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NICOLAUS COPERNICUS UNIVERSITY IN TORUŃ
Faculty of History

Society for Experimental Prehistoric Archaeology

Edited by GRZEGORZ OSIPOWICZ

EDITORIAL

Dear Readers, we are pleased to present the next issue of our Newsletter. We have posted inside three different, but as always (we hope) interesting articles. The first one deals with one of the aspects of experimental studies that we carry with prehistoric techniques of amber processing for the needs of traceological analysis. You can read here about our works aimed at the reconstruction of the way of drilling holes in the tubular beads. The second article present experiments realized by our students, devoted to dyeing wool and linen fabrics with various types of natural dyes. The last of the articles, deals to the construction at the backyard of our Institute a wooden hut in a mixed (saddle-notch and post-and-log) technique. The building refers to the medieval and modern structures of this type known from the area of Poland. As always, we count on interest in our works, which can be expressed, for example, by writing to us. We will also be present during EAC11 in Trento, where we hope for a successful discussion with conference participants! See you there!

INSIDE THIS ISSUE

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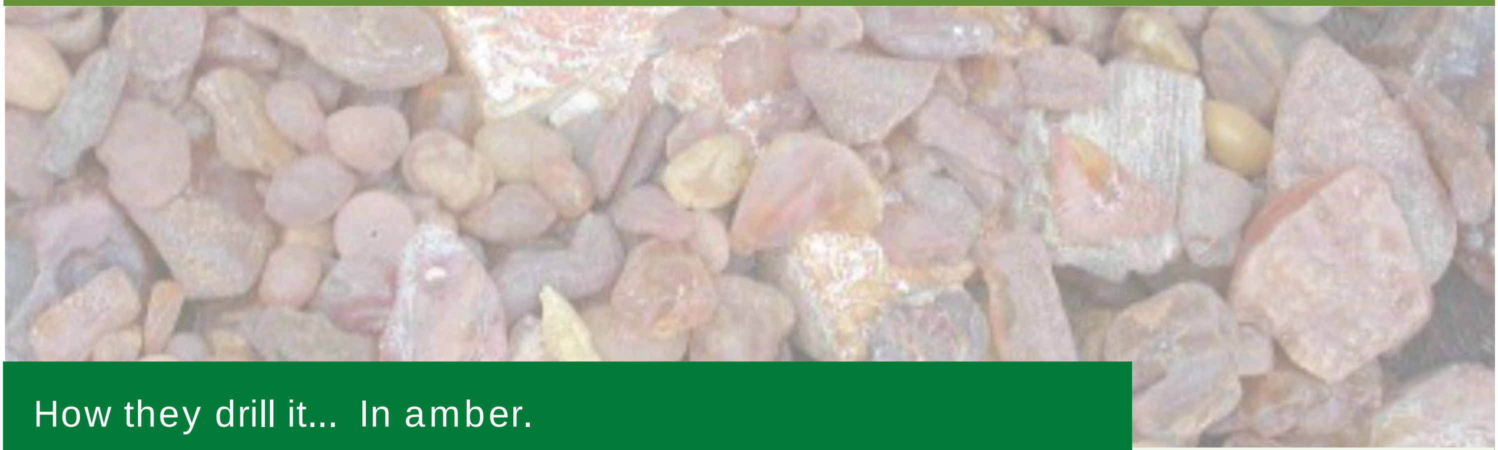
Experimental Archaeology in Poland!

We warmly invite You to participate as a volunteer in the excavations conducted under the research program "Mesolithic Communities of the Chełmno-Dobrzyń Lakeland - daily life, mobility, external contacts and relationships with the environment".

The excavations will take place in July and August 2019 on several sites located in the subglacial valley of Grodno and Plebanka lakes (about 40 km from Toruń, central Poland).

During the excavations we plan to carry a multi-faceted experimental archaeology program. Detailed information You can find on the last page of the current number of the Newsletter :)



How they drill it... In amber. Experimental making of holes in amber tubular beads

Amber has accompanied human for a long time. The oldest artefacts made of this raw material comes from the Palaeolithic sites, where it was used (as in other periods) for various purposes. Most often, however, it was used for the production of pendants and amulets, which numerous examples come also from Poland. One of the most remarkable examples are the Neolithic finds from Niedźwiedziówka, a small village in Żuławy, where remains of amber workshops were discovered (Mazurowski 1983). In the Neolithic, the most popular were beads in the form reminiscent of today's "buttons" and tubular beads (fig. 1).

