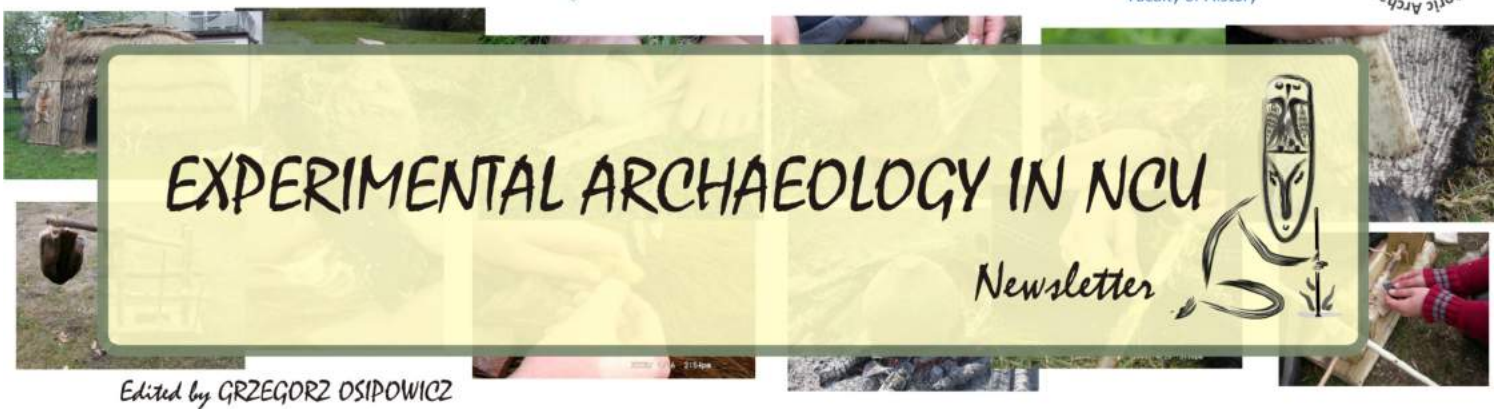
NICOLAUS COPERNICUS UNIVERSITY IN TORUŃ
Faculty of History

Society for Experimental Prehistoric Archaeology



EDITORIAL

Dear Readers, at the outset, I would like to apologize for the delay in publishing issue no 16 of our Newsletter. The COVID pandemic and the confusion associated with it are to blame here and we hope all of You will understand the problems created by the current situation.

In this issue, we have prepared the following texts. The first article is about one of the recently performed experimental programs in our Institute, which aim was to characterize the morphology of damages creating on the working surfaces of the antler hammers used for various activities. In the second text, we present some examples of slightly more promotionally oriented activities that took place not long ago in our Institute. They were aimed at the reconstruction of the Late Midle Ages and Modern-times garments basing on grave clothes. The last article presents experiments focused on the reconstruction of use-wear traces that creates on the osseous mining tools used to work in the limestone rock. The experiments were based on the Late Paleolithic/Early Mesolithic finds from one of the flint mines in Poland. On behalf of the Editorial Board,

I wish you a pleasant reading!

INSIDE THIS ISSUE

People of the experiment

Prof. Jolanta Małecka-Kukawka

Professor at the Institute of Archaeology NCU in Toruń. In 1995, she participated with a group of students in the traceological Camp in Izhevsk, organised by the Russian Academy of Sciences. As a result of the cooperation established during this event, in April 1996, two-week traceological course was organised in IA NCU for the first time. She was the initiator and first head of the Laboratory of Traceology in the Institute of Archaeology NCU, which start its work in 2008.

She published the first traceological handbook in Polish, which was a translation of the book by G. F. Korobkova entitled: Narzędzia w pradziejach. Podstawy badania funkcji metoda traseologiczną, Toruń 1999.

She is the author of many publications and books on traceology.

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Flint-knapping tools or maybe something else? Experiments with antler hammers

Among the whole range of various types of tools used by humans in prehistory, soft hammers made of deer antlers occupy an important role. These items were mainly made of antler beams with a preserved base, which served as a future working part of the tool (e.g. due to its favourable properties resulting from, among others, the shape and the thick layer of bone tissue in this place). The shape of antlers also made it possible to easily adapt a part of the main beam as a tool handle (the branches were cut off or preserved in fragments; Averbouh, Bodu 2002).

