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NICOLAUS COPERNICUS UNIVERSITY IN TORUŃ
Faculty of History

EDITORIAL

The beginning of the studies in experimental archeology conducted at the Institute of Archeology of the Nicolaus Copernicus University in Toruń (NCU) can be dated back to the 1970s. During this nearly half-century of research, a variety of archaeological experiments have been carried out at our center, of which unfortunately only a small part has been reported in the scientific publications. The vast majority of the studies for various reasons went into oblivion, which is undoubtedly a significant loss for a science. Awareness of this situation has become an impulse for creating a Newsletter whose first issue, with great satisfaction, we are giving into Your hands.

The content of the number fully reflects what we want our Newsletter to be. We are interested in refreshing and disseminating the results of experimental archeology works carried out at the NCU in the past, that are almost completely forgotten today, and outside of our center unknown at all. Therefore, the first of the texts published below refers to the history of the studies in experimental archaeology at the Institute of Archeology NCU. It is complemented by a list of the previous publications in this field that can be found on the last page.

Of course, the main purpose of the Newsletter is presentation of the most current experimental archeology studies carried out at the NCU. This goal is accomplished by the second of the texts in the issue, describing some aspects from the results of the recent experiments with replicas of the Early Holocene heavy duty bevel-ended tools.

The Newsletter was conceived also to provide a platform for young adepts of experimental archeology, allowing for presentation of the initial results of their works. We want to make possible their dissemination and discussion, and thus, facilitating their subsequent publication in the full range in thematic periodicals. That is the reason why the third text included in the number relates the preliminary results of the interesting experiments concerning the strength testing of tar binder and other natural adhesives, recently conducted by the students of the Institute of Archaeology NCU, as a part of the classes at the University.

The Newsletter will be published quarterly. I hope very much that our initiative will appeal to You All and that we will meet a positive response. I wish you pleasant reading and I encourage You to write us and comment on our research. Of course, we are happy to publish Your comments in the next issues of the Newsletter. And please forgive us, we are not native speakers... ;-)

INSIDE THIS ISSUE

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Experimental archaeology in Nicolaus Copernicus University - a historical overview

Experimental archaeology in Poland has a long, more than 100-year tradition which begun in 1915, when Stefan Krukowski published the results of his works on function of the stone age flint burins. In the Institute of Archaeology NCU, this method was used for the first time in the 1970s by Kazimierz Żurowski (1974), to study the prehistoric ways of softening osseous raw materials (fig.1a,b). Other works were carried out by Andrzej Kola and Gerard Wilke (1975) and concerned methods of production of Medieval crossbow bolts (fig.1c-f). In 1995, Jolanta Małecka-Kukawka participated with a group of students in traceological camp in Izhevsk, organized by the Russian Academy of Sciences. As a result of the established cooperation, the two-week course of use-wear analysis was organized in the Institute of Archaeology NCU in April 1996.

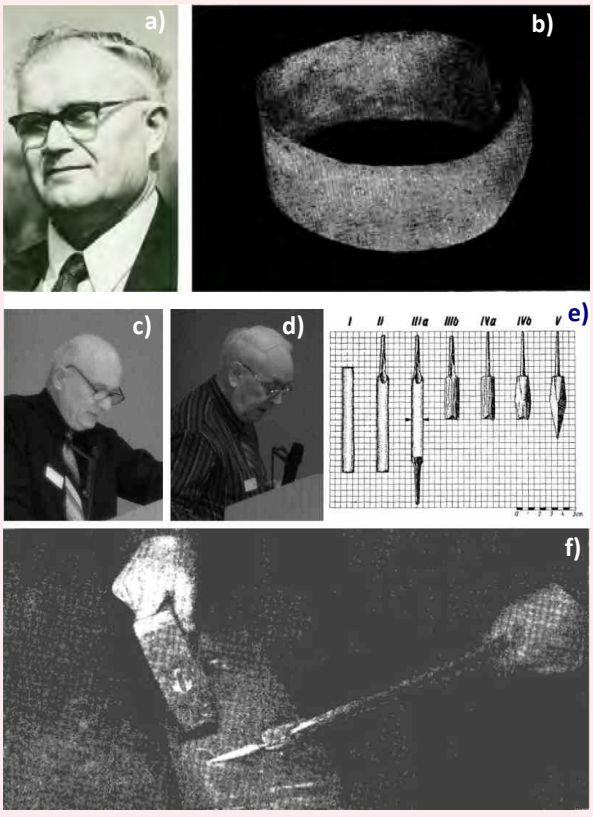


Fig.1 a) Kazimierz Żurowski; b) An armlet made by Kazimierz Żurowski of a rib bone, softened in sour milk (Żurowski 1974); c) Andrzej Kola; d) Gerard Wilke; e) Diagram of production phases for crossbow bolts; f) Production of bolts during the experiment (Kola, Wilke 1975).