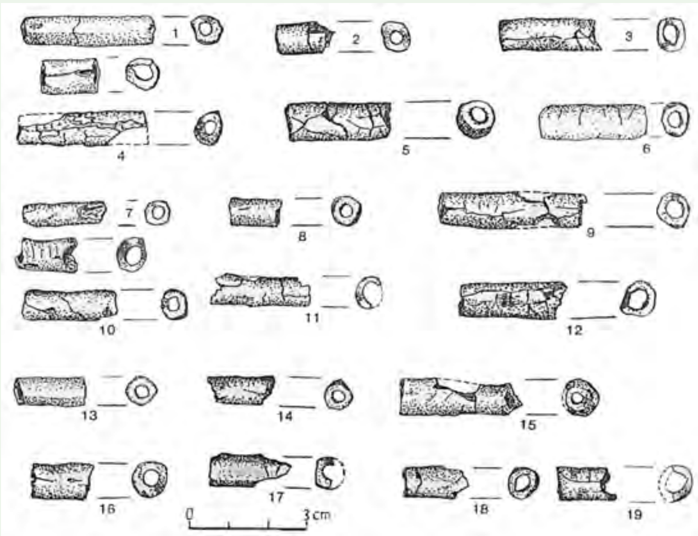


Fig. 1. Selection of the Late Neolithic amber artefacts from northern Masovia, ph. III . Zaborze, grave II (source: Mazurowski 1977).

The members of the Society for Experimental Prehistoric Archaeology conducted a series of experiments aimed at the reconstruction of various amber processing techniques with the use of flint, stone and bone tools. The primary initiator of this type of work was Eryk Popkiewicz. Below, we would like to present one of the technological aspects of processing this raw material, namely making long and narrow holes, such as in the case of the aforesaid tubular beads.

We have decided to present our experiences in this area in the Newsletter after a brief discussion on this issue, which we recently witnessed during the conference: International Open Workshop conference: Socio-Environmental Dynamics over the Last 15,000 Years: The Creation of Landscapes VI, that took place in Kiel (Germany).

At the outset, it should be noted that drilling a hole in amber could take place at any time during its processing. The amber artefacts found among others in Niedźwiedziówka indicate that the holes were drilled in uncut or partially processed lumps. Drilling in the initial stage of raw material processing (when it is still in the raw state; fig. 2) is more ergonomic because it is easier to hold or fix a more massive object so that it is stable during work. It is also more economical because it's the most challenging part of the process when the greatest destructions occur (Popkiewicz 2012).

Fig. 2. Example of raw amber nodules.

During the experimental works carried out by SEPA members, the drilling of amber was made among others with the use of flint borers and perforators, mounted on a wooden stick about 30 cm long. To propel the drill, the so-called bow drill was used. The use of bow drill is known, at least from the Mesolithic, which has been confirmed, among others, at the Danish site in Mullerup (David 1999, 475).

Fig. 3. Experimental flint perforator mounted on wooden stick.

In order to properly make the hole, the first step is to point the place of drilling, so that the drill does not slip on the surface of the amber. This treatment can be performed with the help of a sharp-edged flint blade or flake.

As a result of many experiments, it turned out that the best results were achieved by drilling, during which the base of the drill was placed vertically into the ground, and the amber nugget was being pressed (slightly) against the flint borer on the top (fig. 4). This technique is known thanks to ethnographic observations. The processed raw material should be kept firmly in hand, and a drill should be moved in a reciprocating motion. The advantage of this method is that you can very precisely control the applied force, it requires only one person and you do not need to create a special yoke that keeps the drill or amber. During drilling, amber dust falls out from the resulting hole (under the influence of gravity), sometimes a slight crack is heard when a tiny piece of a flint drill crushes out inside the amber. However, these wastes immediately fall out of the hole, which protects the processed material.

Fig. 4. Experimental drilling with bow drill.

Using the bow drill and two flint borers, a 3 cm hole is obtained in about 1.5 hours. During the experiments with flint tools, it has been observed, that the use of a borer causes increased friction and thus an increase in temperature, which can result in amber cracking. However, drilling with the use of a perforator causes less heating up of the raw material, which reduces the risk of its breaking. Generally, drilling in amber cannot take a long time, i.e., every five minutes one should make a break to cool the drill and amber. The time for making the holes with the use of borer and perforator is comparable. The perforator can work faster and longer without interruption. Borer is more effective, but it has to be used working slowly and for shorter periods of time (with intervals), in order not to overheat the amber and tool. The disadvantages of both tools are balanced. Both are suitable for drilling deep holes in amber, although from the perspective of the economics of time and the human factor, the perforator seems to be a better choice.

