EXARC Journal
2017/3
13 Articles | Open Access

Reviewed Article:

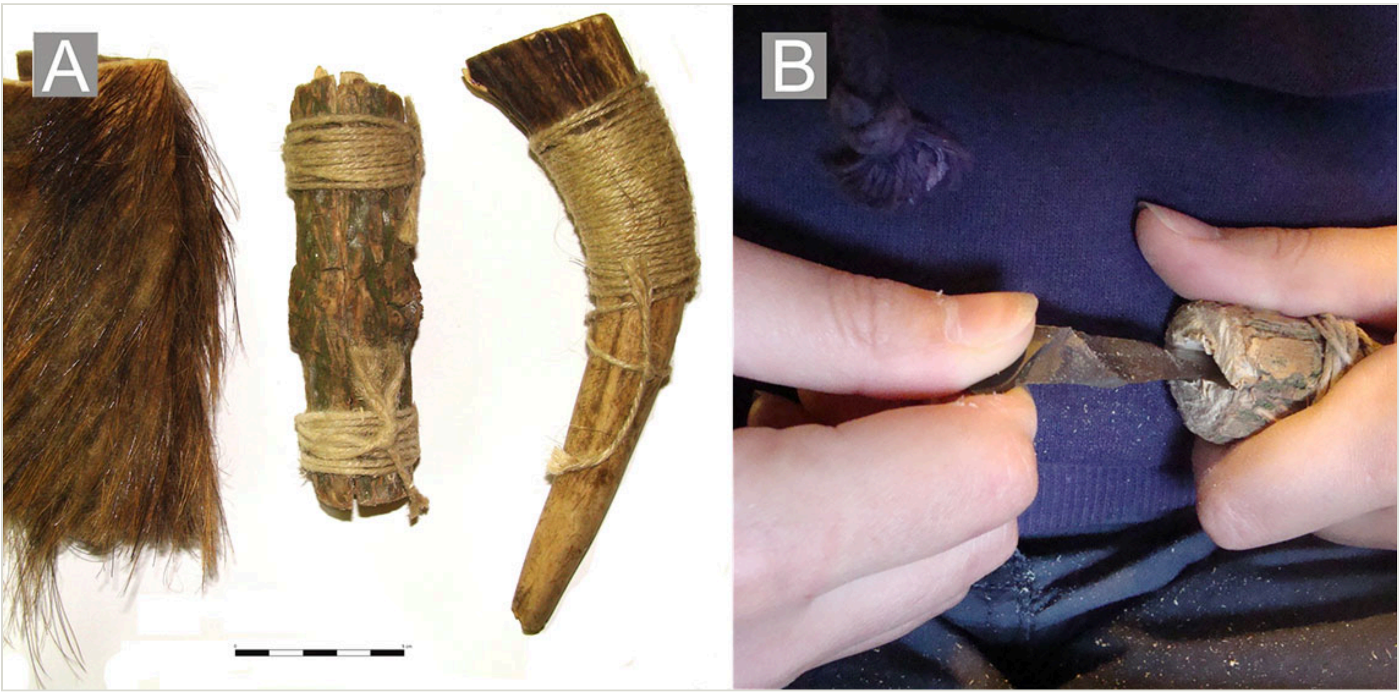
Twenty Years with Flint. The Society for Experimental Prehistoric Archaeology – Where are We Now?

Persistent Identifier: https://exarc.net/ark:/88735/10304

EXARC Journal Issue 2017/3 | **Publication Date:** 2017-08-30

Author(s): Grzegorz Osipowicz [1] ✉, Justyna Kuriga [1]

[1] Uniwersytet Mikolaja Kopernika, Katedra Prahistorii, Instytut Archeologii, Szosa Bydgoska 44/48, 87-100 Toruń, Poland.



The Society of Experimental Prehistoric Archaeology (SEPA, www.keap.umk.pl – see Figure 1) is an organisation affiliated with the Nicolaus Copernicus University's Institute of Archaeology since 1998. The first academic supervisor of SEPA was Jolanta Małecka-Kukawka, now led by Grzegorz Osipowicz. The Society brings together people interested in experimental archaeology, especially in studies aimed at the analysis and interpretation of Stone Age

research problems. An important part of SEPA activities are the popularisation of, and education in, experimental archaeology. The aim of this paper is to summarise the near 20-year history of the Society by exposing the latest projects of its members to a wider audience.

> One of the important aspects of SEPA activities is the popularisation and outreach aspect of archaeology, experimental archaeology concerning the Stone Age. Students belonging to the society organise numerous presentations and archaeological workshops, which are addressed both to the young and the adults .

A selection of SEPA recent experimental projects

Over many years of scientific activity, the members of SEPA have performed numerous experiments, ranging from works related to the methods of tar production (with and without the use of ceramics), hide tanning, plant material processing, pottery making, experiments with dyes and throwing weapons, amber processing methods through to food preparation. Moreover, numerous experiments concerning various aspects of stone, bone and antler processing have also been carried out, including drilling experiments with a replica of a Stone Age drill, as well as bone and antler softening techniques. Research conducted by SEPA members has been presented during numerous conferences and widely published in both national and international peer-reviewed journals.