One of the most important events for the development of the experimental archaeology in our University was the foundation of the Laboratory of Traceology in 2008, which is very strongly associated with experimental works and have one of the biggest Poland's comparative base of various kinds of experimental tools. The emergence and development of this base was possible thanks to the work and commitment of the members of the Society for Experimental Prehistoric Archaeology (SEPA), founded in 1998, which is currently lead by one of the founders – Grzegorz Osipowicz (fig.2).

Fig.2 Logo of the Society of Experimental Prehistoric Archaeology (SEPA).

The aim of the work carried out by members of the Society (fig.3, 4) is reconstruction of certain aspects of human life in prehistory, with particular emphasis on the period of the Stone Age. Over many years, the members of SEPA performed numerous scientific experiments, among which one of the most important works were related to the methods of tar production (with and without the use of ceramics), making holes in stone axes, as well as softening osseous raw materials.

Fig.3 Year 2003 - SEPA with friends

Recently performed tasks were related to the function of polished flint scrapers from Nida site (Lithuania), splitting the bones in the Late Neolithic site in Osłonki (Poland) and influence of peat environment on use-wear traces on prehistoric antler tools. Details on these works can be found on the SEPA website (www.keap.umk.pl) and in the publications, whose list is at the end of this Newsletter. Many of the above works have been realized in the course of one- or two-week experimental camps in which participated students from Toruń and other Universities from Poland. During one of such meetings, an attempt was made to reconstruct a shallow pit-house from the Stone Age in the Sąsieczno village (picture behind the title). Students belonging to the Society, organised numerous presentations or archaeological workshops and participated in many events such as science festivals, archaeological picnics or history lessons.

Fig.4 Year 2017. Members of SEPA during round trip of Holland.

In recent years, in the courtyard of the Institute of Archeology NCU, an archaeological open-air museum has been created with reconstructions of buildings with residential and economic functions belonging to various periods of history. It includes a Mesolithic hut covered with reeds (fig.5,6), a Neolithic shallow pit house, an Early Medieval log house in a post-and-plank construction and semi-open forge. The economic background created next to them include different workshops (carpentry, blacksmith, potter, foundry-goldsmith and spinning-weaving) used for high spectrum of experimental activities.

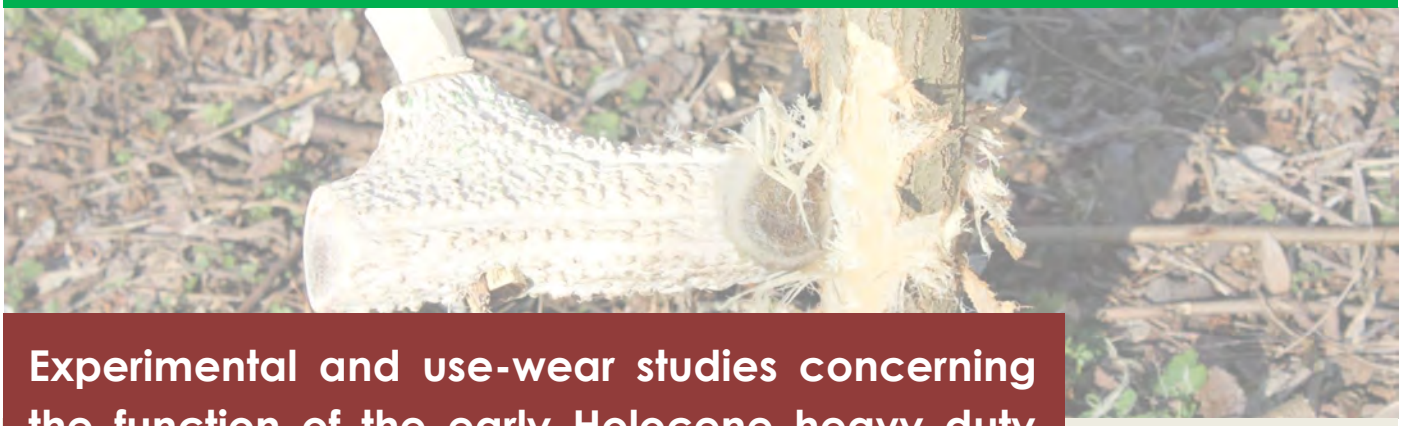
Fig.5 Experimental construction of the Mesolithic shelter.