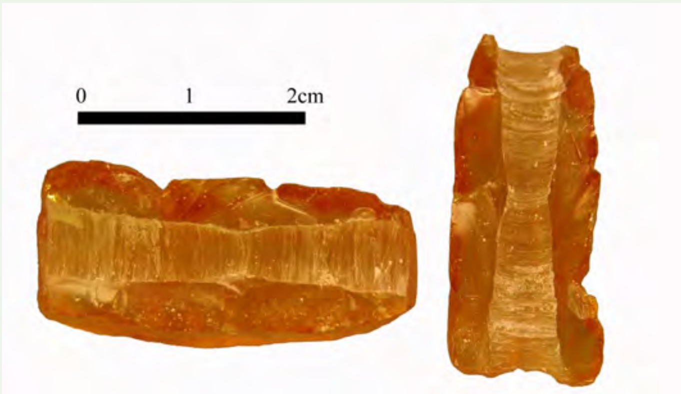


Fig. 5. Example of experimentally drilled amber.

Numerous experiments carried out with drilling holes in amber proved that thanks to the use of appropriate techniques and tools, we can efficiently perform deep drilling in this raw material without damage it (fig. 5). The occurrence of tubular beads in archaeological materials may be a testimony to the knowledge of the above-described or similar method of treating this raw material by the prehistoric communities.

References :

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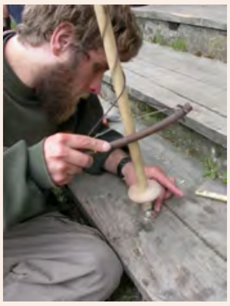
Popkiewicz E. 2012. Rekonstrukcje narzędzi, technik i technologii obróbki bursztynu, Prace Muzeum Ziemi 50, 91-101.



Eryk Popkiewicz – archaeologist, educated at the Institute of Archeology, Nicolaus Copernicus University in Toruń. A long-time member of the Society for Experimental Prehistoric Archaeology (SEPA). He specialises in designing and making artistic jewellery in amber and silver. In addition to the production of amber and silver jewellery, he also carries out reconstructions and stylizations of tools and ornaments from amber workshops from the Middle Ages and prehistory. He runs workshops on amber processing. He is the author of scientific articles about this raw material.

Experiments with the dyeing of fabrics using natural dyes

As a part of the experimental archaeology classes conducted at the Institute of Archeology NCU, a group of students planned and prepared experimental program related to old techniques of dyeing fabrics, using vegetable dyes. The experiment was carried out by Elwira Taglewska, Anita Czyrzniewska, Patrycja Kryszak and Mateusz Kowalski.

One of the oldest archaeological sources that may be evidence for the use of dyeing techniques are flax fibres from Dzudzuana Cave in Georgia dated 36,000 years ago (Kvavadze et al. 2009). There are many discoveries of fragments of the dyed fabrics at the archaeological sites in Europe from various chronological periods. Traces of the use of natural dyes were identified on 90 out of 220 samples of the Viking fabrics from Dublin and 19 archaeological sites from Norway and Denmark. These fabrics were dyed on red (madder or bedstraw), purple (lichens), yellow (unidentified plant) and indigotin (woad) (Walton 1988).

During the experiments in this regard conducted at IA NCU, students tested the effectiveness of several selected plant dyes in dyeing linen and wool, the intensity of colouring of individual colours from a specific colour group and the susceptibility of materials to dyeing. In order to obtain a blue colour, 0.25 kg of blueberry and 0.45 kg of red cabbage were used. For the yellow colour, 0.2 kg of oak bark and onion skins from 1.5 kg of peeled onion were used. To achieve a red colour, 0.5 kg of cherries and 0.5 kg of red beets were used.

Fig. 1. Textiles made from natural linen and natural wool - fragments before dyeing.

Six pieces of natural linen fabric measuring 10 cm x 10 cm and six pieces of natural wool fabric measuring 10 cm x 10 cm were used to carry out the experiment.

Before the experiment started, the following factors were considered:

- the influence of water temperature on the intensity of dyeing,

- the boiling time, which depends on the type of dye and has an influence on the depth of colour we want to achieve,

- the effect of the amount of dye per weight of a fabric,

- properties of non-treated linen and wool (both materials shrink in boiling water, therefore it is best to dye the fabric or the thread in the skein, not the finished clothes).

