Daniel Groß · Harald Lübke · John Meadows · Detlef Jantzen (eds.)

# Working at the Sharp End: From Bone and Antler to Early Mesolithic Life in Northern Europe

10

Untersuchungen und Materialien
zur Steinzeit in Schleswig-Holstein
und im Ostseeraum

Untersuchungen und Materialien zur Steinzeit
in Schleswig-Holstein und im Ostseeraum

Band 10

Untersuchungen und Materialien zur Steinzeit in Schleswig-Holstein und im Ostseeraum
aus dem Museum für Archäologie Schloss Gottorf und dem Zentrum für Baltische und Skandinavische Archäologie
in der Stiftung Schleswig-Holsteinische Landesmuseen Schloss Gottorf
Band 10

Begründet von
Jürgen Hoika †

Herausgegeben von
Sönke Hartz und Harald Lübke

# Working at the Sharp End: From Bone and Antler to Early Mesolithic Life in Northern Europe

Daniel Groß, Harald Lübke, John Meadows and Detlef Jantzen (eds.)

Wachholtz

1. Auflage 2019

Redaktion: Gundula Lidke, SSHLM Schloss Gottorf, Schleswig
Satz: Daniel Groß, SSHLM Schloss Gottorf, Schleswig
Einbandgestaltung: Jürgen Schüller, SSHLM Schloss Gottorf, Schleswig; Foto: Markus Wild, SSHLM Schloss Gottorf, Schleswig



Bibliografische Informationen der Deutschen Nationalbibliothek: Die Deutsche Nationalbibliothek verzeichnet diese Publikation in der deutschen Nationalbibliografie; detaillierte bibliografische Daten sind im Internet unter http://dnb.n-nb.de abrufbar.



ISBN 978-3-529-01861-9
ISSN 2510-313X
Druck und Vertrieb: Wachholtz Verlag, Kiel/Hamburg
Printed in Europe
Besuchen Sie uns im Internet:
www.wachholtz-verlag.de


Laserscan of the wooden sign that was attached to the excavation hut during the Hohen Viecheln excavations ('To the sharp harpoon'; Laserscan: J. Nowotny, ZBSA).

ZBSA

DFG

# Contents

# Vorwort der Herausgeber

Die Schriftenreihe „Untersuchungen und Materialien zur Steinzeit in Schleswig-Holstein“ wurde von dem ursprünglichen Herausgeber Jürgen Hoika vor mittlerweile 25 Jahren im Jahre 1994 begründet, um am damaligen Archäologischen Landesmuseum Schleswig (ALM) und heutigem Museum für Archäologie Schloss Gottorf (MfA) ein Publikationsorgan für die Veröffentlichung von Forschungsergebnissen zur Steinzeit Schleswig-Holsteins zu schaffen. Dabei sollte es sich zum einen um Sammelwerke mit Beiträgen von vorzugsweise auf Schloss Gottorf veranstalteten Symposien, Workshops und Tagungen mit steinzeitlicher Thematik und zum anderen um zumeist in Dissertationen zusammengestellte ausführliche Materialvorlagen handeln. Entsprechend enthielt der 1994 vorgelegte erste Band der Reihe die Beiträge zum 1. Internationalen Trichterbechersymposium, welches, von Jürgen Hoika gemeinsam mit Jutta Meurers-Balke initiiert, 1984 am Archäologischen Landesmuseum in Schleswig stattgefunden hatte. In der Folge wurden dann aber beginnend mit den Arbeiten der beiden heutigen Herausgeber nunmehr acht überwiegend am Institut für Ur- und Frühgeschichte der Christian-Albrechts-Universität zu Kiel fertiggestellte Dissertationen veröffentlicht, die ganz wesentlich mit der wissenschaftlichen Vorlage und Auswertung von Forschungsgrabungen in Schleswig-Holstein und – seit der Beteiligung des Zentrums für Baltische und Skandinavische Archäologie an der Herausgeberschaft – aus dem gesamten Ostseeraum befasst sind.

Deshalb ist es eine besondere Freude für die Herausgeber, mit dem vorliegenden Band 10 „Working at the Sharp End: From Bone and Antler to Early Mesolithic Life in Northern Europe“ der Schriftenreihe „Untersuchungen und Materialien zur Steinzeit in Schleswig-Holstein und im Ostseeraum“ wiederum einen Sammelband mit den Beiträgen eines Workshops vorlegen zu können, der vom 14. bis 16. März 2016 auf Schloss Gottorf stattgefunden hat. Dabei handelt es sich um den Abschlussworkshop des von der Deutschen Forschungsgemeinschaft geförderten Projektes „Neubewertung von Chronologie und Stratigraphie des frühholozänen Fundplatzes Hohen Viecheln (Mecklenburg-Vorpommern) unter besonderer Berücksichtigung der diagnostischen Knochenartefakte“ (DFG-Projektnummer 271652103) unter Leitung von Daniel Groß, Harald Lübke, John Meadows (alle ZBSA) und Detlef Jantzen (Landesamt für Kultur und Denkmalpflege Mecklenburg-Vorpommern; Landesarchäologie). Entsprechend enthält dieser Band neben dem Abschlussbericht des Forschungsprojektes insgesamt 17 Beiträge der eingeladenen Workshop-Teilnehmer, die entweder ergänzende Studien zum Fundplatz Hohen Viecheln enthalten oder sich grundsätzlich mit verwandten Themen zur Erforschung des frühholozänen Mesolithikums im nördlichen Europa befassen.

Alle Beiträge wurden nach internationalem Standard von jeweils zwei anonymen Gutachtern in einem Peer-review-Verfahren bewertet und danach den Autoren zur erneuten Überarbeitung übergeben, bevor die abschließende redaktionelle Bearbeitung der Manuskripte erfolgte. Die Textredaktion für alle Beiträge wurde von Gundula Lidke durchgeführt, Jana Elisa Freigang und Jorna Titel leisteten dabei unterstützende Arbeiten. Das Layout übernahm Daniel Groß, Titelbild und Umschlag entwarf Jürgen Schüller. Die meisten Karten und Zeichnungen wurden von den Autoren selbst bereitgestellt. In einzelnen Fällen erfolgte eine Überarbeitung durch Daniel Groß. Allen sei dafür an dieser Stelle herzlich gedankt.

Neu im Rahmen der Schriftenreihe ist, dass die Beiträge unmittelbar nach Fertigstellung und Freigabe der Autoren in einem „online-first“-Verfahren auf der Homepage des Verlages im Open Access zum freien Download bereitgestellt wurden. Für die Umsetzung dieser Forderung der Herausgeber danken wir dem Wachholtz Verlag, insbesondere Herrn Henner Wachholtz, sehr.

Besonderer Dank gilt dem Vorstand des Zentrums für Baltische und Skandinavische Archäologie Schleswig, besonders dem Direktor, Claus von Carnap-Bornheim, und der Forschungsleiterin, Berit Valentin Eriksen, die die Veröffentlichung dieses Bandes durch die Bereitstellung der erforderlichen Mittel für den Druck der Arbeit maßgeblich unterstützten.

Sönke Hartz und Harald Lübke
Schleswig, im Oktober 2019

# Editors' Preface

The series 'Untersuchungen und Materialien zur Steinzeit in Schleswig-Holstein' was founded by its first editor, Jürgen Hoika, in 1994, 25 years ago, in order to establish a possibilty to publish Stone Age research results from Schleswig-Holstein at the then Archaeological State Museum (Archäologisches Landesmuseum [ALM]), today's Museum for Archaeology (Museum für Archäologie, Schloss Gottorf [MfA]). Publications should, on the one hand, reflect proceedings of symposia, conferences and workshops with Stone Age topics primarily held at Gottorf Castle, on the other hand, dissertations presenting comprehensive material. According to that, the first volume, published in 1994, contained the contributions to the 1st International Funnelbeaker Symposium, which, initiated by Jürgen Hoika and Jutta Meurers-Balke, had taken place at the Archaeological State Museum in 1984. Following that, eight dissertations, mainly accomplished at the Institute for Pre- and early History at the Christian-Abrechts-University Kiel, were published, starting with those by today's editors. All these volumes contributed substantially to the scientific presentation and analysis of excavation materials from Schleswig-Holstein and – since 2012, when the Centre for Baltic and Scandinavian Archaeology (ZBSA) also became involved in editig the series – the whole of the Baltic Sea area.

Therefore the editors are especially happy to once more present conference proceedings with volume 10 of the series 'Untersuchungen und Materialien zur Steinzeit in Schleswig-Holstein und im Ostseeraum': 'Working at the Sharp End: From Bone and Antler to Early Mesolithic Life in Northern Europe' collects contributions to a workshop held at Gottorf Castle on 14th–16th March, 2016. This represented the closing workshop of the DFG-funded project 'Neubewertung von Chronologie und Stratigraphie des frühholozänen Fundplatzes Hohen Viecheln (Mecklenburg-Vorpommern) unter besonderer Berücksichtigung der diagnostischen Knochenartefakte' (DFG project no. 271652103), directed by Daniel Groß, Harald Lübke, John Meadows (all ZBSA) und Detlef Jantzen (Landesamt für Kultur und Denkmalpflege Mecklenburg-Vorpommern; Landesarchäologie). In addition to the project's final report the volume contains 17 papers by researchers invited to participate in the workshop, representing either additional studies on material from the site Hohen Viecheln or related topics in research of the early Holocene Mesolithic in northern Europe.