Fig.6 Finished experimental construction of the Mesolithic shelter.

Since 2016 at the Institute of Archeology NCU, the lessons has been started (both, in Polish and English), which provides students with theoretical and practical knowledge of experimental archeology.

It is hoped that subsequent generations of students and scholars will uphold the long tradition of experimental archaeology in the Institute of Archaeology NCU, through participation in the new projects and further development in this field of research.

J. K.



Experimental and use-wear studies concerning the function of the early Holocene heavy duty bevel-ended tools

Heavy duty bevel-ended tools, such as axes and mattocks, belong to the category of the most frequently discovered artefacts on the early Holocene hunter-gatherer European archaeological sites. These objects are distinguished by c.a. 50-degree bevelled working edge and the raw material used to produce them was mostly deer antler. Despite the relatively large number and versatility of the studies carried out so far (e.g. Jensen, 1991; Riedel et al., 2004), the contemporary knowledge of the probable function of these objects remains incomplete. The problem here arises primarily from lack of detailed characterization of damage observed on these tools and resulting from work in a variety of raw materials, that could be used as a comparative basis for the interpretation of the function of these archaeological artefacts.

This issue became the basis for planning and carrying out experimental program, which tries to fulfil two main objectives: verification of the suitability of these tools to perform various activities and processing of various types of raw materials and the identification, analysis and classification of macro and microscopic traces formed on their working surface during work. During the experiments conducted directly for the purpose of this project, a wide variety of household activities were tested, taking into account many possible variables, such as: kind of worked material (soil, wood, hide, flesh, ice), type of activity performed (chopping, digging, scraping, hewing, hitting) and duration of work.

One of the part of the experimental program was connected with wood processing. The works included two actions: chopping and hewing. The experiments of the first type consisted of chopping various tree species using axes (fig.1). The raw material was divided into two main categories, according to its hardness. Division and selection of appropriate species was based on the Janka wood hardness scale.

Fig.1 Examples of photographs illustrating the experimental works: a) chopping young/hard wood; b) chopping soft wood

In the experimental works involving chopping, trees were classified as soft (pine or birch), ab. 20-25 cm in diameter, or hard (young acacia, maple), ab. 10-15 cm in diameter. Hard/young trees were cut at a height of approx. 20-30 cm from the ground. In this way, the total number of several trunks were acquired. As for the softwood, besides felling trees, lying trees from fresh felling in forests were chopped. A total of seven experiments involving chopping wood were carried out, which lasted a total of about eight and a half hours.

The carpentry experiments involved a multi-stage removal of scorched, charred layers of birch wood (fig.2). Two morphological mattocks were used for this purpose. The starting point for this part of the experiment was the current knowledge of the possible techniques for making dugout boats in prehistoric times. During the experiments, trunks no larger than 25 cm in diameter were placed in a fire for about 10 minutes, giving approx. 1-2 cm thick layer of charred wood. This layer was removed with the experimental tools and the action was repeated several times. The total time of two conducted experiments in this case was one and a half hour.

The performed experimental works were the basis for further microscopic examination which led to document a number of the usage traces, whose characteristics can be a significant source for comparative analyses with the prehistoric artefacts (fig.3). The full results of the studies will be published soon (Orłowska, Osipowicz, 2018 in press).

J. O.

Fig.2 Examples of photographs illustrating the experimental works: a) hewing burnt wood; b) exemplary macroscopic damage visible on the one of the experimental tools after hewing.