Artefacts of this type are known from over a dozen European sites of the Stone Age. Most tools of this type come from Upper Palaeolithic sites associated with Solutrean and Magdalenian communities (Averbouh, Bodu 2002).

How were they used?

The most frequent interpretation of the possible uses of Palaeolithic soft hammers made of deer antler is related to the processing of stone raw materials. The thesis that these products were used during the preparatory processing of flint cores, repairing of the tools' working edges, breaking the concretions, and shaping various rock products, is widely accepted (Korobkowa 1999, 22). It was the experimental studies that have provided the most important arguments to support such suggestions. In many cases, they were supplemented by results of the use-wear analysis that confirmed the analogies between the usage damages visible on experimental products and the artefacts (Korobkowa 1999, 23; Averbouh, Bodu 2002). However, not every hammer had to fulfil this role, as evidenced, for example, by finds from the Czech Republic. Some of the antler hummers from the site Pavlov I were used most likely for grinding/ crushing plant and mineral materials, not to flint processing (fibres, dyes, etc .; Goutas 2015). It clearly indicates that these tools could perform many more functions than they are commonly assigned to.

Experimental program

The aim of the conducted experiments was to study and characterize the location and morphology of damages that are creating on the working surfaces of the antler hammers used for various activities. A base and the comparative material for these works was a find of Upper Palaeolithic antler hammer from the site in Biśnik cave.

For the purposes of the experiments, eight hammers were prepared from the red deer antler (Cervus elaphus). The tools were initially shaped (shortening the beam and removing the tines) with the use of mechanic tools. However, their working surfaces were formed by grinding on a sandstone slab (Fig. 1).

The tools created in this way were used to processing various types of raw materials:

Fig. 1. Examples of hammers used during the experiments.

a) Three hammers were used to process the flint raw material, particularly to produce typical for Upper Palaeolithic bifacial knives as well as to knapp the blades (Fig.2). The knapping was carried out by a qualified specialist. Knapping lasted for about 2 hours. As a result three bifacial knives, and several dozen blades from three cores were produced.

Fig. 2. Experimental flint knapping. Making upper palaeolithic blades.

b) One hammer was used to crush the hematite to obtain a powdered dye (Fig. 3A). The lumps of hematite were placed on a flat, stone pad made of sandstone and then struck with a hammer. The experiment lasted half an hour; a dozen or so hematite lumps of various sizes (from 4 to 10 cm in length) were fragmented;

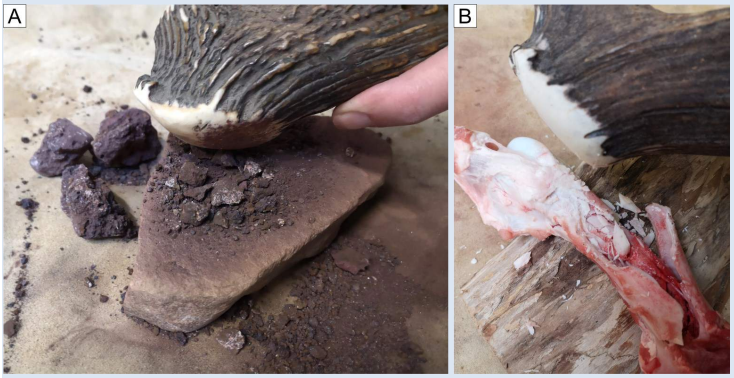


Fig. 3. Experimental crushing of the hematite (A) and breaking fresh bones to obtain marrow (B).

c) One hammer was used in an experiment involving splitting long bones in order to obtain marrow from them (Fig. 3B). Thirty fresh long bones of the domestic pig (Sus domestica) and four metapodial bones of red deer (Cervus elaphus) were gathered for the purposes of the work. The work consisted in hitting the bone with a hammer until it was split into smaller fragments. The experiment lasted 30 minutes;

d) The sixth hammer was used to hit the flint wedges, in the process of bone segmentation (Fig. 4A). For the purposes of the experiment, flint flakes and burins were used. They were placed on the long bones epiphyses or their shafts and hit, what resulted in the division of the raw material along its axis. The experiment lasted 30 minutes which allowed to make a few hundred "hits";

e) The last two hammers were used similar to the hammer described above, however in this case the wedges were made of bone (for the first hammer) or wood (for the second one). With these tools, we have processed birch branches that were usually about 5 cm in diameter (Fig. 4B). As before, the experiments lasted 30 minutes which was enough time to hit the wedges several hundred times.