Each paper was, according to international standards, peer-reviewed by two anonymous reviewers and then returned to the author for reworking before final editorial work. Copy-editing was performed by Gundula Lide, supported by Jana Elisa Freigang and Jorna Titel. Daniel Groß realised the layout; cover and cover illustration were designed by Jürgen Schüller. Most maps and figures were provided by the authors themselves, some were reworked by Daniel Groß. We express our sincere thanks to all involved!

It is a novelty for the series to have papers published online first immediately after completion and authors' approval in open access for free download on the website of Wachholtz Publishers. We would like to thank Henner Wachholtz, Wachholtz Publishers, very much for making this possible!

Special thanks are due to the board of the Centre for Baltic and Scandinavian Archaeology (ZBSA) Schleswig, particularly to the director, Claus von Carnap-Bornheim, and the head-of-research, Berit Valentin Eriksen, who substantially supported this publication by providing financial means for its printing.

Sönke Hartz and Harald Lübke
Schleswig, October 2019

# Grusswort des Landesarchäologen von Mecklenburg-Vorpommern

Mit seinen großflächigen, oft noch weitgehend unberührten Niederungen und Binnengewässern bietet Mecklenburg-Vorpommern beste Voraussetzungen, um die gewässeraffinen Kulturen des Mesolithikums zu erforschen. Die Überreste ihrer Wohn- und Jagdstationen sind im feuchten Milieu hervorragend erhalten geblieben. Störungen durch Torfabbau, Begradigung von Gewässern oder Meliorationsmaßnahmen blieben im Wesentlichen auf das 19. und 20. Jahrhundert beschränkt. Sie haben zwar einen gewissen Schaden angerichtet, aber, weil sie zumindest im 20. Jahrhundert oft von aufmerksamen ehrenamtlichen Bodendenkmalpflegern beobachtet wurden, überhaupt erst zur Entdeckung vieler Fundstellen geführt.

Welche Fundstellen eingehender erforscht werden und damit das Bild einer Epoche besonders prägen, unterliegt oft dem Zufall. Hohen Viecheln rückte in den Fokus der Forschung, weil die Entdeckung mehrerer Knochenharpunen zu Beginn der 1950er Jahre auf eine günstige Konstellation traf: 1953 war aus der Vorgeschichtlichen Abteilung des Staatlichen Museums das Museum für Ur- und Frühgeschichte Schwerin entstanden, das auch für die Bodendenkmalpflege in den drei Nordbezirken der DDR zuständig war. Der ehrgeizige Direktor des Museums, Ewald Schuldt, hatte sich durch Ausgrabungen auf der Burgwallinsel Teterow einen Namen gemacht und war nun auf der Suche nach einem geeigneten Fundplatz für ein eigenes Forschungsprojekt.

Wegen der sehr guten Erhaltungsbedingungen versprach Hohen Viecheln, zusätzlich zu dem bekannten Spektrum an Steinartefakten auch ein umfangreiches Geräteinventar aus organischen Materialien bergen zu können. Die ebenfalls ausgezeichnet erhaltenen Tierknochen sollten Aufschluss über das Jagdwild geben. Hinzu kam die Aussicht, aus der Stratigraphie neue Erkenntnisse zur Chronologie und zu den Veränderungen der naturräumlichen Verhältnisse zu gewinnen. Diese Erwartungen wurden nicht enttäuscht: Hohen Viecheln entwickelte sich zu einem der bedeutendsten Plätze mesolithischer Forschung, gleichrangig mit Duvensee, und inspirierte weitere Forschungen, u. a. in Friesack und Rothenklempenow.

Hohen Viecheln gehört nach wie vor zu den legendären archäologischen Fundstellen in Mecklenburg-Vorpommern, auch wenn es aus heutiger Sicht nicht mehr so einzigartig dasteht. Dank einer intensiv betriebenen ehrenamtlichen Bodendenkmalpflege ist die Zahl der bekannten mesolithischen Fundplätze im Land deutlich gestiegen, von denen vermutlich mehrere ein ähnliches Potenzial wie Hohen Viecheln aufweisen. Verändert haben sich aber nicht nur die Verbreitungskarten, sondern auch die Möglichkeiten archäologischer Forschung. Es drängte sich deshalb geradezu auf, Hohen Viecheln noch einmal unter die Lupe zu nehmen, bisherige Erkenntnisse kritisch zu prüfen und neue hinzuzufügen. Der DFG und allen Projektpartnern gebührt herzlicher Dank dafür, dass sie das ermöglicht haben.

So wird Hohen Viecheln auch weiterhin als exemplarischer Fundplatz für das Mesolithikum in der norddeutschen Tiefebene stehen – eine hochinteressante Umbruchszeit, in der Klimawandel, Anstieg des Meeresspiegels und andere Veränderungen eine ständige Anpassung der Menschen an ihre Umwelt erzwangen.

Detlef Jantzen
Schwerin, im September 2019

# Welcome address by the State Archaeologist of Mecklenburg-Western Pomerania

Mecklenburg-Western Pomerania with its large, often unspoiled lowlands and inland waters offers outstanding possibilities for research into the water-oriented cultural groups of the Mesolithic. Remains of their settlement and hunting sites are often well preserved in wet conditions. Disturbances by peat extraction, straightening of watercourses or melioration measures mainly took place during the 19th and 20th centuries. They did some damage, but – as at least during the 20th century they were often supervised by vigilant amateur archaeologists – many sites were discovered this way in the first place.

But often it is left to chance which sites can be thoroughly investigated to largely characterise the picture of a whole timespan. Hohen Viecheln became the focal point of research interest under favourable circumstances: the discovery of several bone points there at the beginning of the 1950s fell together with the establishment of the Museum of Pre- and Early History in Schwerin (out of the former Department of Prehistory at the State Museum) which was also responsible for the preservation and care of field monuments in the three northern districts of the GDR.

The ambitious museum director, Ewald Schuldt, had already gained reputation through his excavations of the Slavic ring wall island near Teterow, and he was looking for a suitable site for another research project. Due to the very good preservation conditions at the site, Hohen Viecheln promised, in addition to the spectrum of artefacts known from other places, a substantial organic inventory. The well-preserved animal bones were expected to shed light on game species and hunting strategies. Furthermore, important results were expected concerning chronology and environmental changes. These hopes were not disappointed: Hohen Viecheln has become, alongside Duvensee, one of the most important sites for Mesolithic research, and research there has inspired further excavations, e.g. at Friesack or Rothenklempenow.

Hohen Viecheln is still one of the legendary archaeological sites in Mecklenburg-Western Pomerania, even if it no longer stands alone. Thanks to intensive voluntary archaeological surveys the number of Mesolithic sites has increased significantly; and several of these may have a potential similar to that of Hohen Viecheln. But not only distribution maps have changed during the last years, but also the possibilities of archaeological research. Therefore, the idea to have another look at Hohen Viecheln, to challenge old results and add new ones, suggested itself. I want to thank the German Research Foundation (DFG) and all project contributors for having made this possible. In this way, Hohen Viecheln will continue to be an exemplary North German Lowland site of the Mesolithic – a highly interesting time when climate change, sea-level rise and other changes enforced constant human adaptions to the environment.

Detlef Jantzen
Schwerin, September 2019

# Acknowledgements

This volume of the series 'Untersuchungen und Materialien zur Steinzeit in Schleswig-Holstein und im Ostseeraum' represents the proceedings of a workshop held at the Centre for Baltic and Scandinavian Archaeology (ZBSA) in Schleswig in March 2016. It is a part of the editors' project 'Neubewertung von Chronologie und Stratigraphie des frühholozänen Fundplatzes Hohen Viecheln (Mecklenburg-Vorpommern) unter besonderer Berücksichtigung der diagnostischen Knochenartefakte', funded by the German Research Foundation (DFG) under the project number 271652103.

While the project was dealing with the re-evaluation of the site Hohen Viecheln 1 for chronological and stratigraphical aspects, this volume does not only cover its final publication but comprises additional modern studies about the site by different scholars. These are furthermore embedded into the international research landscape by adjacent studies covering an area from modern day Britain in the west to the Urals in the east.

All contributions are representing the authors' point of view and respective terminologies. Therefore differences in the vocabulary may appear to the careful reader. While a homogenisation of terms and data recording is relevant for comparative studies, it was beyond the scope and means of this project. As a consequence, terminologies may differ between the contributions, as exemplified by the terms 'uni-serial' and 'uni-lateral' bone points: both are characterised by barbs or notches on one lateral side. At the British site Star Carr those have ever since been named uni-serial, whereas uni-lateral is a more common term in other parts of Europe.