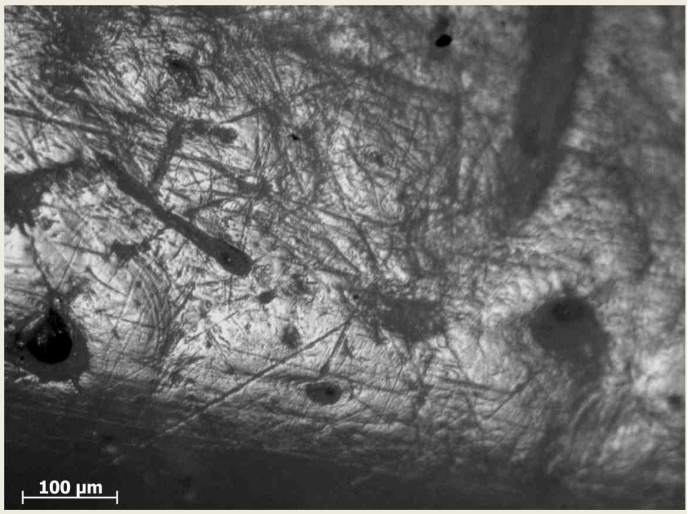


Fig.3 Example of micrograph of use-wear traces visible on experimental tool – chopping young/hard wood.

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Strength testing of tar binder and other natural adhesives

In 2005, in the (Re)construction and Experiment in Archaeology magazine an article was published presenting a method for producing tar without the use of ceramic vessels, which could have been used in the periods preceding their introduction in the Neolithic, as reconstructed in the course of experimental studies (Osipowicz 2005). Since that time, at the Institute of Archaeology NCU multispectral research was conducted with the aim to perfect it, together with studies on the properties of the obtained binder and its chemical composition in the context of similarities and differences regarding prehistoric substances and the possibility to differentiate them from a product made by means of 'ceramic' methods. The results of these studies will be published soon (Osipowicz et al. in print).

Here, we would like to present a part of this research program, concerning strength testing of tar binder and other natural adhesives. Experimental research described was conducted by students of the IA NCU Katarzyna Olczak, Marlena Piżewska, Milena Marecka and Mateusz Kobyłka as part of experimental archaeology classes.

The key objective of the depicted experiments was to investigate the properties and the strength of joints made with the use of three basic types of natural adhesives with due account to the types of bonded materials (fig.1). The experiments involved the use of: tar obtained by means of the two-vessel method, pine resin mixed with charcoal and adhesive made from milk and vinegar with the addition of calcium (Beatson 2014, Helm-Clark 2007). Binders made from the first two substances were subjected to strength tests after 3 hours from joining the bonded surfaces, whereas the adhesive made of milk and additives required a 24-hour drying time.

Fig.1 Examples of used during experiments adhesives: a) pine resin mixed with charcoal; b) adhesive made from milk and vinegar with the addition of calcium; c) tar obtained by means of the two-vessel method.

The conducted experiments involved bonding two pieces of wood , a wooden stick with antler (fig.2) or flint, flint and hide, as well as two pieces of hide. In all cases, the bonded elements were butt-joined together in order to eliminate any possible factors that could additionally improve the strength of the joints (e.g., friction or a different distribution of forces during strength tests). It was also ensured, that the area of contact was the smallest possible and the same in a given type of experiment, i.e., ab. 1 cm (the diameter of a stick) in most experiments.

Fig.2 Example of bonding a wooden stick with antler using tar.

The conducted strength tests consisted in applying under bonded elements a load of increasingly greater weight and examining the load each joint could withstand, with the test being considered 'passed' if a given load did not break the joint for at least 15 seconds (fig.3).

Assuming, that the conducted tests are credible to some extent, tar proves to be clearly the most useful adhesive for bonding various types of materials of all the three tested in the experiments. The exceptionally high strength of the binders created by this adhesive is prominent by the fact, that ab. 1 sq. cm joints is able to withstand tensile strength of nearly 8 kg (in the case of glued wood and flint). Here, one ought to note, that the adhesive properties of the employed types of binders for joining various materials together are significantly different. Interestingly, the suitability of pine resin for bonding wood is analogous to that observed for tar, whereas pine resin proved completely unsuitable for joining wood and flint together, where tar proved (as mentioned above) an excellent binder. This problem shall be further discussed in the planned publication that accounts for the currently conducted verification tests.

G. O.

Fig.3 Example of one of conducted strength tests consisted in applying under bonded elements a load of increasingly greater weight and examining the load that joint could withstand.

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Our Team

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