Fig. 4. Experimental hitting in various wedges: A - flint, B - bone.

Despite the fact that the working time with these hammers may seem short, significant changes and damages of different morphology have been observed on their working parts (Fig. 5).

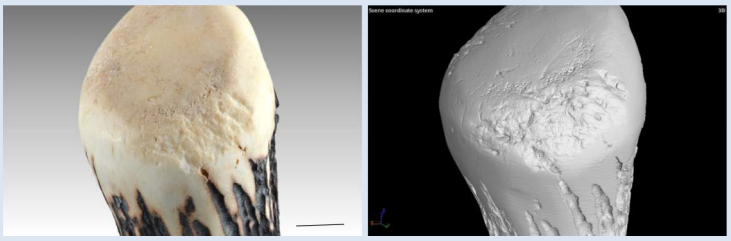


Fig. 5. Example of the damages created on hammer used to produce bifacial knives. On the left: general photo; on the right: 3D model of the hammer made with micro-CT scanning. The micro-CT study was conducted at the AGH University of Science and Technology in Kraków, Poland.

Now all experimental tools will be subjected to traceological analyses. Publication of the results soon! :)

References:

Averbouh, A., Bodu, P., 2002. Fiche percuteur sur partie basilaire de bois de cervidé. In: Patou-Mathis, M. (Ed.), Industrie de l'os préhistorique. Cahier X, Compresseurs, Percuteurs Retouchoirs. Editions Société Préhistorique Française, Paris, pp. 103-115.

Goutas, N., 2015. From stone flaking to grinding: three original Pavlovian antler tools from Moravia (Pavlov I, Czech Republic). Quaternary International 359-360, 240-260.

Korobkova, G.F., 1999. Narzędzia w pradziejach. Podstawy badania funkcji metodą traseologiczną. Toruń.

Promotion of archaeological reconstructions in public. Modern times fashion found in graves

Symultanetly to the development of the experimental archaeology many different "reconstruction teams" appeared that as a main porpose of the existence found bringing closer the different aspects of life in the past to a wider audience. In the beginning, that was the domain of history enthusiasts, who met on the occasion of historical events anniversaries. Very soon, making artefact copies craftsmen joined them, which unfortunately introduced a lot of confusion to the way that prehistory and history is percepted by the public, because the knowledge sold with the copies was very often not "solid", full of half-truths, and far of the past reality. Nowadays, the members of the reconstrustion groups are real scientists (archaeologists and historicals) who try to popularize the past by making it more understandable both for children and adults. They turned a part of their scientific interest into the various reenactors activities, what brought benefits not only for education, but also for science. In the beginning they were single scholars working together with student researching societies functioning at Universities historical departments. Their work quickly became the focus of public interest, however at this stage, the development and promotion of this type of studies was limited by the lack of funding for such purposes.

For some time a tendency can be observed that in order to create a kind of counterbalance to reenactors-amateurs' activities and to build a more adequate vision of the past in the interested audience, new scientifically profiled projects are started, where the knowledge imparted to people is built strictly basing on archaeological finds, paleobotany, studies on historical diet and written sources.

One of the teams working this way was created also at the IA NCU, under the management of Prof. Małgorzata Grupa. The team consists of archaeological students and post-graduate students, but also historians and anthropologists. The team focuses on the reconstructions of the historical garment.

One of the first projects realized by the members of the team concerned the reconstructions of the garment from the Late Medieval Period and Modern times based on the grave clothes (Fig. 1).