We, as editors, would like to thank all contributors for being part of this volume and their interesting and high-quality articles; also we are grateful for the voluntary support of all anonymous peer-reviewers and their help in improving the articles. Furthermore, we thank the German Research Foundation (DFG) for funding our research and the workshop as well as the Centre for Baltic and Scandinavian Archaeology represented by its director, Claus von Carnap-Bornheim, and the head-of-research, Berit Valentin Eriksen, for support of the project and its presentation in the current form. A tremendous help in the course of making this book was Gundula Lidke who was responsible for text editing, proof-reading, and correspondence with the authors and publishers. Thank you very much! Further editorial support was provided by Jana Elisa Freigang, Jorna Titel, Matthias Bolte, Isabel Sonnenschein and Jürgen Schüller. The latter is also responsible for the cover drawing. Much help and support was provided by Peter Teichert-Köster with respect to handling the finds and accessing them in the depot of the Landesamt für Kultur und Denkmalpflege Mecklenburg-Vorpommern; Landesarchäologie in Schwerin. Close collaboration with Mathieu Boudin of the Royal Institute for Cultural Heritage, Brussels, improved our radiocarbon measurements and the analysis of the consolidant.

We thank all people, mentioned and unmentioned here, who were involved in this book and the different research projects, who helped by further pushing the boundaries of our understanding of the cultural remains and chronologies of the past.

Daniel Groß, Harald Lübke, John Meadows, Detlef Jantzen
Schleswig, October 2019

# The Early Mesolithic bone and antler industry in Latvia, Eastern Baltic

Ilga Zagorska

**Abstract**
*The Early Holocene in the Eastern Baltic, as in the rest of Northern Europe, was marked by pronounced changes in the environment and human ways of life. The centres of settlement shifted from the major river valleys to inland lakes and river systems. One such example is the Zvejnieki II habitation site on the shore of Lake Burtnieks in northern Latvia, which has yielded a rich assemblage of bone and antler artefacts. The article examines the stratigraphy and possible chronology of the settlement layers, but focuses primarily on a typological analysis of the bone and antler artefacts, also presenting insights into the origins of the Early Mesolithic 'culture' in the Eastern Baltic.*

## 1 Introduction

The Stone Age in the Eastern Baltic – Estonia, Latvia, and lately there were also discoveries in Lithuania – is characterised by rich and important bone and antler artefact collections, which have been recovered as stray finds at lakeshores and riverbanks as well as settlement sites and burial grounds. Thanks to some well-stratified sites (Pulli in Estonia, Zvejnieki II and Sūļagals in Latvia), a certain proportion of the bone and antler finds can be attributed to the very beginning of the Mesolithic – the second part of the Preboreal and the beginning of the Boreal climatic period.

The earliest habitation in Latvia occurred at the very end of the Late Glacial, after the retreat of the ice sheet, when reindeer and their hunters entered the country along the valleys of the major rivers (Zagorska 2012). At the beginning of the Preboreal, along with climatic amelioration, development of forests and changes in the fauna, new centres of habitation formed around the inland lakes and their river systems. During this period climatic conditions gradually improved, becoming more favourable for plants and animals. Stands of birch and pine spread, later accompanied by spruce, alder and willow. Elk dominated in the forest environment, and the number of fish species in the waters increased, with a strong dominance of pike.

Only two settlement sites with bone and antler assemblages from this period are known in present-day Latvia. One is the Sūļagals site in southeastern Latvia, now located near Lake Lubāns, but previously situated on a hilly peninsula or island in the ancient lake. In the course of small-scale excavation in 1979 conducted by Ilze Loze a Mesolithic cultural layer with bone and flint finds was revealed on the sloping part of the site (Loze 1988). A sample (twig) taken just under the cultural layer of the site gave a date of 9575 ± 80 BP (TA-1317) or 9239–8730 cal. BC (Loze 2015, 28).

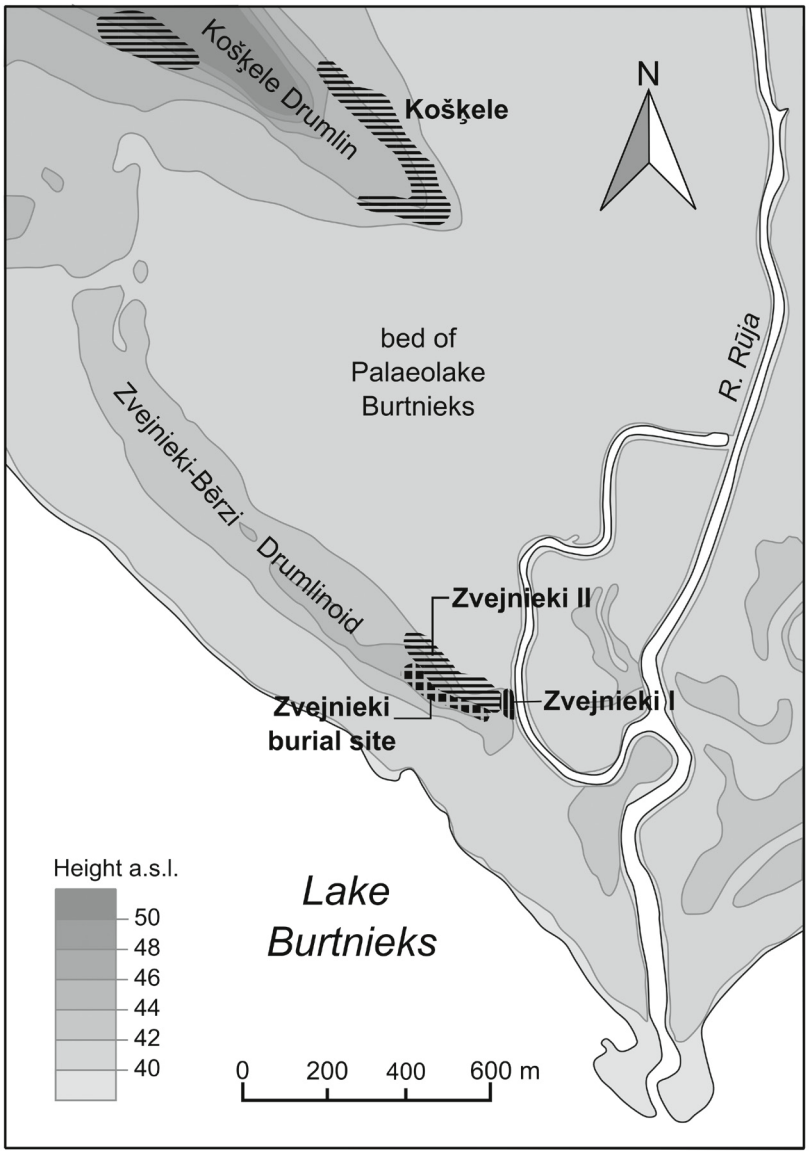


Fig. 1. Location plan showing the Zvejnieki archaeological complex in relation to palaeo-Lake Burtnieks (drawing V. Bērziņš).

The second settlement site, more extensively excavated by Francis Zagorskis (1971, 1974, 1975, 1977 and 1978) is the Zvejnieki II site, near Lake Burtnieks in northern Latvia (Zagorskis 1987; Zagorska/ Zagorskis 1989; Zagorska 2009). This site was part of a bigger archaeological complex, consisting of a burial ground used over a period of five millennia (approximately 7500–2600 cal. BC) and two settlement sites, Mesolithic and Neolithic, partly contemporaneous with the cemetery. This article examines the bone and antler artefacts from the lower layer of the Mesolithic site.

## 2 Zvejnieki – the archaeological complex

Lake Burtnieks, a lake of glacial origin, is located in northern Latvia, in a depression within a field of drumlins left by the retreating ice. The upper parts of the drumlins surrounding the lake became ice-free before 13,500–13,300 BP (Rinterknecht et al. 2003).

The Zvejnieki archaeological complex is situated on the northern shore of Lake Burtnieks, on a drumlinoid stretching northwest to southeast. This drumlinoid, a gravel ridge approximately 1600 m long and 2–4 m in elevation, was previously a narrow, isolated island in the lake, separated from the northwestern shore of the lake by a low-lying belt of flat, boggy plain – the former lakebed (Fig. 1). The Mesolithic site Zvejnieki II developed at the southeastern end of the island, on its gently sloping northern, leeward side. A recent survey in this area has also revealed remains of Mesolithic habitation on the northern slope of the highest part of the gravel hill, now removed, where the oldest part of the burial field was situated.