Birch tar experimental programme

The members of SEPA have had long-term involvement in developing and improving methods of birch tar acquisition without the application of ceramics. This method may well have been employed in periods preceding its introduction in the Neolithic (Osipowicz, 2005a). The oldest tar findings are dated to the Middle Palaeolithic and originate, for example, from the Königsaue site in Germany (Grünberg, 2002). Recently, residues of this substance have also been discovered at the Polish Jaskinia Biśnik site (Cyrek and Cyrek, 2009). In later periods, tar became the basic binder used in for example flint-tipped arrows and harpoons (Clark, 1957, 248; Galiński, 2002, 312). The majority of findings of this type originate from the Mesolithic. One should mention here in particular the arrow from Lilla Loshult, in Sweden (Junkmanns, 2001, 15), which has two flint insets hafted using the mentioned binder. Similar residues of tar have been identified on arrow and arrowhead fragments and shafts from the Swiss site of Egozwil (Junkmanns, 2001, 15). From among the artefacts found in Poland, a perfectly preserved harpoon from the site in Tłokowo should be mentioned, equipped with two rows of microliths (SulgostowskaandHoffmann, 1993).

Methods of birch tar production without the use of ceramics has been investigated by many researchers (Todtenhaupt, Elsweilerand Baumer, 2007; Palmer, 2007; Hirzel, 2008; Todtenhauptand Pietsch, 2011; Kurzweiland Weiner, 2013). Relevant experiments carried out recently by the members of SEPA have been aimed at seeking for an effective method of birch bark pyrolysis, which would leave no archaeologically recognisable traces of smelting kilns (See Figure 2). Various types and variants of kiln structures are tested: closed-hearth stone kilns lined with sandy clay, open-hearth stone kilns, kilns made of wattle covered with silt, as well as kilns made of empty goose egg shells, which is a particular imitation of the two-vessel method. Moreover, methods for separating tar from impurities by means of various filters made of grass, hide, wattle, stones, sand, bark, etc. while still firing are also investigated (Osipowicz,*et al.*,2017). Research conducted so far include analyses of the properties of the binder, obtained experimentally, and its chemical composition in the context of similarities and differences from archaeologically acquired prehistoric substances, as well as the possibility of distinction from a product obtained with the use of the “ceramic methods.” Preliminary results indicate that it is not possible to distinguish tar produced using the developed non-ceramic (single-container) method from a substance obtained with the employment of the two-vessel method, based on the applied so far ATR-FTIR spectral analyses. However, it should be noted that the currently conducted experiments, which make use of other, non-standard methods, suggest that this could be a possibility.

Curved knives – what was their function?

Among experiments carried out by SEPA, one can also find research oriented towards the identification and interpretation of differences and similarities in use-wear traces occurring on flint tools used in the processing of various types of silica plants (See Figure 3). The latest experimental works on this subject are devoted to the so-called curved knives, a group of functional tools made using flint blades and flakes of naturally concave edges, characterised by a very specific and complex set of use-wear traces (Juel Jensen, 1994, 65-67). Tools of this type occur mainly in the materials dated to the Late Mesolithic and the Early Neolithic associated with the Kongemose and the Ertebølle cultures (van Gijn, 1989, 85, 144; 2010, 65; Juel Jensen, 1994, 53, 65, 76). The function of curved knives has not been precisely determined so far, however, it is believed that they should be associated with splitting of plants containing large amounts of silica (Vaughan and Bocquet, 1987, 402; Juel Jensen, 1994, 67; van Gijn, 2010, 66). Plant fibres obtained this way might have been used in the production of ropes or fabrics.

The aim of the experimental programme concerning this subject, planned and carried out recently by SEPA members, was to attempt to answer the question if it was possible to identify particular plant species processed with the use of curved knives in prehistory. The results obtained from traceological and spatial studies done at the Mesolithic site of Ludowice 6 (Wąbrzeźno comm., Poland), which was probably an economically specialised place targeted at the processing of silica plants with these type of tools, serving as the starting point for these experiments. Taking into account the character of the use-wear traces observed on the working edges of prehistoric artefacts found in Ludowice, seven types of curved knives were distinguished (Osipowicz, 2017). During the experiments, various parts of several plant species, selected on the basis of the palynological profile created for an ancient lake located next to the mentioned site, were processed. They included: greater tussock-sedge (*Carex paniculata*), lesser pond-sedge (*Carex acutiformis*), broadleaf cattail (*Typha latifolia*), marsh fern (*Thelypteris palustris*), eagle fern (*Pteridium aquilinum*), and horsetail (*Equisetum*). These plants were used in the prehistoric as well as the historic periods in food preparation and as medicine, but they were also woven into ropes, mats, and braids. In order to ascertain identical physical-chemical properties of the tools, blades knapped from a single concretion of Baltic flint were used. The conducted studies revealed a number of differences between the traces occurring due to processing of even theoretically similar plants. In some cases (horsetail and one of the sedge species), the observed traces indicated the use of a specific curved knife type, in others, for example when working with some fern species, a few types could be excluded. Complete results of these studies will be published elsewhere (Osipowicz, 2017).