Fig. 1. Examples of the reconstructed elements of costumes discovered in the burial crypt of the church in Bytom Odrzański. Burials date back to the middle of the 18th century.

The project has been summarised during a public event, where, thanks to the cooperation with specialists reconstructing clothes from earlier periods, it was possible to prepare a kind of fashion show 'across centuries' to present non-professional changes in everyday and grave clothes in the space of the centuries.

The fact, that the reconstructed during the project grave clothes consisted of garments worn for everyday or the ones specially made for burials (imitating the everyday clothes but made of the worse quality or less expensive textile) made it possible to present and discuss these differences during the show (Fig. 2).

All these reconstructions are presented on historical picnics, 'open doors' festivals and The Festival of Science and Art – an annual event in Toruń. Together with increasing interest from the side of educational institutions and culture centers, the team visits these places with shows and lectures more and more often.

Dawid Grupa

Fig. 2. A, D - "Old fashion show" Old Town Square Toruń - Museum Night 14/09/2013; B, C, E, F - Show of copies and reconstructions of costumes. Presentation of the results of the crypt research in the church of Name of the Blessed Virgin Mary in Szczuczyn - 21/09/2013

Reconstructing the Late Palaeolithic flint miner toolkit - osseous chisels

The presented experiment was performed by Grzegorz Osipowicz, Justyna Orłowska and Justyna Kuriga and was described in the article entitled: The oldest osseous mining tools in Europe? New discoveries from the chocolate flint mine in Orońsko, site 2 (southern Poland), published in 2019 in Quaternary International (Osipowicz et al. 2019).

Three bone artefacts were found in the fills of Late-Palaeolithic mining shafts within the boundaries of a chocolate flint mine in Orońsko, Site 2 (southern Poland). The radiocarbon ages of eleven charcoal samples from the backfill and bedrock of shaft in which bone artefacts were discovered indicate that the features were filled up at the end of the Alleröd period and early Younger Dryas. On the mentioned artefacts, very specific use-wear traces were identified, which suggest that tools could be used during mining works.

Our experiments aimed to replicate the activities that might have been performed using similar tools at the flint mine. In the beginning, we decided to simulate the mining activity using large flint nodules brought from a quarry in Iłża, about 30 km from Orońsko. The Iłża deposit contains chocolate flint and banded flint. For the experiment, a long chisel made of deer metatarsus was prepared and shaped similarly to the analysed tools from Orońsko. The chisel was hit with an antler hammer (Fig. 1A). The work performed using this tool should be considered successful, yet about 25 min later, a long blade detached from the tip of the implement, considerably damaging the working edge (Fig. 1B). This ended the first stage of the experiment. The tip of the tool was cut off (to conduct use-wear analyses), while the remaining part of the item was used for making another chisel (Fig. 1C), which was used to continue the work. At this stage of the experiment, the tool was also employed as a burin for picking out lime. The tool was not hit with a hammer but pressed to the surface of the limestone, which allowed for carving deep grooves in it and securing its working edge from fracturing. The experiment was finished 30 minutes later since it was sufficient to make a macroscopically visible wear polish.