The drumlinoid consists of stony clay and till, covered by various grades of sand, gravel with pebbles, and occasionally larger boulders. These deposits, covering the ridge, consist mainly of fragments

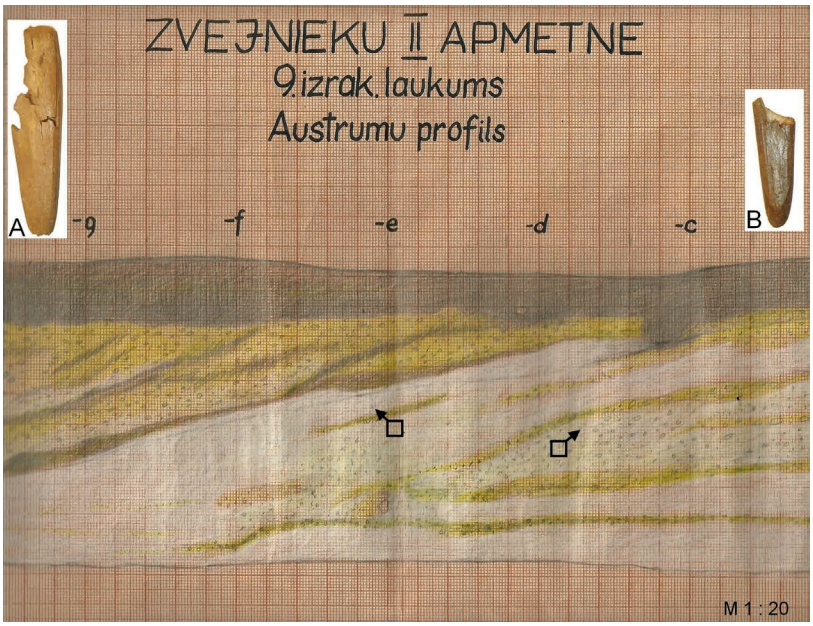


Fig. 2. Zvejnieki II settlement site: cross-section of the eastern section of area IX (drawing I. Eglite).

of carbonaceous sedimentary rock (dolomite, limestone). On the northern slope of the ridge, at the Zvejnieki farmstead, an accumulation of freshwater lime more than 1 m thick was discovered, covered by a layer approximately 0.8–1 m thick, consisting of pebbles and gravel. Under the freshwater lime there was very fine calcareous sand, with pebbles and gravel below this, underlain by clay and till. It is in this particular area that the Stone Age settlements, Zvejnieki I and Zvejnieki II, were located (Eberhards et al. 2003; Eberhards 2006).

A geological section across the upper part of the slope revealed a freshwater lime layer which became thinner downslope. This layer contained sand and gravel-pebble lenses with archaeological material – the Zvejnieki II lower layer (Fig. 2). Starting from the upper part of the slope and falling away gradually, a dark brown, or even black peaty layer was observed, saturated with organic remains and artefacts (Zvejnieki II upper layer). This layer firmly covered the freshwater lime layer with the earliest finds. The pollen from the freshwater lime layer provide evidence of Preboreal conditions (Kalniņa 2006, 56–62).

The chronology is further supported by radiocarbon dates on bone and antler artefacts as well as on a peat sample (Intcal13 curve; Ox Cal.v.4.2). A fragmentary bone point from the lower layer has been dated to 9415 ± 80 BP or 8921–8479 cal. BC (Ua-18201). A second fragment from a harpoon with wide barbs was dated to 9170 ± 70 BP, corresponding to 8566–8271 cal. BC (Ua-19797). A bulk sample of peat from a layer at the foot of the slope gave a date of 8240 ± 120 BP (TA-2791), or 7481–6714 cal. BC.

During the Late Glacial and early Post-Glacial the inland Lake Burtnieks was much larger than today. With its sinuous shoreline, many shallow bays, peninsulas, islands and river deltas, it provided a very suitable area for Stone Age habitation. The excavations at the settlement site also yielded data that permit a reconstruction of the Mesolithic environment. According to pollen analysis, the Zvejnieki archaeological complex and its surroundings show weak traces of possible human presence even since the very end of the Younger Dryas. The Early Mesolithic environment of the region was characterised by climatic amelioration and a partly open landscape, which was covered by sparse birch-pine forest, accompanied by a rich grass community. Later, pine-birch forest dominated, but with meadows still present. Ruderal plants and charcoal in the pollen spectra from the Zvejnieki II lower layer reflect human activity in the area (Eberhards et al. 2003).

Ten species are represented in the mammal remains, with a strong dominance of elk (*Alces alces*). Also present are beaver (*Castor fiber*), wild boar (*Sus scrofa*), brown bear (*Ursus arctos*), roe deer (*Capreolus capreolus*) and other species (Fig. 3,1). Pike (*Esox lucius*) dominates among the fish remains from the lake, followed by bream (*Abramis brama*), perch (*Perca fluviatilis*), tench (*Tinca tinca*) and whiting (*Leuciscus cephalus*) (Fig. 3,2). Studies of this material and of the archaeological finds serve to characterise the earliest Mesolithic inhabitants of Zvejnieki as typical hunter-fisher-gatherers.

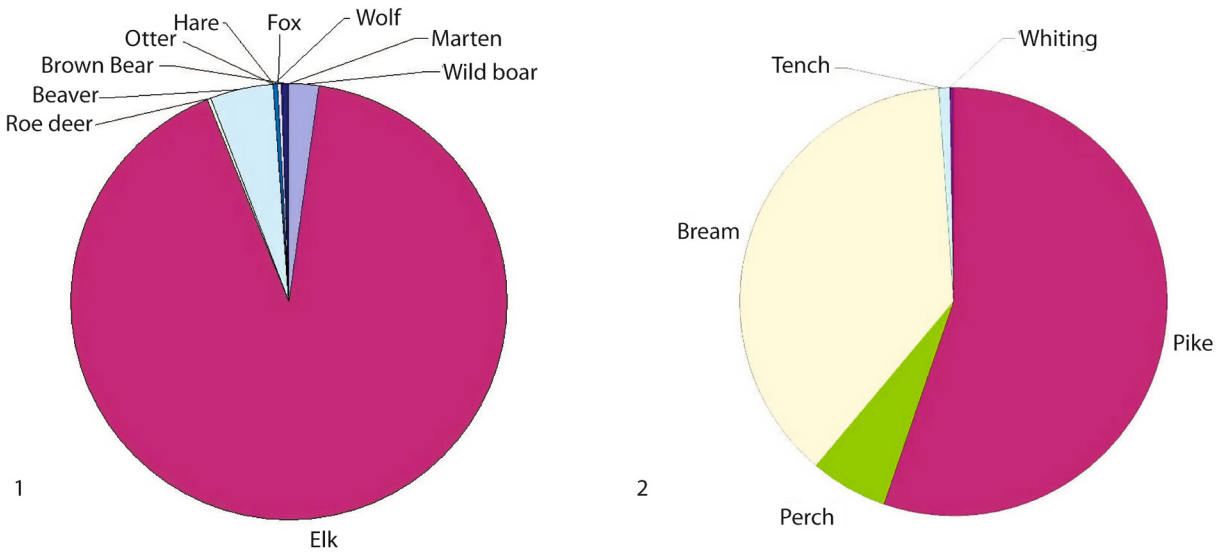


Fig. 3. Zvejnieki II, lower layer. 1 – Mammal species (after Lõugas 2006); 2 – Fish species (after Lõugas 2006, based on identifications by J. Sloka).

Within the Zvejnieki settlement site, on the upper part of the slope in excavation areas I, IX, XIII, XV, and partly also VI (the lower part), a total area of more than 180 m² was excavated that can be considered as yielding the earliest finds on the site (Fig. 4): approximately 3310 artefacts and waste pieces of bone and antler, 214 pieces of worked flint and debitage, and a large number of animal bones and fish remains. The bone and antler finds were rich and diverse: hunting equipment, domestic inventory, some jewellery and items of art, miscellaneous fragments of artefacts that were impossible to identify precisely, and waste from artefact manufacturing.

Several more bone and antler artefacts can also be attributed to the earliest stage of habitation, namely those found in the freshwater lime layer, which extended even further, constituting the basal layer in other excavation areas, but the stratigraphic and typological evaluation have yet to be checked by radiocarbon dating, which is a task for the immediate future.

## 3 Manufacturing methods

Tools were manufactured from the long bones of large ungulates – elk, aurochs, and less commonly red deer (mainly metapodials). Sometimes, artefacts were also produced from other bones, such as ribs, scapulae and mandibulae. Worked antler tines and other parts of antler are also present.

Éva David, who studied the bone finds from the Zvejnieki lower layer, focused on the technological aspects of the industry (David/Zagorska 2004; David 2006). During the preparation of blanks for artefacts, the distinctive 'Z' method was used (after Zamostje, the well-known Russian site). After sawing and fracturing the distal parts of metapodial and metacarpal bones, the upper surfaces of these long bones were then prepared by the removal of axial flakes all around the preform, obtaining a cylindrical matrix. Then the bones were split lengthwise, obtaining blanks for manufacturing tools. Blanks of maximal length were obtained, 1.2–2.5 cm wide and 4–6 mm thick, and subsequently divided into smaller fragments. Other methods for producing implements were also used, but these always depended on the raw material itself, or on the morphology of the item to be produced (David 2006, 238–239).