In the first stage of the experiment blue dyes were prepared - from blueberries and red cabbage. The vessels (no. 1 and 2) were loaded with 0.125 kg of blueberries, which were then ground. In two subsequent vessels (no. 3 and 4), 0.225 kg of chopped and crushed red cabbage were placed. Each vessel was filled with water up to ¾ of its height, placed over a fire and boiled for 30 minutes.

Fig. 2. Boiling dyes mixtures from red cabbage and blueberries.

After this time, prepared fragments of linen fabric were put into the vessels no. 1 and 3, and wool fragments to the vessels no. 2 and 4. Each piece of fabric was boiled in the solution for 1 hour, the solution was mixed from time to time with a wooden spoon and the loss of evaporating water was topped up. After an hour of boiling, fragments of fabrics were removed and dried in the open air.

An analogous process and method of conduct were used for the remaining pairs of dyes, i.e. onion skins and oak bark, as well as cherries and red beets.

Fig. 3. Boiling fabrics to make them blue: 1 - wool in a solution with bluberry; 2 - flax in a solution with bluberry; 3 - wool in a solution with red cabbage; 4 - flax in a solution with red cabbage.

Fig. 4. Placing a wool fabric in a dye from oak bark.

All dyes proved to be effective in the dyeing of considered types of fabrics, however, the expected colour was not obtained in each case. Instead of the planned blue colour, purple was obtained both for blueberries and cabbage. Some dyes, despite the intense colour of the solution (beets, red cabbage) dyed the fabric very poorly, while others, with a bright solution (cherries, blueberries) dyed much more intensely. In the case of onions and oak bark, the resulting colours of the fabrics are comparable.

Fig. 5. Removing colored fabrics from dyes.

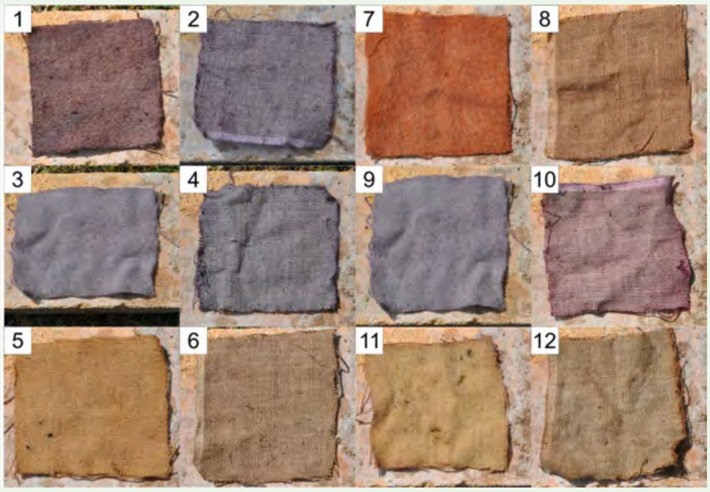


Fig. 6. Colored fabrics after drying: 1. wool fabric - blueberry dye; 2. linen fabric - blueberry dye; 3. wool fabric - red cabbage patch; 4. linen fabric - dye from red cabbage; 5. wool fabric - oak bark pigment; 6. linen fabric - dye from oak bark; 7. wool fabric - onion color; 8. linen fabric - onion dye; 9. wool fabric - cherry color; 10. linen fabric - cherry color; 11. wool fabric - beet dye; 12. linen fabric - beet dye.

Wool turned out to be a fabric susceptible to dyeing and the one in which case aesthetically better shades were obtained. This may be due to the properties of wool which, compared to linen, have a more luminous, natural color or a loose weave.

References :

Kvavadze E., Bar-Yosef O., Belfer-Cohen A., Boaretto E., Jakeli N., Matskevich Z., Meshveliani T. 2009. 30,000-Year-Old Wild Flax Fibers, Science 325, 1359

Walton P. 1988. Dyes of the Viking Age: a summary of recent work, Dyes in History and Archaeology 7, 14-20.

Construction of a wooden hut in a mixed (saddle-notch and post-and-log) technique in the Institute of Archaeology, NCU in Toruń

In 2014, the Institute of Archaeology of the Nicolaus Copernicus University in Toruń acquired funds from the Ministry of Science and Higher Education for the implementation of the "Restructuring of the Cabinet of Artefacts" program. The project was in line with the tendency to intensify interdisciplinary research and the need to create and implement new ways of deepening knowledge about the human past.