Sockets, transport, and sheaths – other types of use-wear traces

SEPA members also focus their interests on issues concerning use-wear traces occurring after a flint tool was fitted and carried in various containers for a prolonged time. Evidence for their existence comes from many archaeological sites. Examples include a bone container for flint arrowheads from a Mesolithic burial in Bad Dürrenberg, Germany (Hansen, 2010, 20-21; Bugajska, 2014, 43), the oldest evidence for tool fitting from Kathu Pan 1, South Africa, dated for 500 000 years (Wilkins, *et al.*, 2012) or the aforementioned imprints from Königsaue, Germany (Grünberg, 2002). Traces found by researchers on flint tools are very often complex and difficult to identify and interpret unambiguously, with their type, size, and number being determined by many different factors (e.g. Keeley, 1982; Rots, 2008; 2010). In case of sockets and containers, the characteristics of use-wear traces are also influenced by such variables as the handle or container structure, material used in its manufacture, or the very manner of the tool's usage. Due to this reason, the discussed issue continually demands systematic investigations.

SEPA's experimental project concerning this subject has already been completed. The research consisted of three parts. First, in a series of experiments, flint flakes were repeatedly placed in and taken out of sheaths made of wild boar leather, antler, and wood (See Figure 4). The second part of the project was focused on traces occurring as a result of the tool's contact with the surface of its fitting during usage (handles were made from the same materials as the mentioned sheaths). The final stage of the project comprised carrying flint flakes in various containers made of chamois leather, bone, and wood for several months. Currently, laboratory experiments aimed at microscopic analysis of use-wear traces occurring as a result of all the mentioned activities are underway. However, already at this point it can be observed that such processes have an enormous impact on the state of a flint's surface and the characteristics of use-wear traces formed on the working edges.

Trampling

Another type of experiment realised by the SEPA members has been connected with the so-called trampling. The studies are aimed at the analysis and interpretation of the post-depositional damage occurring on flint and stone tools during the process of intense treading (Shea and Klenck, 1993). Their character depends on the type and chemical composition of the soil, water presence, treading intensity, and landform. For the purpose of an experiment carried out by SEPA, a path framed in wood, 1 m wide and 4 m long, consisting of four equal sectors, was built (See Figure 5). Each of the sectors was filled with a different material: sand, gravel, stone, and clay. Three types of flint (Baltic, chocolate, and świeciechowski) and one stone material (red quartz porphyry) were employed. A specific number of flakes of a given material were located in each sector of the path. The experiment's time span was planned for three months, admitting daily usage of the path. The flakes utilised in this experiment are currently being subjected to traceological analysis. Already, some considerable significance of this experiment's impact on the interpretation of the origin of the so-called micro-scrapers, found on many Mesolithic sites in Poland, can be claimed (Osipowicz, 2010, 2017).

Experiments with bone and antler softening

Studies on various methods of bone and antler softening methods, which could have been possibly used in prehistoric times, have been conducted at the Institute of Archaeology of the Nicolaus Copernicus University for more than ten years. During that time, numerous experiments and analyses have been carried out on different aspects of this issue (Osipowicz, 2005b). In the current ongoing SEPA project, the focus has been on seeking methods most useful for the softening of bone materials, both from the perspective of them being worked with flint tools, and their flexural strength. Another aim is to pick out those methods, which could have been used by prehistoric communities. This project consists of three parts. The first covers experimenting with seven methods most commonly referred to in the literature, namely: soaking in water (Cnotliwy, 1956, 152-154; Newcomer, 1976, 293; MacGregor, 1985, 63; Edholm, 1999; Lindemann, 2001; Schibler, 2001, 52), soaking in lactic acid (Żurowski, 1974; Bagniewski, 1992; Drzewicz, 2004, 48-52), soaking in oxalic acid (Żurowski, 1950; 1974; MacGregor, 1985, 63-64; Drzewicz, 2004, 48-52), soaking in urine (Newcomer, 1976, 293), soaking in flax oil (Hołubowicz, 1956, 144), soaking in lye (Bagniewski, 1992, 18), and boiling in water (Izjumowa, 1949; Szafrański, 1961; Cnotliwy, 1973; Baales, 1996; Watts, 1999). In the course of the experimental works, all listed methods were tested for the workability of the softened material both in terms of flint working and bending (See Figure 6). The second phase includes use-wear analyses of traces formed on flint tools used for work in materials softened using various methods and seeking their "counterparts" on prehistoric tools. The last stage consists of chemical analyses focused both on investigation of softening substances themselves, and materials exposed to their influence. The goal is to verify the identification of particular methods using analysis of changes in chemical composition, structure, and density of bone materials occurring during the softening process.

Experiments with drilling techniques

Another aspect of SEPA activities related to the processing of osseous raw materials are the experiments with prehistoric techniques of drilling. Within the range of artefacts encountered by the Stone Age researchers, one may distinguish those with characteristic, large (over 1.5 cm) holes. Upper-Palaeolithic *bâtons de commandement*, Mesolithic shafts and mattocks, or Neolithic T-shaped axes are only some examples of this type of artefacts found at various archaeological sites (Kempisty, 1961; Newcomer, 1976; Bagniewski, 1992; Płonka 2003). Holes visible on prehistoric artefacts often have different longitudinal sections, which may suggest differences in the techniques used to make them.

