substances of human desire (c.f. Mintz, Smith).

Despite these convergences, it is remarkable that there is no straightforward connection between salt production, urbanism, and agricultural production. While some scholars emphasized the connection between incipient urbanism and salt production, here in the Caddo homeland there are centuries of salt production that take place without the establishment of large towns. Evidence from many areas point to many situations where salt production exists without the establishment of agriculture. There are interesting cross-cultural analyses to be done in the future.

Finally, despite the international scope of the conference, there is yet more room for the inclusion of more work to be done in areas that are already represented in this group. For my own part, I hope to see more North American papers, particularly on the material culture of salt production in the past two centuries. We also need more scholars working in Africa (particularly sub-Saharan) and Japan, and any research on places like China, which factors heavily into the history of salt production (Kurlansky), and places not yet represented at the conference, like Australia and India. Applications outside of the commonly-discussed culinary ones, such as the use of salt in nuclear reactor research beginning in the 1960s, or the environmental and cultural impacts of the production of lithium from salt deposits are areas of further research.

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OBITUARY NOTE

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Archaeology, a Never-Ending Story... In Memoriam Gheorghe Lazarovici (13 September 1941 – 3 February 2025)

Professor Gheorghe Corneliu Lazarovici passed away at the age of 84 and would still have had much to say on a fundamental field of prehistoric civilizations, remaining in the consciousness of several generations of archaeologists with whom he collaborated during his career. Through his scientific activity, research and the dissemination of his results, Professor Gheorghe Lazarovici remains one of the most important Romanian archaeologists.

He was born on September 13, 1941 in a small town in Caraş-Severin County. Between 1948–1955 he attended the General School in Reşiţa, and between 1955–1958 he attended the vocational school in the same city. He graduated from high school in 1962, also in Reşiţa, and in 1968 he completed his university studies at the Faculty of History and Philosophy of the "Babeş-Bolyai" University in Cluj-Napoca. In 1979 he became a doctor in history, specializing in prehistory, at the same university, and between 1971–1972 he was a Herder scholar at the Institut Für Ur- und Frühgeschichte der Universität Wienn, with a complex postgraduate specialization, namely the Neolithic of Southeast Europe and the relations with Anatolia, under the coordination of Professor Richard Pittioni. He has contributed significantly to the training of new generations of archaeologists through his teaching activity. He was lecturer on history and archaeology courses at various universities in Cluj-Napoca and Alba Iulia (1993–1994), Reşiţa (1997–2007) and Sibiu (2002–2016). From 2002 he became a doctoral coordinator at "Lucian Blaga" University in Sibiu. He was a researcher and scientific secretary at the Romanian Institute of Thracology between 1991–1993.

He was a member of the editorial boards of the journals *Acta Mvsei Napocensis*, *Acta Mvsei Porolisensis* and *Tibiscum (Ethnographic-History Studies and Communications)*.

Between 1968 and 2004, Gheorghe Lazarovici occupied various positions at the National History Museum of Transylvania (MNIT) in Cluj-Napoca, evolving from archaeologist and museographer to the institution's General Director in the period 1993–1997. His scientific activity is extremely varied and broad, participating in congresses, symposium and conferences abroad: Belgrade, Nice, Bratislava, Budapest, Vienna, Novi Sad, Tolbukhin, Verona, Xanthi, Kiev, Ljubljana, Lisbon, Rome, The Hague, Riva del Garda and even in China. He organized several specialized scientific events, national and international, in archaeometry (32 editions), ethnoarchaeology (15 editions), ethnoreligion (9 editions).

He took part in numerous international archaeological expeditions, organized in Austria, Bulgaria, the Republic of Moldova, Ukraine, Romania, Hungary and Olten (Switzerland), as well as ethnoarchaeology in Romania, with international participation (Institute of Archaeology in London), in the years 1973–1974, 1982–1986. This inevitably led to collaboration with many prestigious specialists and among them we can only mention a few: 1972 – Greece, Volos, together with Vl. Milojčic from Heidelberg University; 1974 – Romania, research into obsidian sources, together with J. Nandriş from the University of London; 1982–1986, 1999 – ethnoarchaeological studies in the Carpathian Mountains, in collaboration with J. Nandriş; 1992 – the search for prehistoric

sources of copper, in partnership with Prof. Dr. Ernst Pernicka Institute of Earth Sciences Im Neuenheimer Feld, Heidelberg University; 2003–2004: research on prehistoric sources of raw materials on the territory of Romania, together with G. Trnka from the University of Vienna.

As an archaeologist and museographer, a specialist in the research of prehistoric civilizations, he coordinated numerous archaeological expeditions, of which we mention only a few: Gornea, Zorlenţ, Balta Sărată, Parţa, Iclod, Cheile Turenilor, Cheile Turzii. He highlighted the significance of discoveries from Tărtăria and Parţa through international multidisciplinary research.

He organized several major national and international exhibitions, as evidenced by the published scientific catalogs. His scientific contributions include numerous studies and specialized articles, as well as significant works, either as a sole author or in collaboration, books that contain conclusions that are still valid today.