As part of restructuring activities, part of the backyard of the Institute has been arranged as an open-air archaeological museum with reconstructions of different buildings along with infrastructure, as well as places of burial and worship. The created buildings were associated with labs for experimental studies on the equipment, construction and internal organisation of traditional craft workshops.

Restructuring activities related to obtaining the necessary ethnographic base in the form of tools and devices of old artisans (available only sporadically on the antiquity market), were unfortunately quite long-lasting. As a result, however, it was possible to attain a substantial collection of resources enabling the implementation of the project.

Due to the lack of employment opportunities for a qualified external specialist, all work was carried out exclusively by persons employed at the Institute of Archaeology.

Fig. 1. View at the undeveloped area of the Institute of Archaeology.

For the organisation of experimental facilities, an undeveloped area of 10 ares has been allocated, limited on four sides by the buildings of the Institute of Archaeology (Fig. 1). The spatial structure of the area has been prepared, taking into account the existing buildings and technical infrastructure, following the provisions of the Construction Law. Work began with shaping (levelling) the ground and in 2015 construction of the facilities provided in the program was started.

For carpentry, casting and goldsmith's workshop, a hut that was intended to build in the eastern part of the area was planned, measuring 4 x 6 m and 5.5 m high, made in a mixed saddle-notch and post-and-log construction. The walls were built from round, peeled pine logs on which a gable roof was arranged, in a combined purlin structure, with the ridge supported on wooden oak plow. The roof cover was arranged from planks, in accordance with the slope of the roof. The roofing with overhangs was created from overlapping spruce rived planks, which were pegged to the roof structure (ridge and purlins). The roof ridge was equipped on one of its ends with a so-called "śparogi" – a wooden decoration in the form of crossed spears.

As the foundation, granitic boulders were placed under the bottom logs in the corners of the hut. A flat limestone rock was positioned below the doorstep beam (Fig. 2, 8).

Fig. 2. Works related to building walls.

To connected the logs in the corners, saddle-notch corner type of joint with protrusions was used. In the middle of the walls, vertical posts were inserted, in which the tie-beams have been fitted with mortise and tenon joint. In the longer side walls, two vertical posts with grooves were used to connected short logs (Fig. 3, 4). Wall seals between beams were made of forest mulch, mainly from moss.

Fig. 3. The bottom logs placed on stone foundation with attached short logs.

The building has mostly an earthen floor, although the its part at the entrance was made of wooden pavement from the leftovers of oak piles that remained after dendrological research. The hut also has a partially open attic with a lumber floor. The floor planks from one end are based on the wall crests, and from the other on a log that was been inserted in ca. 1/3 of the length of the hut (Fig. 5).

Fig. 4. Building walls and first guests.

Inside the hut, a pit for food storage was dug. Its bottom was paved with stones, the walls were planked with rived timber, and the whole storage pit was covered with a flap made of sawn planks joined with pegs. A pear-shaped, stone-clay stove with a smoke hole in the top was made for the purpose of heating the building. Ventilation, similar to a chimney-less hut (smoky hut), is provided by open gable tops, additionally equipped with curtains made of sheep skins, which allow for covering the clearances depending on the wind direction (Fig. 5).

Fig. 5. The interior of the hut and subsequent guests.

The entrance door was made of boards from different species of trees (black locust, apple tree, pear tree, plum tree). They were hand-fitted with each other in order to preserve the most natural edge at the points of contact (Fig. 6, 8). All the elements of the door (boards, lock, handles) were connected with wooden pegs and hung on a yew pivot, fitted into ash tree sockets. The last element of the building was a small window with a single-section frame made of spokeshaved pine laths, filled with a cellulose film fixed in the window opening with wooden pegs.

Fig. 6. Erection of the roof structure.

Fig. 7. Fastening of the wooden plow.

Furthermore, some interior furnishings were made. In the central part, there is a wooden bench with an oiled top made of matching ash boards joined with wooden pegs, with two legs made of debarked large timber (Fig. 5). In a similar technique, adjacent benches and a shaving horse were made.

Fig. 8. View of the hut during use.