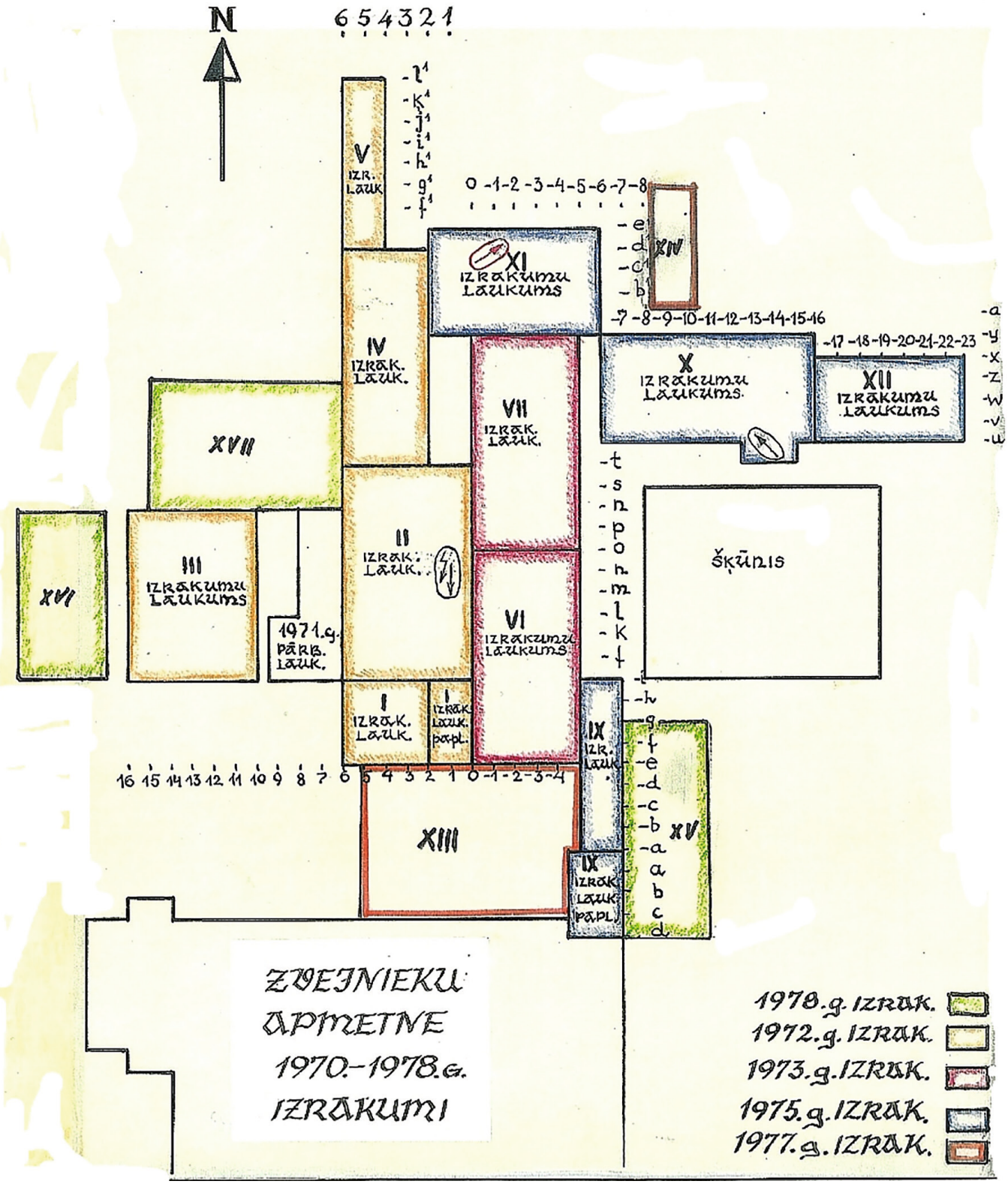


Fig. 4. Zvejnieki II settlement site, areas (I–XVII) excavated in 1972, 1973, 1975, 1977, 1978 (drawing I. Eglīte).

Table 1. The bone and antler artefact assemblage from the Zvejnieki II settlement, lower layer.

**Zvejnieki II settlement, lower layer**

| | Hunting weapons | | | | Domestic inventory | | | | | | | | Ornaments | | Indet. | Waste | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Square** | Harpoons | Projectile points | Slotted points | Daggers | Chisels | Knives | Wedges | Awls | Axes / adzes | Blade axes | Punches | Sleeves | Tooth pendants | Others | | Phalanges | Foot bones | Others |
| I | 1 | 18 | 0 | 0 | 6 | 0 | 6 | 2 | 1 | 2 | 1 | 1 | 5 | 1 | 9 | 3 | 0 | 4 |
| VI | 3 | 10 | 5 | 1 | 9 | 0 | 10 | 5 | 1 | 1 | 3 | 0 | 7 | 2 | 7 | 9 | 2 | 5 |
| IX | 1 | 2 | 0 | 4 | 6 | 1 | 2 | 2 | 0 | 1 | 1 | 0 | 9 | 5 | 7 | 4 | 0 | 5 |
| XIII | 0 | 7 | 2 | 4 | 11 | 2 | 5 | 2 | 1 | 1 | 2 | 0 | 2 | 0 | 10 | 18 | 0 | 12 |
| XV | 0 | 2 | 2 | 2 | 3 | 3 | 6 | 1 | 0 | 0 | 4 | 1 | 1 | 0 | 15 | 11 | 2 | 13 |
| Sum | 5 | 39 | 9 | 11 | 35 | 6 | 29 | 12 | 3 | 5 | 11 | 2 | 24 | 8 | 48 | 45 | 4 | 39 |
| Altogether: 335 | | | | | | | | | | | | | | | | | | |

# 4 The bone and antler inventory

Using a classification scheme elaborated for bone and antler artefacts from the Eastern Baltic (Zagorska 1983), all the finds from the Zvejnieki II lower layer have been classified according to their function, after which morphological types and subtypes have been singled out. Indeterminate fragments form a separate group, quite a large one, as it is usual for settlements. Waste from tool production forms the last group (Table 1).

The first major group consists of hunting equipment – harpoons, projectile points, and daggers (Fig. 5). Harpoons are preserved only in fragmentary form – the tips are usually missing and barbs in many cases broken off. They belong to a type with widely arranged, angular or slanting barbs along one side of the tool and a reverse barb at the base (Fig. 5,9.10). The projectile points group consists of spear- and arrowheads. Spearheads were made of long bones, with a smoothed surface and a rounded oval, sometimes irregular or flattened cross-section, narrowing towards both ends. Some of these spearheads are quite massive (Fig. 5,5.12). One fragmentary example of a flat spearhead had an ornamentation consisting of incisions forming rhombuses (Fig. 5,11). The arrowheads are needle-shaped, round in cross-section with a tapered tip and a short, conical, pencil-shaped base (Fig. 5,3.8). Some arrowheads are smaller and show a flat cross-section (Fig. 5,4). Quite characteristic are slotted bone artefacts – points with a groove for inserts along one or both edges. In two cases flint inserts were still preserved intact in the grooves (Fig. 5,1–2). Some daggers and knives also have such grooves. Bone daggers were made of large mammal bones (ulna, tibia, scapula), preserving the natural form of the bone as the handle, while the other end has a curved, pointed tip, which is sharpened and smoothed (Fig. 5,14). In some cases the natural form has not been retained, and the handle has been worked (Fig. 5,13). Thus, the main hunting weapons from this earlier period were harpoons and various projectile points, including spears, arrowheads and slotted artefacts, along with daggers, confirming the importance of hunting in the Early Mesolithic.

Domestic utensils were more numerous and diverse, including chisels and gouges, knives, axes and adzes, blade axes, awls, punch artefacts made of antler tines, and others (Fig. 6). Various parts of animal bones as well as antlers were used for manufacturing such items. Most numerous are finds of chisels, made of longitudinally split bone strips, varying in width (3–5 cm wide). The surface was smoothed, with