In numerical terms, his scientific activity is titanic and is difficult to ever equal or surpass. He published more than 20 books and university courses, collaborated on 6 catalogs and atlases, developed over 100 syntheses, 70 analytical articles, 85 articles publishing archaeological materials, has more than 50 research reports, 6 micro monographs, 45 interdisciplinary articles, over 50 presentations at international congresses, countless press articles and reports from the sites under research, television interventions and documentary films.

He published more than 450 studies and specialized articles, as well as several books as sole author or in collaboration. We would highlight some of the more prominent monographs here: Gh. Lazarovici, *Gornea*, Reșița 1996, 124 p. and 84 pl.; Gh. Lazarovici, *Neoliticul Banatului*, in the BMN collection, vol. III, Cluj 1979, 273 p., 50 figs., 10 tables, 162 pl.; Gh. Lazarovici, Fl. Drașovean, *Cultura Vinča în România*, Comisia muzeelor și colecțiilor, Timișoara 1991, 250 p.; Gh. Lazarovici, Z. Maxim, *Gura Baciului*, in the BMN collection, vol. XI, Cluj-Napoca 1995, 452 p., 38 pl., 55 fig.; D. Țeicu, Gh. Lazarovici, *Gornea. From the archaeology of a medieval village in the Danube Gorge*, in the Caiete Banatica collection, Reșița 1996, 163 p., 26 pl.; Gh. Lazarovici, *Modern Methods and Techniques of Research in Archaeology*, Bucharest 1998; Gh. Lazarovici, Fl. Drașovean, Z. Maxim, *Parța*, Archaeological Monograph, vol. 1.1, 341 p., vol. 1.2, 115 pl., 137 figs, Timișoara 2001, Waldpress, BHAB, 12; Gh. Lazarovici, D. Micle, *Introduction to Computerized Archaeology*, BHAUT, vol. III, Timișoara 2001, 234 p., *Cheile Turzii. Archaeological Monograph* was published in 2024, with over 400 pages. The monograph *The Place of Banat in the Neolithization Processes of Southeast Europe – The Early Neolithic* was launched post-mortem, representing an essential contribution to the understanding of prehistoric cultures, synthesizing decades of research, archaeological discoveries and profound interpretations of the humanity past. What is not seen and cannot be measured in the pages of his publications is how much of his soul he put between the pages of these volumes.

The recognition of his outstanding merits is evidenced by the granting of prizes and distinctions from the Romanian Academy, such as the "Nicolae Bălcescu" Prize for the *Gura Baciului Monograph* in 1995; the "Vasile Pârvan" Prize for the volume, C.-M. Lazarovici, Gh. Lazarovici, *Arhitectura Neoliticului și Epocii Cuprului din România. I. Neolitic* in 2008. The Presidency of Romania decorated him, in 2004, with the Order of Cultural Merit, officer rank H, for scientific research, and in 2007 he became an honorary citizen of the city of Timișoara, for his contribution to historical and archaeological research in Banat. In 2014, the Universitatea de Vest din Timișoara organized an ArheoVest Symposium dedicated to the honor of Professor Gheorghe Lazarovici, accumulating the symposium materials in two substantial volumes, which capitalize on articles from all areas of the archaeological and interdisciplinary interest on which the professor focused.

His passion for archaeology and dedication to the discovery and interpretation of humanity's past established him as a pillar of Romanian archaeology, having a long lasting influence on the understanding of prehistory in Southeastern Europe. He was equally concerned with the dissemination of information, collaborating on the production of several films presenting archaeological sites and documentaries.

There is no person who collaborated or had contact with Professor Gheorghe Lazarovici and remained unimpressed. During breaks on the archaeological sites, the workers and many students over time, with whom he worked, would come to sit next to him to listen to stories about tribes, chieftains, prehistoric societies and their houses, about love, war, thefts, attacks, raising children, their initiation rituals and many other great things about the people who lived a long time before us. His scientific qualities were exceptional, but his human qualities always prevailed. He was a man who will live forever, both through the memory of those who knew him, and through the ar-

ticles and monographs that changed the way we perceive southeastern European prehistory. He had a vast knowledge of the Balkan-Anatolian and southeastern European Neolithic, being capable of a comprehensive, synthetic image of prehistoric civilizations. He had rich stores of information about the ancient and medieval periods, being familiar with the processes of transformation and acculturation. He was frequently concerned with the application of innovative research methods in archaeological studies.

Gheorghe Lazarovici remains a benchmark in terms of the interdisciplinary approach to research on Neolithic sites. He defined, through research and then through publication with large demonstrations and conclusions, of almost mathematical precision, a series of cultures and cultural groups. He coordinated diverse and large work teams on archaeological sites that provided not only scientific research hypotheses, but also an inestimable value for museum collections, which he enriched. The establishment of at least five museum collections is related to his name. The site monographs, as well as the large synthesis studies on which he worked tirelessly, are not only testament to his dedication, but a work ethic almost to the point of obsession in demonstrating social and evolutionary processes. He opened new avenues of approach, through the conferences he organized, bringing related fields closer to archaeology. He organized conferences on archaeometry, ethnoarchaeology, ethnoreligion, statistics applied in archaeology and cutting-edge computer techniques.