The main idea of the hut builders was the willingness to deal with as many different processing techniques as possible and a large set of materials. Hence the use of many types of wood as well as all available tools. Before the work began, a full carpentry workshop was purchased from the collection of one of the authors and wooden semi-finished products were collected. Thanks to these activities, various copies of hand drills, drills, planes, axes, chisels, saws, adzes and axes were obtained. Many of these tools have variously shaped working parts that are entirely unknown to today’s carpenters. The collection is completed by clamps, hammers and mallets, a logs grab, carpenter shave horses, as well as a wooden lathe.

As part of the experiment, it was decided to perform the most challenging stage of work related to the construction of the roof structure, i.e. an attempt at completing this task by only one person. It turned out that this is possible with the help of straight uprights from ropes and levers (Fig. 7, 9).

The whole hut construction was carried out within a timeframe of about five months. Effects of the realised restructuring and the work preceding them have all been documented in a multimedia form.

Krzysztof Rybka, Paweł Kucypera

Builders: P. Błędowski, R. Kaźmierczak, P. Kucypera, R. Mieszek, K. Rybka

Photos: W. Ochotny

Fig. 9. An example of self-seating of a ridge in plow. A small mistake could ruin the whole day's work. As you can see during the work, the beam did not hit the socket. Fortunately, she stopped at the end of the opposite branch.

Experimental Archaeology in Poland!

As we said, during the excavations in Paliwodzizna, we plan to carry a multi-faceted experimental archaeology Program. Below You can find some details about the main works:

- **Experiments with ornaments made from teeth and shells**

As part of the planned experiments, we want to make replicas of the prehistoric pendants from animal teeth and shells. The primary purpose of these works will be to test different techniques of making holes in these raw materials. The reference points for the conducted works are archaeological finds from Polish (Janisławice, Pierkunowo) and Lithuanian (Sventoji) sites dated to the Stone Age.

- **Experiments with the manufacture and use of Stone Age bone adzes and mattocks**

We intend to make tools from the radial and metapodial cow bones in the form of adzes and mattocks known from the Stone Age. During the work, different bone processing techniques will be tested, which could be used for this purpose, i.e. systematic planning, scraping, breaking and nicking of the bone. The next step of the experiments will be associated with interpreting the ways of using this type of forms in prehistory and their usefulness for various activities. The selection of processing techniques and tested activities will be based on the results of the traceological analyses of such tools from various sites in Poland, such as Krzyż Wielkopolski 7, Trudna, Góra Orle, Borki. During our experiments we also want to recreate the technological *chaine operatoire* presented by Eva David (David 2005, p. 1999, fig. 119) which was based among others on finds from such sites like Mullerup I and Ulkestrup Lyng Øst II in Denmark.

- **Bruszczewo „knives"**

The starting point for the planned works is a collection of unique artefacts made of animal bone scapulas discovered at the early-bronze age site in Bruszczewo, Poland. During the works, it is planned to reconstruct the operational chain related to the process of their production basing on the technological traces observed on surface of analysed materials and the use of experimental replicas. The function of these tools is still not known. Thanks to the conducted traceological and physicochemical analysis, it was possible to suggest the raw materials potentially processed and a kind of activities made with their use. These hypotheses will be tested during the planned experimental program.

- **Experiments with flint and bone tools used for processing of burnt wood**

As part of the experiment, it is planned to make everyday objects such as wooden containers/utensils, using a burning technique combined with the treatment of burnt wood with bone and flint tools. Various types of deciduous and coniferous wood will be used for the works. The primary objective will be to check the diversity of traces created on the tools used to treat the fired wood (supplementing the comparative database to the traceological analyses).

- **Experiments with hide tanning using tools such as planes and bevell-ended tools**

The processing of raw hides is planned using bone "beamers" (made, for example, from ribs) and so-called bevell-ended tools. The primary objective will be to check the diversity of use-wear traces created on the working edges during the cleaning of hides on the flesh side (using raw materials such as, for example, ocher or ash) and removing the fur. The reference points for the types of tools during experiments are archaeological finds from sites in Sventoji (Lithuania) and Bruszczewo (Poland).

Every week, apart from experimental works carried out as part of the leading experimental programs, other smaller experiments and demonstrations will be conducted, including flint processing, pottery making and firing, wood tar production using various methods, production and use of lamps powered with seal fat, archery, etc.

David, É. 2005. Technologie osseuse des derniers chasseurs préhistoriques en Europe du Nord (Xe-VIIIe millénaires avant J.- C.): Le Maglemosien et les technocomplexes du Mésolithique. Ph.D. Monograph (Nanterre 2003).