The main objective of experiments conducted in this area by SEPA members is the verification of existing opinions concerning the discussed aspect of bone and antler processing in prehistoric times. The majority of works focused on testing the influence on drilling of factors such as: type and singular features of the drilled material, applied methods of its preparation (e.g. softening), location of the hole, drill type and character of the applied drilling powder, or employment of supporting, more “complicated” devices. Many types of fitted and non-fitted flint tools such as burins, borers, scrapers, were used either manually or with the help of a bow drill, or utilising a reconstructed driller with wooden and bone drill bits. After conducting this series of experiments, it is planned to subject the drilled holes to microscopic observations in order to capture diagnostic traces indicating the use of a particular tool and the way it was operated. Some aspects of research in this area have already been published (Orłowska, 2015), although one should note that conclusions concerning the types of drills employed in making large holes require verification. Work similar in character has already been undertaken by SEPA members; however, they were concerned with drilling in inorganic materials (See Figure 7) (Osipowicz, 2006). This line of research is currently pursued through comparative experiments of drilling in stone with black-lilac drills. As a result, it turned out that working with them is very effective, the drilled holes are significantly more regular – much more similar to the ones observed on artefacts. The complete outcome of this research will be published in the near future.

Reconstructions of prehistoric buildings

Major SEPA projects are realised during one- or two-week experimental camps. In 2001, during one of such meetings, an attempt was made to reconstruct a shallow pit-house from the Stone Age (See Figure 8) in the Sąsieczno village. In 2013, SEPA began an experimental construction of a Mesolithic hut (See Figure 9) in a mini open-air museum near the Institute of Archaeology, Nicolaus Copernicus University in Toruń. In the two experiments conducted, only replicas of prehistoric flint, stone, and bone tools were used, together with techniques available at the time (Osipowicz, Nowak and Kuriga, 2015). Recently, SEPA members built their third habitable construction – a shallow pit-house covered with turf (See Figure 10). It was inspired by features originating from Scandinavia, erected by the Samms and called *goahti* or *gamme* (Norwegian), *kota* (Finnish) or *kåta* (Swedish). Constructions of this kind may have been used since prehistoric times until the modern era. The aforementioned shallow pit-house has not yet been presented in greater detail, so we shall devote some space to it here. In the first phase of the work, a rectangular pit with straight walls was dug. Next, every several tens of centimetres, pine stakes braided with willow were driven into the ground. The walls prepared in this way were covered with a mixture of clay, sand, grass, and water. The design of the roof initially included (as in an original *goahti*) two arcs made of naturally bent tree trunks, however, due to the lack of such a material, a decision was made to construct a simple frame from pine beams, which was subsequently covered with wood. The next stage was to isolate the roof from the top with patches of birch bark (in case of the walls, due to the insufficient amount of this material, a layer of reed was fixed instead). Thus prepared surfaces of roof and walls were then covered with bricks of soil with turf. Inside the dwelling, the walls were whitened with a layer of chalk and decorated with paintings made with ochre, inspired by a representation of a site in Alta, dated for 6200 to 2000 BC. The construction of the shallow pit-house was a great opportunity to carry out a series of experiments with prehistoric techniques of wood working (See Figure 11), such as debarking with antler and flint-mounted planes, and wood splitting with wedges made from various osseous materials.

SEPA popularisation activities

One of the important aspects of SEPA activities is the popularisation and outreach aspect of archaeology, experimental archaeology concerning the Stone Age. Students belonging to the society organise numerous presentations and archaeological workshops, which are addressed both to the young and the adults (See Figure 12). During such events, the audience has the opportunity to get acquainted with techniques used for treatment of various materials and tool production in prehistoric times. Presentations include, among others, hole drilling in organic (antler, bone) and inorganic (stone) materials, flint knapping, amber working, pottery burning and tar production with non-ceramic or ceramic methods. The most important goal of these workshops is to promote learning through experience, thus the greatest emphasis is put on encouraging the visitors to get involved in the activities as much as possible. Anyone interested may try their hand at working with replicas of different types of tools, for example drilling different substances with hand drillers, cutting grass with sickles with flint blades or wood chopping with flint and antler axes. It is also a chance to learn hand potting, bow shooting, hide tanning, painting with natural pigments, and erecting a provisional hut. Participants also discover the secrets and flavours of the Stone Age food. Presentations of this type are organised by SEPA members as parts of archaeological festivals which take place across the country. The Society actively collaborates with local governments, public benefit organisations and associations, as well as schools and museums throughout

Poland. Past events include the Long Night of Museums or the Science and Art Festival, organised by the Nicolaus Copernicus University in Toruń.