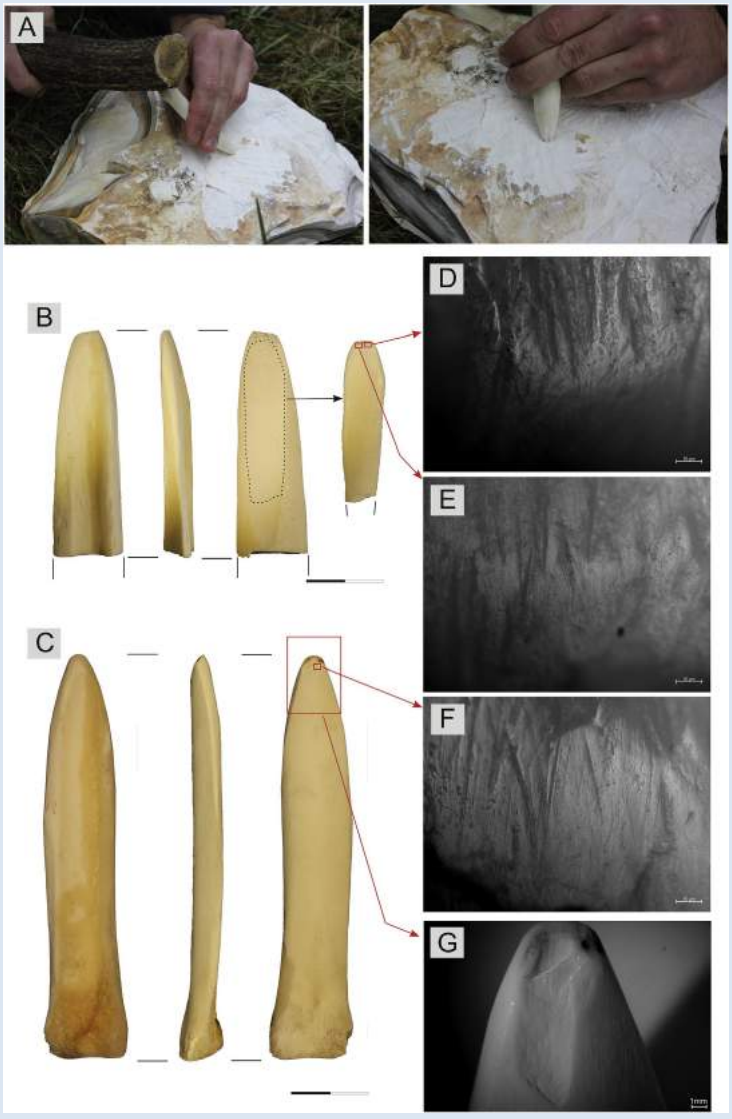


Fig. 1. Experimental studies: A – removal of remains of the limestone rock matrix and limestone cortex from the large flint nodules; B, C - tools used in experiments (after Osipowicz et al.. 2019, fig. 7).

The second part of the experimental works was carried out in the Neolithic mine of the banded flint at the Archaeological Museum and Reserve "Krzemionki" in Ostrowiec Świętokrzystki. Two chisels from the metatarsus of a deer were prepared for the experiment. The experiment was carried out underground in the mine and consisted of extracting flint nodules from the limestone rock matrix. Similarly, as in the case of the above-described experiments, two techniques were used for this purpose, i.e. grooving in the limestone with the use of pressure technique (without hitting the tool - Fig. 2A) and chiselling with a tool hit with a wooden hammer (Fig. 2D). Both techniques were effective, although working with a hammer allowed for easier separation of more problematic rock fragments. The tool used for grooving, in turn, was better for precise purification of flint nodule in the softer parts of the wall. Both tools were used for 40 min. On their working edges, no major damage was observed. As a result of the experiments, a broad spectrum of highly typical use-wear traces was obtained.

More details about the results of performed experimental works and artefacts from Orońsko mine can be found in Osipowicz et al. 2019.

References:

Osipowicz, Kerneder-Gubała, K., Bosiak, M., Makowiecki, D., & Orłowska, J. (2019). The oldest osseous mining tools in Europe? New discoveries from the chocolate flint mine in Orońsko, site 2 (southern Poland). Quaternary International, 512, 82–98. https://doi.org/10.1016/j.quaint.

A short movie from our experiments can be found here (just click or scan the QR code):