He was a professor who was loved and appreciated by all his students, whether in his undergraduate, master's or doctoral classes. Many of them went on to work in museums, as archaeologists or in related fields of activity. For all of them he was like a father, tough in moments of stagnation and gentle in periods of doubt.

As a personal confession, today I can see that Professor Gheorghe Lazarovici had more confidence in me than I myself, over time. He is the man who invested in me and my colleagues the most precious resource a man has in his entire life: his TIME.

Professor Gheorghe Lazarovici will live forever, because archaeology is a never-ending story...

Fig. 1. Professor Gheorghe Lazarovici at a Conference in Constanța, 2018.

Fig. 2. Professor Gheorghe Lazarovici during field research, 2020.

Fig. 3. Professor Gheorghe Lazarovici during field research, 2012.

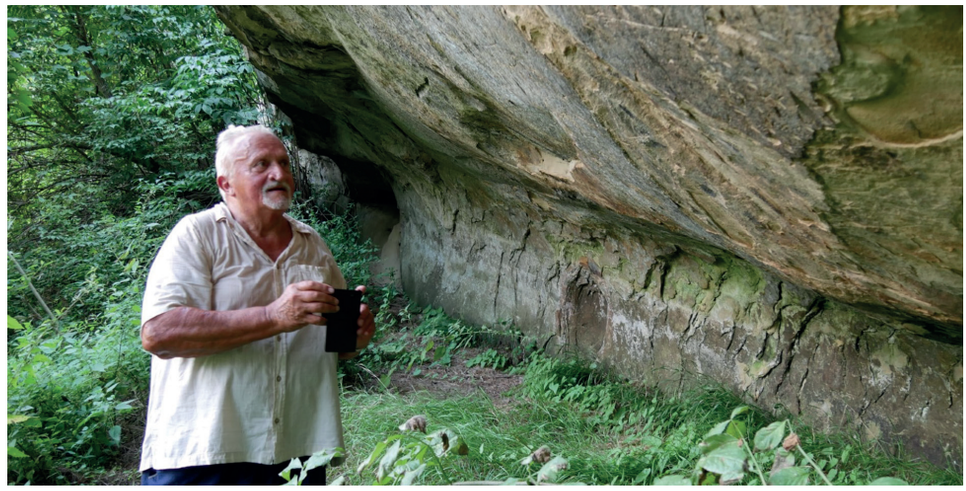

Fig. 4. Professor Gheorghe Lazarovici during field research, 2017.

Fig. 5. Professor Gheorghe Lazarovici on a doctoral committee at Alexandru Ioan Cuza University in Iași, 2010. From right to left: Gheorghe Lazarovici, Nicolae Ursulescu, Attila László, Dan Monah, Dumitru Boghian.

Fig. 6. Professor Gheorghe Lazarovici, researcher Cornelia-Magda Lazarovici and manager Emil-Constantin Ursu, at the "From Symbols to Signs" conference, organized at Suceava, September 2014.

Fig. 7. Professor Gheorghe Lazarovici during a survey in Transylvania, Rupea area, with students from Erlangen-Nuremberg, Germany coordinated by Carsten Mischka and Silviu Gridan along with his family, 2020.
Celebration of his 80th birthday with the same team.

Fig. 8. Professor Gheorghe Lazarovici during research in Transylvania, Rupea area, with Silviu Gridan (red T-shirt), Mircea Oancă (green T-shirt), and Constantin Aparaschivei (2018).

Fig. 9. Professor Gheorghe Lazarovici with a large group of students from Universitatea de Vest Timișoara, at the first ArheoVest Symposium, 2013.

Fig. 10. Professor Gheorghe Lazarovici with Constantin Aparaschivei and Silviu Gridan, along with a group of locals during excavations at Rupea, in 2019.

Fig. 11. Professor Gheorghe Lazarovici with Zoia Maxim and Sergiu-Constantin Enea, on different occasions and conferences, 2013–2014.

Fig. 12. Professor Gheorghe Lazarovici with John Nandriș and Adela Kovacs at ArheoVest Symposium, 2014, In honor of Gh. Lazarovici.

Fig. 13. Professor Gheorghe Lazarovici during a press interview, 2022.

Fig. 14. Professor Gheorghe Lazarovici between colleagues and archaeologists, during a trip organized by the Bukovina National Museum from Suceava. From left to right, first row: Anamaria Tudorie, Dan Aparaschivei, Adela Kovacs, Cornelia-Magda Lazarovici, Gheorghe Lazarovici, Mykhailo Videiko, Natalia Burdo, Aleksandra Kadrow, Constantin-Emil Ursu, Sabin Adrian Luca; second row: Constantin Aparaschivei, Sergiu-Constantin Enea, Monica Dejan, Mihaela Cazacu, Senica Țurcanu. The trip was organized during the conference "From Symbols to Signs", Suceava, 2–5 September 2014.