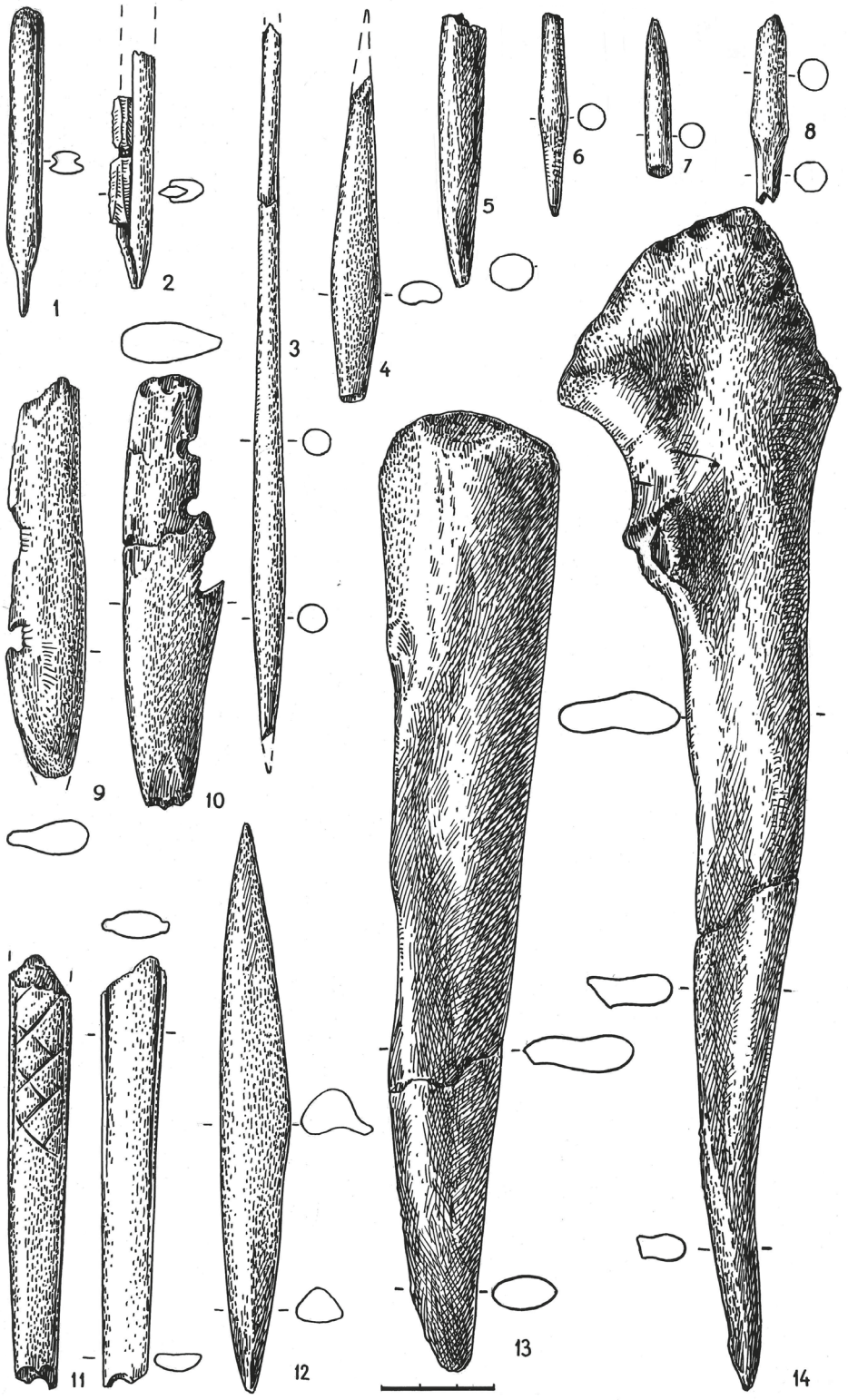


Fig. 5. Bone artefact inventory (weapons) from the Zvejnieki II settlement site, lower layer: 1–2 – slotted arrowheads; 3–4.6–8 – complete and fragmentary arrowheads; 9–10 – harpoons; 5.11–12 – spearheads; 13–14 – daggers (drawings M. Jāņkalniņa).

a straight or slightly convex working edge, bevelled on the inner face. The more robust convex examples could have been used as gouges. Some of these chisels still show traces of processing in the form of large, rough flake negatives on the sides. The active parts, i.e. the working edges, are quite damaged and worn (Fig. 6,9–10). So-called wedge-shaped artefacts were made of bone splinters of various sizes, the working part being made by splitting off material from both sides. The large number of these artefacts suggests that they must have seen extensive use, partly fulfilling the function of burins (Fig. 6,6–8). Knives were made of narrow strips of bone or ribs, sharpened on one or both sides; these could also have been used as scaling tools. Very characteristic for the site are large, broad knives made of the scapulae of large mammals, with a convex, sharpened working edge (Fig. 6,11). Constituting the next category of finds are awls and drills – artefacts with a rounded, polished sharp end made from split tubular bones, elk epiphyses and other bone splinters (Fig. 6,2–3). Antler axes or adzes were preserved in fragmentary form: there are two finds of upper parts with drilled perforations for the shaft (Fig. 6,12) and a heavy antler adze with a shaft hole; the lower part, where there could have been a socket for some kind of insert, has decayed (Fig. 6,13). Antler tools, mainly made of the palm of the antler, form a special group. They were very well worked and smoothed, all of them with a flattened upper part and a lower part sharpened from both sides. These artefacts could have served as blade axes or adzes, when inserted into large sockets (Fig. 6,14–15). Some of the bone items made of mandibulae could have functioned as sockets (sleeves) (Fig. 6,4). Antler tines sometimes bear traces of working at the very tip; they could have been used as punches or as polishers.

Decorative articles are represented in the form of pendants made of teeth of elk and small carnivores, each one with incisions at the root. There is also a pendant made of the middle section of a beaver canine as well as a bone plate with a drilled hole.

There are also a great number of bone and antler fragments the function of which is difficult to determine. Constituting a significant part of the find material are animal bones with traces of use: first and second phalanges with broken holes (Fig. 6,5) and foot bones with shallow holes in the heel (?) part. Waste from tool production includes animal long bones (metapodials, metacarpals, etc.), various bone splinters and worked fragments, as well as segments of antler tines and palms (Fig. 6,1).

The bone and antler inventory from the Zvejnieki II layer thus consists of hunting tools, including specific forms of harpoons, projectile points, slotted artefacts and daggers, along with a great variety of domestic implements – chisels, awls, knives, axes and adzes, blade axes, sleeves and decorative items, mainly animal tooth pendants, all stressing the great importance of the bone and antler industry in this earliest period.

A very similar inventory, only more fragmented, is represented on the Sūļagals site, with similar bone harpoons, slotted bone points, needle-shaped arrowheads, massive, smoothed spearheads, daggers, chisels and gouges (Loze 1988, plate II–III; 2015, fig. 13–14). All these finds have parallels in the rich collection of stray finds from Lake Lubāns in southeastern Latvia (Vankina 1999). Here, similar finds occur as whole, unbroken items: harpoons with wide, angular barbs and a basal barb facing the stem, needle-shaped points, a large number of slotted artefacts, daggers with a curved, pointed end and others (Vankina 1999, plate II; XXVIII; XLII; XLIX), testifying that the shores of Lake Lubāns were already quite densely inhabited during the early part of the Mesolithic. Further sites need to be located.

The closest resemblance is to the assemblage of bone and antler artefacts found at the well-known Pulli site in southwestern Estonia, excavated by Lembit Jaanits (Jaanits/Jaanits 1975; 1978). The same kind of needle-shaped arrowheads, massive projectiles, harpoon fragments, adzes, chisels and awls are present. Small differences are observed, of course, e.g. in harpoon details (barbs) and some arrowhead forms. At Pulli long, needle-shaped arrows with conical and biconical upper parts occur, whereas at Zvejnieki only a small fragment – a very small tip of such an arrowhead – is known.

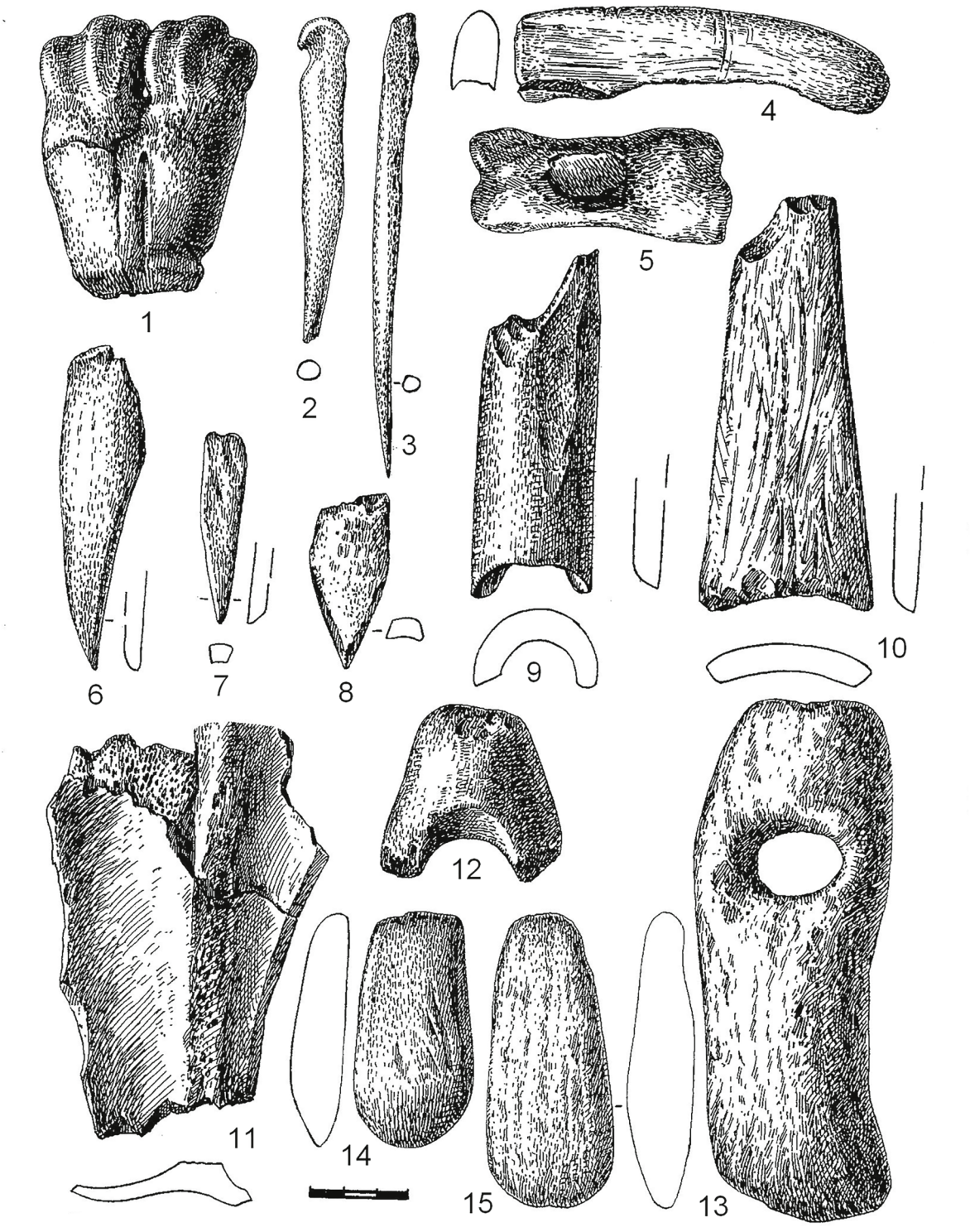


Fig. 6. Bone and antler inventory (domestic appliances) from the Zvejnieki II settlement site, lower layer: 1 – distal part of metacarpal of aurochs; 2–3 – awls; 4 – socket or sleeve; 5 – phalange with a broken hole; 6–8 – wedge-shaped artefacts; 9–10 – chisels; 11 – scapula of large mammal with a sharpened working edge; 12–13 – antler adzes; 14–15 – antler blade axes (inserts) (drawings M. Jāņkalniņa).