These days, it is necessary to promote science through modern means of communication, primarily the Internet, which allows one to reach a virtually unlimited audience. Since 2010, the website at www.keap.umk.pl is dedicated entirely to all aspects of SEPA activities. An interested reader will find in its resources and information include the history of the Society, principles of experimental archaeology, experiments carried out by SEPA members over the years, current projects, traceology, publications, conferences, as well as upcoming festivals. Courtesy of the financial support of the authorities of the Nicolaus Copernicus University and the *Amicus*Universitatis Nicolai Copernici Fundation in Toruń, since 2013, the webpage is also available in English. More recently, we have been present in social media through Facebook (facebook.com/keap.torun). It should be noted that SEPA popularisation projects have been praised in numerous journals, for instance in *National Geographic Poland* 4 (55) /2004.

Conclusion

It is hoped that subsequent generations of students will uphold the nearly 20-year-old SEPA tradition through participation in its projects and further development of its activities. In the immediate future, SEPA hopes to launch a major project on wood processing by burning, employing only tools made of stone and osseous materials. These experiments should provide an excellent opportunity to make a replica of a prehistoric dugout boat. Furthermore, experimentation utilising flint tools in the processing and application of haematite is planned. It is important to note that the existence of organisations such as SEPA allow students and young career researchers to contribute to the development and promotion of archaeology. Hopefully, those participating will be as numerous and as eager for cooperation as possible, because this approach can often resolve the multi-faceted analysis and completion of complex, scientific problems concerning the Stone Age and beyond.

Acknowledgements

We would like to cordially thank all SEPA members as well as other participants in SEPA projects over the years. We would also like to thank the Society's enthusiasts, both native and foreign, for their ongoing help and support.

Keywords experimental archaeology
university
construction of building
bone
use wear analysis
knife
tar or pitch

Country Poland

Summary

The Society for Experimental Prehistoric Archaeology (SEPA) is a student organisation bringing together people interested in experimental archaeology founded in 1998. The goal of projects led by its members is to reconstruct some aspects of human life in prehistoric times, in particular during the Stone Age. Over the years of SEPA activity, its members have carried out hundreds of experiments. These include projects related to ceramic and non-ceramic methods of tar production, hide tanning, treatment of plant materials, harvesting tools, production of ceramics, experiments with dyes, throwing weapons, techniques of amber working or food preparation. There are plenty of experiments related to various aspects of stone and osseous material treatment, including hole drilling with a replica of a Neolithic driller and methods of bone, and antler softening. Results of the research conducted by SEPA have been reported at many conferences and communicated in numerous papers in national and international academic journals. The Society constructed three dwellings using only prehistoric tool replicas: a Mesolithic hut, a pit-house of the *goahti* type (accessible to visitors of the open-air museum managed by the Institute of Archaeology of the Nicolaus Copernicus University) in Toruń, as well as a Late-Palaeolithic shallow pit-house in Sąsieczno. Another aspect of SEPA activities is the popularisation of archaeology during numerous festivals and scientific picnics. We have organised many archaeological workshops throughout Poland at the invitation of schools, museums, and other organisations.

Bibliography

BAGNIEWSKI, Z., 1992. W sprawie obróbki surowca rogowego w mezolicie. *Studia Archeologiczne*, 22, pp. 13-33.

BAALES, M., 1996. *Umwelt und Jagdökonomie der Ahrensburger Rentierjäger im Mittelgebirge*. Mainz: Monographien des RGZM.

BUGAJSKA, K., 2014. Obrządek pogrzebowy łowców-zbieraczy epoki kamienia w południowej Skandynawii i na Niżu Środkowoeuropejskim. *Przegląd Archeologiczny*, 62, pp. 5-70.

CLARK, G., 1957. *Europa Przedhistoryczna. Podstawy gospodarcze*. Warszawa: National Science Press.

CNOTLIWY, E., 1956. Z badań nad rzemiosłem zajmującym się obróbką rogu i kości na Pomorzu Zachodnim we wczesnym średniowieczu. *Materiały Zachodniopomorskie* 2, pp. 151-182.

CNOTLIWY, E., 1973. *Rzemiosło rogownicze na Pomorzu wczesnośredniowiecznym*. Wrocław-Warszawa-Kraków-Gdańsk: Ossolineum Polish Academy of Sciences Press.

CYREK, K. and CYREK, M., 2009. Composite tools in the oldest levels of the Biśnik Cave, Poland. Iin: J.M. Burdukiewicz, K. Cyrek, P. Dyczek and K. Szymczak, eds. *Understanding the Past: Papers Offered to Stefan Karol Kozłowski*. Warsaw:University of Warsaw. pp. 91-96.

DRZEWICZ, A., 2004. *Wyroby z kości i poroża z osiedla obronnego ludności kultury łużyckiej w Biskupinie*. Warszawa: Semper.

EDHOLM, S., 1995. Making a reduced antler flaker. In: D. Wescott, ed. 1999. *Primitive Technology: A Book of Earth Skills*. Salt Lake City: Gibbs Smith. pp. 72-74.

GALIŃSKI, T., 2002. *Społeczeństwa mezolityczne. Osadnictwo, gospodarka, kultura ludów łowieckich w VIII-VI tysiącleciu p.n.e na terenie Europy*. Szczecin: National Museum.

GIJN, A.L. van, 1989. *The wear and tear of flint principles of functional analysis applied to Dutch Neolithic assemblages*, Analecta Praehistorica Leidensia 22. Leiden:Leiden University Press.