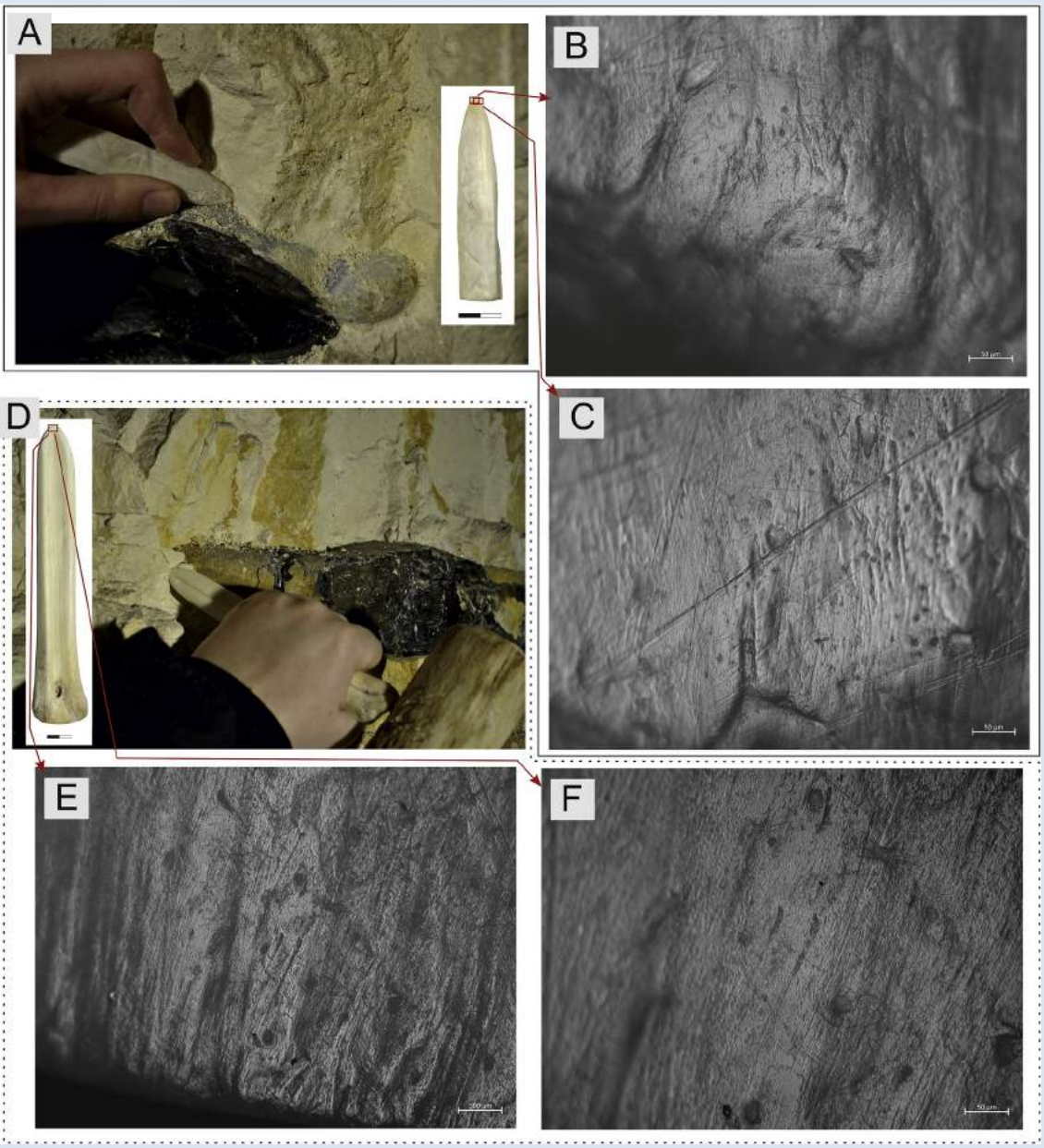


Fig. 2. Experimental studies: A – grooving in the limestone rock matrix to extract the flint nodule with the use of pressure technique; B, C, E, F – examples of observed usage traces; D – chiseling the limestone rock matrix to extract the flint nodule with a tool hit with wooden hammer (Photo G. Osipowicz; J. Orłowska; after Osipowicz et al.. 2019, fig. 8).

Our recent publications

Andrzej Buko, Tomasz Dzieńkowski, Stanisław Gołub, Mirosław P. Kruk, Marek Michalik, Aleksandr Musin, Grzegorz Osipowicz, Alicja Rafalska-Łasocha and Marcin Wołoszyn

BEYOND BEAUTY. BYZANTINE STEATITE ICON FROM CHEŁM. ARCHAEOLOGY, PETROGRAPHY AND TRACEOLOGY

Abstract: A fragmentarily preserved Byzantine icon made of steatite was discovered in 2015 during regular excavations in Chełm, eastern Poland. Identified as the left wing of a diptych illustrating the Twelve Great Feasts and created at the close of the 12th century, the find is one of the most important and beautiful Byzantine artefacts to have been found in Poland. The icon was uncovered within the confines of the palace complex which was created by Daniel (Danylo) Romanovych († 1264) in Chełm in the second quarter of 13th century. The icon, even though it was found within the borders of what is now Poland, is material evidence of contact between Byzantium and the social elite of the Galicia-Volhynia lands, rather than with the Polish Piasts.