Fig. 7. Flint stray finds from present-day Latvia: 1 – Olaine; 2–3 – Jersika hillfort (photos J. Kankaanpää).

The Pulli site has now yielded seven radiocarbon dates, ranging between 9300 and 8200 cal. BC (Kriiska/Lougas 2009, 168), i.e. the Early Mesolithic, contemporaneous with the Zvejnieki II lower layer.

In Lithuania, a typologically similar bone harpoon from Rudninkai, palynologically dated to the Preboreal, and perhaps also a fragmentary harpoon with broad barbs from Balsupai, as well as some of the slotted bone stray finds may be typologically attributed to the Early Mesolithic; there are as yet no stratified sites with a bone inventory from this period (Rimantienė 1994, 62 plate 15).

The Eastern Baltic Early Mesolithic finds constitute a typical forest zone hunter-gatherer hunting complex, used for hunting large and small terrestrial mammals and birds, and also species inhabiting the inland lakes and rivers. The bow and arrow was the main hunting weapon, supplemented by the spear, dagger, and harpoon. Implements for domestic use were numerous and diverse. The environment, the bone and antler artefact complex as well as evidence of the hunted animals characterise the society as subsisting from the terrestrial and the freshwater ecosystem.

## 5 Origins

When discussing the origins of the Early Mesolithic bone and antler artefact complex, the Late Palaeolithic influence must be mentioned first. This is seen in the form of the harpoon, with widely spaced, robust barbs and a reverse barb at the base – an archaic type known from the North European Late Palaeolithic, Clark's type 11 (Cziesla 2004; Cziesla/Masojć 2007; Verhart 1990). Stefan Karol Kozłowski has connected this type with the Tanged Point cultural tradition and its immediate successors (Kozłowski 2007, 498). Our harpoon, when it had broken, was later reshaped into a chisel. It has been dated to 9170 ± 70 BP, or 8566–8271 cal. BC (Ua-19797). It is most interesting that it has been established in the frame of interdisciplinary studies that the artefact may have been made of the bone of an herbivore that subsisted mainly on lichen (Erikson 2006). If this were confirmed, then perhaps it would be the last evidence of reindeer on the eastern shore of the Baltic Sea basin in the early part of the Holocene. Éva David also identified two pieces of retoucheurs which were worked using a Palaeolithic technique and later reshaped into a chisel and gouge (David 2006, 236–237).

In contrast to this, the finds of long, needle-shaped arrowheads with conical or biconical tips connect our tool complex with areas further to the east, where during the Mesolithic the so-called 'Shigir-type' arrowheads occur in the area from the eastern shore of the Baltic basin to the Ural Mountains in the east. Finds of biconical arrowheads from the Early Mesolithic site of Stanovoje IV in the Upper Volga area have also been dated to the end of the Preboreal (Hartz et al. 2010, 163 fig. 11). The main technical manufacturing method (the so-called 'Z' method) also reveals similarities with more easterly regions. This method of manufacturing bone artefacts is known at e.g. the Zamostje site (Upper Volga region), at Pulli in Estonia, and at the Scanian Ageröd sites, forming the 'North-Eastern Technocomplex' (David 2009).

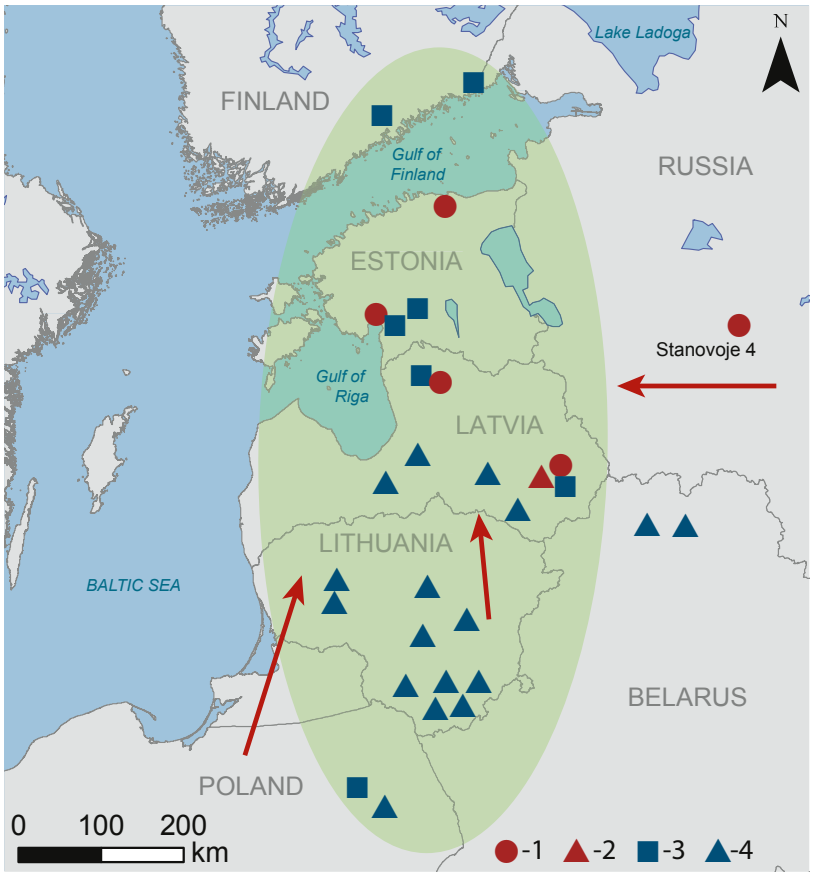


Fig. 8. The area of the Pulli Culture in the eastern Baltic Mesolithic: 1 – sites with a bone and antler inventory; 2 – stray finds of bone and antler harpoons; 3 – sites with a flint inventory; 4 – stray finds of flint arrowheads.

A bone and antler artefact complex very similar to the early Baltic complex was found in the Upper Volga region at the site of Stanovoje 4, layer IV. It dates a little earlier, to the very end of the Younger Dryas and the beginning of the Preboreal, and consists of needle-shaped and slotted points, antler sockets, blade axes, broad knives made of scapulae, etc. (Zhilin 2007).

Some more new influences, coming from the south, may be seen in the flint material of the Early Mesolithic sites. Visual analysis reveals that two types of flint are present in Latvia. One consists of small, mainly grey, light brown or yellowish pebbles and nodules, most likely from Silurian flint, distributed by glacial processes in Estonia and northern Latvia (Kriiska et al. 2011, 79–80). More interesting in this context is the second type of flint – black-brownish flint of high quality, probably deriving from Cretaceous flint formations. This type of flint is known from southern Lithuania and Belarus, as well as Poland and Ukraine (Kriiska/Lõugas 2009). The finds are characterised by blade technology and pressure technique, with single-platform conical cores, blades, and special tanged points. These arrowheads are long, with ventral retouch along the sides of the tang, and the tip sharpened by flat, ventral retouch. These finds are widely distributed on Early Mesolithic sites from northeastern Poland, Lithuania, northwestern Belarus, through Latvia and Estonia to southern Finland (Ostrauskas 2000; Sørensen et al. 2013). In Latvia we know at least three places with objects made of this black flint. Cores and a fragmentary arrowhead are known from cultural layers of later sites, the Jersika and Ķenteskalns hillforts on the River Daugava, and a complete arrowhead has been recovered as a stray find by the lower reaches of the River Lielupe (Olaine); both rivers flowing through central Latvia (Fig. 7).

A similar bone artefact complex and comparable artefacts made of black, high quality flint mark the territory of the Early Mesolithic cultural unit which is known as the early Kunda or Pulli stage of the Kunda Culture, or even identified as an independent Pulli Culture (Fig. 8). I support the use of the latter term for this phenomenon. Of course, the Eastern Baltic Kunda Culture later developed from this earliest stage, but in the beginning our assemblages do not include the main weapon of the Kunda Culture – the barbed Kunda-type fishing spear.

## 6 Conclusions

The described complex of Early Mesolithic bone and antler artefacts from Latvia (c. 9000–7000 cal. BC) not only serves to characterise the material culture of the ancient inhabitants and their hunter-fisher lifestyle, but also indicates the place of this industry within the wider geographical and cultural area encompassing Estonia, the southern part of Finland and northwest Russia. In assessing the origins of the Early Mesolithic bone and artefact complex, a continuation of Palaeolithic artefact forms may be identified, as well as the appearance of new processing techniques and tool forms.