GIJN, A.L. van, 2010. *Flint in focus, Lithic Biographies in the Neolithic and Bronze Age*. Leiden: Sidestone Press.

GRÜNBERG, J.M., 2002. Middle Palaeolithic birch-bark pitch. *Antiquity,* 76(291), pp. 15-16.

HANSEN, S., 2010. *Archaeological Finds from Germany. Booklet to the Photographic Exhibition*. Berlin: s.n.

HIRZEL, J., 2008. Herstellung von Birkenpech ohne Spuren an gebrannten Tongefäßen. *Experimentelle Archäologie in Europa,*7, pp. 67-73.

HOŁUBOWICZ, W., 1956. *Opole w wiekach X-XII*. Katowice: Śląsk Press.

IZJUMOWA, S.A., 1949. Technika obróbki kości w okresie diakowskim i w dawnej Rusi. *Kratkije Soobszczenia,*30, pp. 15-26.

JUEL JENSEN, H., 1994. *Flint tools and plant working, hidden traces of stone age technology. A use wear study of some Danish Mesolithic and TRB implements*. Aarhus: Aarhus University Press.

JUNKMANNS, J., 2001. *Pfeil und Bogen. Herstellung und Gebrauch in der Jungsteinzeit*. Biel: Museum Schwab.

KEELEY, L.H., 1982. Hafting and Retooling: Effects on the Archaeological Record. *American Antiquity*, 47(4), pp. 798-809.

KEMPISTY, A., 1961. Ze studiów nad sposobami obróbki surowca kostnego i rogowego w kulturze pucharów lejkowatych. *Wiadomości Archeologiczne*, 27(1), pp. 133-143.

KURZWEIL, A. and WEINER, J., 2013. Wo sind die Retorten? – Gedanken zur allothermen Herstellung von Birkenpech. *Experimentelle Archäologie in Europa*, 12, pp. 10-19.

LINDEMANN, M., 2001. Die Knochen und Geweihbearbeitung im westeuropäischen Jungpleistozän. *Experimentelle Archäologie, Bilanz 2000, Archäologische Mitteilungen aus Nordwestdeutschland*, 37, pp. 7-28.

MACGREGOR, A., 1985. *Bone, Antler Ivory and Horn. The Technology of Skeletal Materials since the Roman Period*. Sydney: Routledge.

NEWCOMER, M., 1976. Experiments in upper palaeolithic bone work. In: H. Camps-Fabrer ed. 1977. *Methodologie appliquee a l'industrie de l'os prehistorique*. Paris: CNRS. pp. 293-301.

ORŁOWSKA, J., 2015. How Did They Drill That? – A Few Observations on the Possible Methods for Making Large-sized Holes in Antler. *EXARC Journal,*[online] Available at: https://exarc.net/issue-2015-2/ea/how-did-they-drill-few-observations-possible-methods-making-large-sized-holes-antler[Accessed: 10.03.2017].

OSIPOWICZ, G., 2005a. A method of wood tar production, without the use of ceramics. EuroREA: *(Re)construction and Experiment in Archaeology – European Platform,* 2, pp. 11-17. https://exarc.net/files/exarc-eurorea_2_2005-a_method_of_wood_tar_production_without_the_use_of_ceramics.pdf [Accessed: 30.08.2017].

OSIPOWICZ, G., 2005b. *Metody rozmiękczania kości i poroża w epoce kamienia w świetle doświadczeń archeologicznych oraz analiz traseologicznych*. Toruń: Adam Marszałek Press.

OSIPOWICZ, G., 2006. Drilling through stone axes. *Experimentelle Archäologie in Europa,* 4, pp. 115-122.

OSIPOWICZ, G., 2010. *Narzędzia krzemienne w epoce kamienia na ziemi chełmińskiej. Studium traseologiczne*. Toruń: Nicolaus Copernicus University Press.

OSIPOWICZ, G., 2017. Społeczności mezolityczne Pojezierza Chełmińsko-Dobrzyńskiego. Próba modelowej analizy wieloaspektowej funkcji i organizacji przestrzennej wybranych obozowisk.Toruń: Nicolaus Copernicus University Press.

OSIPOWICZ, G., NOWAK, D. and KURIGA, J., 2015. Two Reconstructions of Prehistoric Houses from Toruń (Poland). *EXARC Journal,* [online] Available at: https://exarc.net/issue-2015-1/ea/two-reconstructions-prehistoric-houses-torun-poland[Accessed: 10.03.2017].

OSIPOWICZ, G., BOSIAK, M., KURIGA, J., and LIPKOWSKA, J., (in press). New data from the "birch tar research project" conducted in the Institute of Archaeology, Nicolaus Copernicus University, Toruń. In: W. Piotrowski, ed. *Proceedings of the Second International Symposium on Wood Tar and Pitch.*

PALMER, F., 2007. Die Entstehung von Birkenpech in einer Feuerstelle unter paläolithischen Bedingungen. *Mitteilungen der Gesellschaft für Urgeschichte*, 16, pp. 75-83.