In this paper we concentrated on the presentation of the archaeological context of the find, which made it possible to establish that the icon arrived Chełm before the middle of the 13th century (terminus ante quem 1253), and especially on petrographic and traceological analyses of the icon.

Assuming that greenish plaques were indeed the most characteristic steatite icon type, a decision was made to examine, apart from the Chełm artefact made from white rock, a greenish icon from the National Museum in Krakow as well.

Petrographic analyses were based on optical microscopy, scanning electron microscopy with energy dispersive spectrometry (SEM-EDS) and X-ray powder diffraction (XRPD). Both icons were carved in steatite i. e. talc rich rock but their chemical compositions indicate the presence of other components. Artifact from Chełm is white. Porous, enriched in potassium (K) and locally blistering outer rim of the icon from Chełm was formed probably during the fire event. Presence of forsterite and subordinate amount of leucite also indicate high temperature influence. Local enrichment in calcium (Ca) is related to exchange reactions with ground compounds. Accumulation of different components on the surface of the icon's surface was noted. The icon from the National Museum in Krakow is greenish probably because of the presence of chlorite.

The results of the traceological analysis (icon from National Museum in Krakow was not analysed) indicate that the icon found in Chełm was created most likely by a skilled and experienced carver with access to the high-quality magnifying glass and specialist tools required for rendering minuscule objects and their details. The production of the icon also involved the use of a "mechanical" tool, probably a kind of a miller with a rotating polishing head, which also seems to point to a specialist workshop. The use-wear traces observed on artefact are limited to polish resulting from prolonged contact with human hands or storing the icon in a leather case.

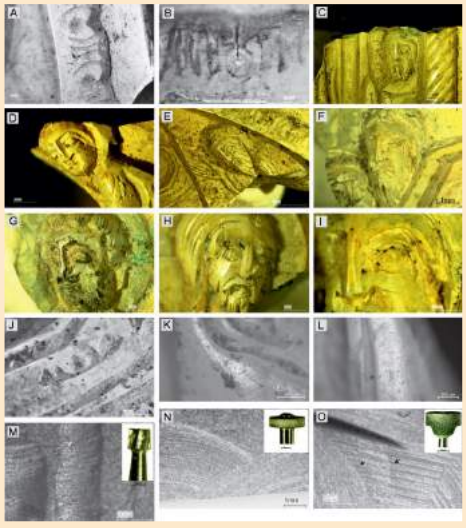
Most of the extant Byzantine icons are unprovenanced objects held in museum collections or church treasuries. Therefore, as the icon presented in this paper was discovered during archaeological excavations, it ranks among the few Byzantine artefacts to have been found outside of this realm. The petrographic and traceological analyses conducted are the first published natural science contributions to the study of Byzantine steatite icons and we hope they will provide the impetus for undertaking such research on other Byzantine finds, helping to develop Byzantine archaeology further.In Journal: Archeologicke Rozhledy LXXI:45-66 (2019)

In Journal: Praehistorische Zeitschrift (2021); https://doi.org/10.1515/pz-2021-2041

Abhandlung

Andrzej Buko*, Tomasz Dzieńkowski, Stanisław Gołub, Mirosław P. Kruk, Marek Michalik, Aleksandr Musin, Grzegorz Osipowicz, Alicja Rafalska-Łasocha, Marcin Wołoszyn

Beyond Beauty. Byzantine steatite icon from Chełm. Archaeology, Petrography and Traceology



Icon from Chełm (A–L) and a steatite plate used in experiments (M–O). Examples of traces observed on the icon's surface and on the steatite plate. Photo: G. Osipowicz (after Buko et al.. 2021, fig. 22).