Questions remain with regard to the rather complex stratigraphy of the rest of the area of the Zvejnieki II habitation site itself (not only the upper part of the slope), where the dating of layers on the basis of artefact forms should be verified by radiocarbon dating. This might actually increase the number of finds relating to the Early Mesolithic. There is also a need for further technological and use-wear analysis of the bone and antler assemblage. The rich array of bone and antler artefacts and production waste, as well as faunal remains, could still yield a great deal more information regarding the beginnings of the Middle Stone Age in the Eastern Baltic.

**Acknowledgements**
The preparation and editing of this article was undertaken as a part of the University of Latvia Academic Development Project (APP 2018, 19) 'The earliest habitation of Latvia – Palaeolithic and Early Mesolithic'. The English text was revised by Valdis Bērziņš.

# References

Cziesla 2004: E. Cziesla, Late Upper Palaeolithic and Mesolithic continuity – or: bone and antler objects from the Havelland. In: T. Terberger/B. V. Eriksen (eds.), Hunters in a Changing World. Environment and Archaeology of the Pleistocene-Holocene Transition (ca. 11000–9000 B.C.) in Northern Central Europe. Internationale Archäologie 5 (Rahden/Westfalen 2004) 165–182.

Cziesla/Masojć 2007: E. Cziesla /M. Masojć, The uniserially barbed harpoon from Węgliny (Wodra Valley, Lower Lusatia, Poland) and some cultural implications. In: M. Masjoć/T. Płonka/B. Ginter/S. K. Kozłowski (eds.), Contributions to the Central European Stone Age (Wrocław 2007) 33–42.

David 2006: É. David, Technical behavior in the Mesolithic (9th–8th millenium BC): the contribution of the bone and antler industry from domestic and funerary context. In: Larsson/Zagorska 2006, 235–252.

David 2009: É. David, Show me how you make your hunting equipment and I will tell you where you come from: technical traditions, an efficient means of characterising cultural identities. In: McCartan et al. 2009, 362–368.

David/Zagorska 2004: É. David/I. Zagorska, Zvejnieku mezolīta apmetne un kapulauks Eiropas kontekstā: kaula un raga industrijas tehniskās izpētes pirmie rezultāti. Latvijas vēstures institūta žurnāls 2, 2004, 5–26.

Eberhards 2006: G. Eberhards, Geology and development of the paleolake Burtnieks during the Late Glacial and Holocene. In: Larsson/Zagorska 2006, 25–52.

Eberhards et al. 2003: G. Eberhards/L. Kalniņa/I. Zagorska, Senais Burtnieku ezers un akmens laikmeta apdzīvotās vietas (The ancient Lake Burtnieks and the Stone Age inhabitation). In: I. Ose/A. Vasks/I. Loze/I. Zagorska (eds.), Arheoloģija un etnogrāfija XXI (Rīga 2003) 27–40.

Erikson 2006: G. Erikson, Stable isotope analysis of human and faunal remains from Zvejnieki. In: Larsson/Zagorska 2006, 183–215.

Hartz et al. 2010: S. Hartz/T. Terberger/M. Zhilin, New AMS-dates for the Upper Volga Mesolithic and the origin of microblade technology in Europe. Quartär 57, 2010, 155–169.

Jaanits/Jaanits 1975: L. Jaanits/K. Jaanits, Frühmesolithische Siedlung in Pulli, Eesti NSV Teaduste Akadeemia Toimetised. Ühiskonnateadused 24 (1), 1975, 64–70.

Jaanits/Jaanits 1978: L. Jaantis/K. Jaantis, Ausgrabungen der frühmesolithischen Siedlung von Pulli. Eesti NSV Teaduste Akadeemia Toimetised. Ühiskonnateadused 27 (1), 1978, 56–63.

Kalniņa 2006: L. Kalniņa, Paleovegetation and human impact in the surroundings of the ancient Burtnieks lake as reconstructed from pollen analysis. In: Larsson/Zagorska 2006, 53–74.

Kozłowski 2007: S. K. Kozłowski, Thinking Mesolithic (Warsaw 2007).

Kriiska/Lõugas 2009: A. Kriiska/L. Lõugas, Stone Age settlement sites on an environmentally sensitive coastal area along the lower reaches of the River Pärnu (south-western Estonia), as indicators of changing settlement patterns, technologies and economies. In: McCartan et al. 2009, 167–175.

Kriiska et al. 2011: A. Kriiska/E. Hertell/M. A. Manninen, Stone Age Flint Technology in South-Western Estonia: Results from the Pärnu Bay Area. In: T. Rankama (ed.), Mesolithic Interfaces. Variability in Lithic Technologies in Eastern Fennoscandia (Saarijärvi 2011) 65–90.

Larsson/Zagorska 2006: L. Larsson/I. Zagorska (eds.), Back to the Origin. New Research in the Mesolithic-Neolithic Zvejnieki Cemetery and Environment, Northern Latvia. Acta Archaeologica Lundensia, series in 8º, N° 52 (Lund 2006).

Lõugas 2006: L. Lõugas, Animals as subsistence and bones as raw material for settlers of prehistoric Zvejnieki. In: Larsson/Zagorska 2006, 75–89.

Loze 1988: I. Loze, Poselenija kamennovo veka Lubanskoi nizini. Mesolit, panii in crednij neolit (Stone Age monuments in Lubana Lowland. Mesolitic, Early and Midle Neolitic). (Rīga 1988).

Loze 2015: I. Loze, Lubāna mitrāja apdzīvotība akmens laikmetā (Stone Age inhabitance in the Lake Lubans wetland). (Rīga 2015).

McCartan et al. 2009: S. B. McCartan/R. Schulting/G. Warren/P. Woodman (eds.), Mesolithic Horizonts 1 (Oxford 2009).

Ostrauskas 2000: T. Ostrauskas, Mesolithic Kunda culture. A Glimpse from Lithuania. In: V. Lang/A. Kriiska (eds.), De Temporibus Antiquissimis ad Honorem Lembit Jaanits. Muinasaja Teadus 8 (Tallinn 2000) 167–180.

Rimantienė 1994: R. Rimantienė, Die Steinzeit in Litauen. Bericht der Römisch-Germanischen Kommision 75, 1994, 23–146.

Rinterknecht et al. 2003: V. R. Rinterknecht/P. U. Clark/V. Zelčs/A. Bitinas, Pēdējā apledojuma izzušanas gaitas datējumu ar 10 Be metodi pašreizējie rezultāti Latvijā un Lietuvā. In: Latvijas Universitātes 61.zinātniskā konference: Ģeogrāfija, ģeoloģija, vides zinātne. Referātu tēzes (Rīga 2003) 174–176.

Sørensen et al. 2013: M. Sørensen/T. Rankama/J. Kankaapää/K. Knutson/H. Knutson/S. Melvold/B. V. Eriksen/H. Glørstad, The first eastern migrations of people and knowledge into Scandinavia: Evidence from studies of Mesolithic technology, 9th–8th millenium BC. Norwegian Archaeological Review 2013: http://dx.org/10.1080/00293652.2013.770416.

Vankina 1999: L. Vankina, The Collection of Stone Age Bone and Antler Artefacts from Lake Lubāna. Latvijas Véstures Muzeja Raksti 4 (Rīga 1999).

Verhart 1990: L. B. M. Verhart, Stone Age bone and antler points as indicators for ‚Social Territories' in the European Mesolithic. In: P. M. Vermeersch/P. van Peer (eds.), Contributions of the Mesolithic in Europe. Studia Praehistorica Belgica 5 (Leuven 1990) 139–152.

Zagorska 1983: I. A. Zagorskaja, Kostjanie orudija ohoti i ribnolovstva kamennogo veka na teritorii Latvii. Avtoreferat kandidata istoriceskih nauk (Vilnius 1983).

Zagorska 2009: I. Zagorska, People and places in the Latvian Mesolithic: a case study from Zvejnieki archaeological complex. In: McCartan et al. 2009, 255–260.

Zagorska 2012: I. Zagorska, Senie ziemeļbriežu mednieki Latvijā (The ancient reindeer hunters in Latvia). (Riga 2012).

Zagorska/Zagorskis 1989: I. Zagorska/F. Zagorskis, The bone and antler inventory from Zvejnieki II, Latvian SSR. In: C. Bonsall (ed.), The Mesolithic in Europe. Papers presented at the third international symposium (Edinburgh 1989) 414–423.

Zagorskis 1987: F. Zagorskis, Zvejnieku akmens laikmeta kapulauks (Rīga 1987).

Zhilin 2007: M. Zhilin, The early Mesolithic of the Upper Volga: selected problems. In: M. Masjoć/T. Płonka/B. Ginter/S. Kozłowski (eds.), Contributions to the Central European Stone Age (Wrocław 2007) 89–104.

Ilga Zagorska
Institute of History of Latvia
University of Latvia
Kalpaka bulvāris 4
Rīga LV 1050
Latvia
ilga.zagorska@gmail.com