PŁONKA, T., 2003. *The portable art of Mesolithic Europe*. Wrocław: Wrocław University Press.

ROTS, V., 2008. Hafting Traces on Flint Tools. In:L.Longo and N. Skakun eds. *Prehistoric Technology: 40 years later. Functional Studies and the Russian Legacy. Proceedings of the International Congress Verona (Italy) 20-23 April 2005*. BAR S1783. Oxford: Archaeopress. pp. 75-84.

ROTS, V., 2010. *Prehension and Hafting Traces on Flint Tools: A Methodology*. Leuven: Leuven University Press

SCHIBLER, J., 2001. Experimental Production of Neolithic Bone and Antler Tools. In: L. Bartosiewicz and A. Choyke, eds. *Crafting Bone: Skeletal Technologies through Time and Space*. BAR S937. Oxford: Archaeopress. pp. 49-60.

SHEA, J.J., and KLENCK, J.D., 1993. An Experimental Investigation of the Effects of Trampling on the Results of Lithic Microwear Analysis. *Journal of Archaeological Science*, 20(2), pp. 175-194.

SULGOSTOWSKA, Z. and HOFFMANN, M., 1993. Kościane ostrze mezolityczne z wkładkami krzemiennymi z Tłokowa, woj. Olsztyńskie – Aspekt technologiczny. *Archeologia Polski*, 38(1), pp. 75-87.

SZAFRAŃSKI, W., 1961. Wyniki badań archeologicznych w Biskupinie, pow. Żnin, na stanowisku 6. In: W. Szafrański and Z. Szafrańska eds. *Z badań nad wczesnośreniowiecznym osadnictwem wiejskim w Biskupinem*. Wrocław-Warszawa-Kraków: Ossolineum, pp. 7-140.

TODTENHAUPT, D., ELSWEILER, F., and BAUMER, U., 2007. Das Pech des Neandertalers – eine Möglichkeit der Herstellung. *Experimentelle Archäologie in Europa*, 6, pp. 155-162.

TODTENHAUPT, D. and PIETSCH, T., 2011. Zahnabdrücke in steinzeitlichem Birkenpech. Wie konnten sie sich so lange erhalten? *Experimentelle Archäologie in Europa,* 10, pp. 205-212.

VAUGHAN, P.C., BOCQUET, A., 1987. Première etude fonctionelle d'outils lithiques néolithiques du village de Charavines, Isère. *L'Antropologie*,91, pp. 399–410.

WATTS, S., 1995: Bone working basics. In: D. Wescott, ed. 1999. *Primitive Technology: A Book of Earth Skills*. Salt Lake City: Gibbs Smith. pp. 62-65.

WILKINS, J., SCHOVILLE, B.J., BROWN, K.S., and CHAZAN, M., 2012. Evidence for early hafted hunting technology. *Science*, 338(6109), pp. 942-946.

ŻUROWSKI, K., 1950. Uwagi na temat obróbki rogu w okresie wczesno-średniowiecznym. *Przegląd Archeologiczny,* 9, pp. 395-401.

ŻUROWSKI, K., 1974. Zmiękczanie poroża i kości stosowane przez wytwórców w Starożytności i we wczesnym średniowieczu. *Acta Universitatis Nicolai Copernici, Archeologia*, 4, pp. 3-23.

Corresponding Author

Grzegorz Osipowicz
Uniwersytet Mikolaja Kopernika
Katedra Prahistorii, Instytut Archeologii
Szosa Bydgoska 44/48
87-100 Toruń
Poland
E-mail Contact

Gallery Image

FIG 1. LOGO OF THE SOCIETY OF EXPERIMENTAL PREHISTORIC ARCHAEOLOGY (SEPA)

FIG 2. EXPERIMENTS WITH METHODS OF BIRCH TAR PRODUCTION WITHOUT THE USE OF CERAMICS. VARIOUS TYPES OF KILN STRUCTURES: A- CLOSED-HEARTH STONE KILNS LINED WITH SANDY CLAY DURING CONSTRUCTION; B - KILN MADE OF WATTLE COVERED WITH SILT; C - KILN MADE OF EMPTY GOOSE EGG SHELLS; D - OPEN-HEARTH STONE KILN.

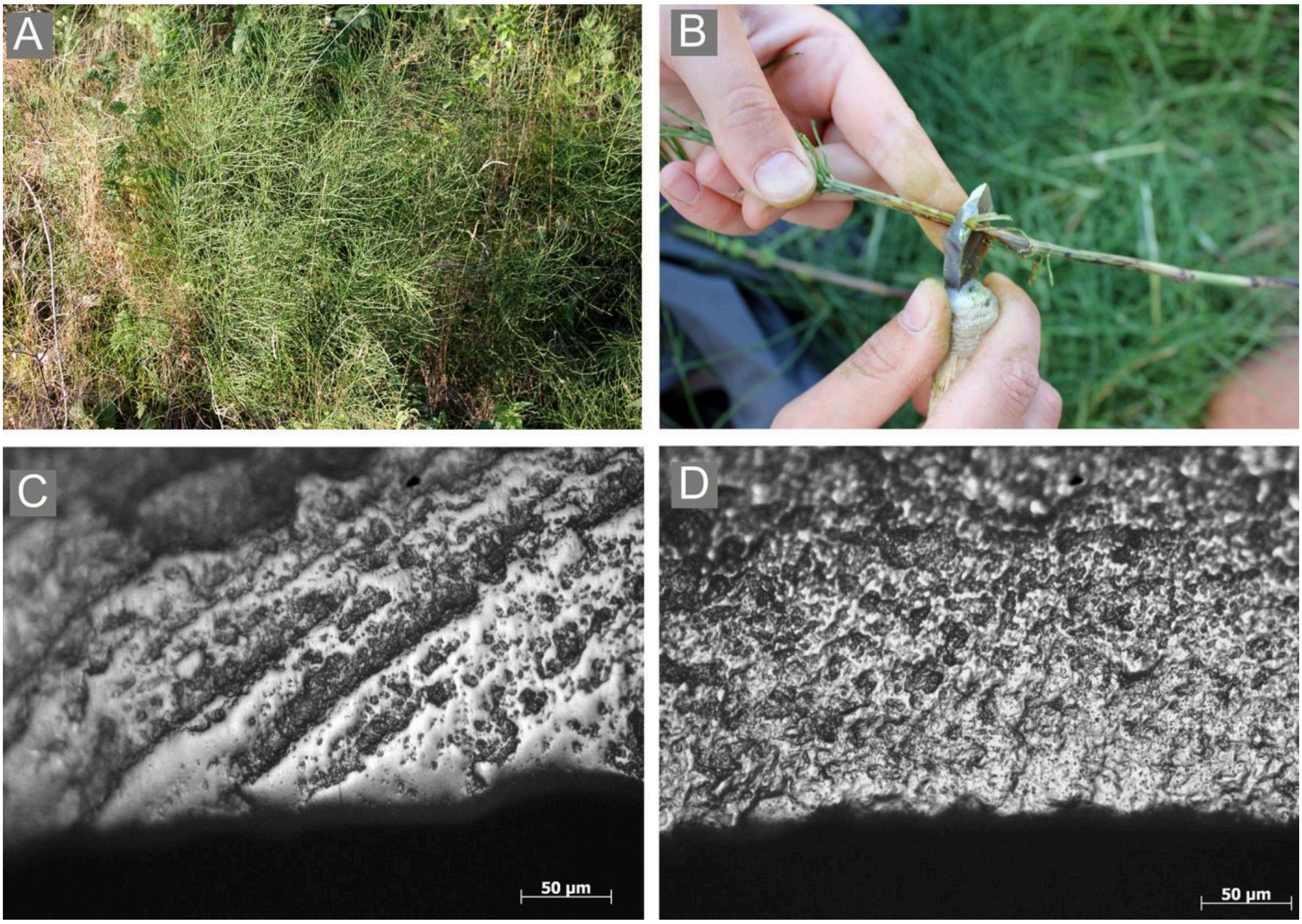


FIG 3. CURVED KNIVES EXPERIMENTAL PROGRAMME: A - HORSETAIL (EQUISETUM); B - EXPERIMENTAL WORKS WITH HORSETAIL; C, D – TRACES ON EXPERIMENTAL TOOLS AFTER WORK WITH HORSETAIL.

FIG 4. A – EXAMPLES OF HANDLES MADE OF WILD BOAR LEATHER, ANTLER, AND WOOD; B – EXPERIMENTAL WORKS WITH HANDLES.

FIG 5. A PATH WITH SECTORS FILLED WITH SAND, GRAVEL, STONE, AND CLAY USED IN EXPERIMENTAL WORKS WITH TRAMPLING.

FIG 6. EXPERIMENTS WITH BONE AND ANTLER SOFTENING: A – ANTLER SOAKING IN OXALIC ACID; B – BENDING A RIB AFTER SOAKING IN LACTIC ACID; C – CUTTING BONE AFTER SOAKING IN OXALIC ACID; D – RIBS AFTER BENDING.

FIG 7. EXPERIMENTAL WORKS WITH DRILLING TECHNIQUES: A – RECONSTRUCTION OF A DRILLER; B, C – DRILLING IN STONE WITH BLACK-LILAC DRILLS; D – DRILLING IN SOFTENING BONE WITH THE HELP OF A BOW DRILL.

FIG 8. EXPERIMENTAL RECONSTRUCTION OF THE STONE AGES SHALLOW PIT-HOUSE.

FIG 9. EXPERIMENTAL RECONSTRUCTION OF THE MESOLITHIC SHELTER.

FIG 10. EXPERIMENTAL CONSTRUCTION OF THE A SHALLOW PIT-HOUSE COVERED WITH TURF - STAGES OF WORK.

FIG 11. EXAMPLES OF EXPERIMENTAL WOKS ON WOOD WORKING: A, B - DEBARKING WITH ANTLER PLANES; C – CHOPPING WOOD WITH FLINT AXE; D - WOOD SPLITTING WITH WEDGES MADE FROM BONE.

FIG 12. ARCHAEOLOGICAL WORKSHOPS DURING FESTIVAL OF SCIENCE AND CULTURE IN TORUŃ.