Raiko Krauss and Harald Floss (Eds.)

SOUTHEAST EUROPE BEFORE NEOLITHISATION

Proceedings of the International Workshop within the Collaborative Research Centres SFB 1070 "RessourcenKulturen", Schloss Hohentübingen, 9th of May 2014

RessourcenKulturen Band 1

Raiko Krauss and Harald Floss (Eds.)

SOUTHEAST EUROPE BEFORE NEOLITHISATION

Proceedings of the International Workshop within the Collaborative Research Centres SFB 1070 "RessourcenKulturen", Schloss Hohentübingen, 9th of May 2014

Tübingen 2016

Peer Review:
The papers published in this volume were subject to an anonymous international peer review.

Cover Picture:
River Danube at the Iron Gates the 'Small Cauldrons' at Dubova, seen from the Serbian shore (see the contribution by Ciocani, 168).

Bibliografische Information der Deutschen Nationalbibliothek

Die Deutsche Nationalbibliothek verzeichnet diese Publikation in der Deutschen Nationalbibliografie; detaillierte bibliografische Daten sind im Internet über http://dnb.d-nb.de abrufbar.

ISBN 978-3-946552-01-7

http://hdl.handle.net/10900/69347
http://nbn-resolving.de/urn:nbn:de:bsz:21-dspace-693475
http://dx.doi.org/10.15496/publikation-10762

Gestaltung und Druckvorstufe: Büro für Design, Martin Emrich, Lemgo
Druck: Pro BUSINESS digital printing Deutschland GmbH

Printed in Germany

Inhalt

Vorwort der Herausgeber

Mit der Buchreihe „RessourcenKulturen“ entsteht ein Publikationsmedium für die Ergebnisse der Forschungen des von der Deutschen Forschungsgemeinschaft geförderten Sonderforschungsbereiches 1070 RessourcenKulturen an der Eberhard Karls Universität Tübingen. Vorrangig wird dies Dissertationen, andere monographische Schriften und Tagungsbände umfassen. Zur Gewährleistung der Einhaltung allgemeiner Standards der Qualitätssicherung werden alle Bände einem internationalen Peer-Review-Verfahren unterzogen.

Mit ihren Bänden spiegelt die Reihe die Fachbreite und interdisziplinäre Kooperation des SFB wider, die aus Archäologien (Ur- und Frühgeschichte, Archäologie des Mittelalters, Vorderasiatische Archäologie, Biblische Archäologie, Klassische Archäologie und Naturwissenschaftliche Archäologie), Empirischer Kulturwissenschaft, Ethnologie, Geographie, Geschichtswissenschaften und Historischen Philologien (Klassische Philologie, Vorderasiatische Philologie) besteht.

Um eine möglichst weite Verbreitung der Ergebnisse des SFB zu gewährleisten, ist neben dem Druck der Werke bewusst auch die Publikationsform des OpenAccess gewählt worden. Die Bände sind über die Homepage des SFB (http://www.uni-tuebingen.de/forschung/forschungsschwerpunkte/sonderforschungsbereiche/sfb-1070.html) sowie über die Website der Tübinger Universitätsbibliothek (https://publikationen.uni-tuebingen.de/) einzusehen.

Es ist unser Anliegen, die Publikationsreihe zu einem wichtigen Werkzeug der Verbreitung der Forschungserkenntnisse des SFB zu machen und damit zu einer lebendigen wissenschaftlichen Diskussion beizutragen.

Die Sprecher des Sonderforschungsbereiches 1070
RessourcenKulturen
Martin Bartelheim
Roland Hardenberg
Jörn Staecker

Publishers' Foreword

This is the first volume in the series 'Ressourcen-Kulturen', a medium for the publication of the results of SFB 1070 ResourceCultures, a collaborative research centre located at Tübingen University and funded by the German Research Foundation (DFG). Primarily the series will include dissertations, monographs and conference publications. In order to ensure compliance with common standards of quality control all volumes are subject to an international peer review procedure.

The series will reflect the wide range and the interdisciplinary cooperation of the research centre, including several archaeological disciplines (Prehistoric Archaeology, Medieval Archaeology, Near Eastern Archaeology, Biblical Archaeology, Classical Archaeology and Scientific Archaeology) as well as Social and Cultural Anthropology, Geography (Human Geography, Physical Geography and Pedology), philologies (Classic Studies, Ancient Near Eastern Studies), and historical sciences (Ancient History, Medieval History, Economic History).

To guarantee widespread distribution we chose to publish in OpenAccess as well as producing printed copies. All volumes will be available on the homepage of SFB 1070 (http://www.uni-tuebingen.de/forschung/forschungsschwerpunkte/son-derforschungsbereiche/sfb-1070.html) and on the homepage of the University Library (https://publikationen.uni-tuebingen.de/).

With this series of publications we aim to create a tool for the circulation of findings attained by the work of the collaborative research centre in order to stimulate a lively scientific discussion.

The spokespersons of SFB 1070 'ResourceCultures'
Martin Bartelheim
Roland Hardenberg
Jörn Staecker

PAOLO BIAGI

The Last Hunter-Gatherers of the Northern Coast of the Black Sea and their Role in the Mesolithic of Europe
A View from Crimea

Keywords: Crimea, Late Palaeolithic and Mesolithic, Shan-Koba, Radiocarbon chronology, Chipped stone assemblages

Acknowledgements

The author is very grateful to the late Professor V. N. Stanko (P. Mogila University, Nikolaev, UA), Dr. G. A. Khlopachev (Peter the Great Museum of Anthropology and Ethnography, St. Petersburg, Russian Federation) and D. V. Kiosak (I. I. Mechnikov State University, Odessa, UA) who provided the samples for AMS dating.

Special thanks are due to Dr. B. A. Voytek (University of Berkeley, USA) for the revision of the original English text, and Dott. T. Fantuzzi (Ca' Foscari University, Venice) for the calibration plots.

In this paper the calibrations diagrams of *figs. 5*, *7* and *8* have been developed according to OxCal 4.2 (Bronk Ramsey/Lee 2013), while the dates of *tables 1* and *2* have been calibrated according to CalPal 2014 (Danzeglocke et al. 2014).

Introduction

The Late Palaeolithic and Mesolithic sequences brought to light during the excavations carried out in the rock-shelters of Crimea are among the most important and complete in south-eastern Europe (Воеводский 1950; Телегін 1982; Gimbutas 1956, 14–17; Демиденко 2003; Demidenko 2014a). The data obtained from these sites helps us follow the cultural and environmental changes that took place along the northern coast of the Black Sea between the end of the Pleistocene and the beginning of the Holocene (Громова/Громов 1937; Бибиков 1941; Antony 2007; Stanko 2007; 2009; Yanevich et al. 2009; Dolukhanov et al. 2009; Demidenko 2014b).

In particular the rock-shelters of Shan-Koba (Бибиков 1946; Бибиков et al. 1994; Schen et al. 2012), Murzak-Koba (Бибиков 1940a; Бибиков et al. 1994; Yanevich 1998, fig. 2; Zaliznyak 1998), Fat'ma-Koba (Бибиков 1959; 1966; Бибиков et al. 1994), and Grot Skalist'iy (Коен 1994; Манько 2010), situated along the south-eastern slopes of the Crimean mountains (*fig. 1*), have yielded long sequences showing different periods of habitation that constitute the main topic of the present paper. Although most of the sites were excavated during the Soviet period, thanks to the prompt and

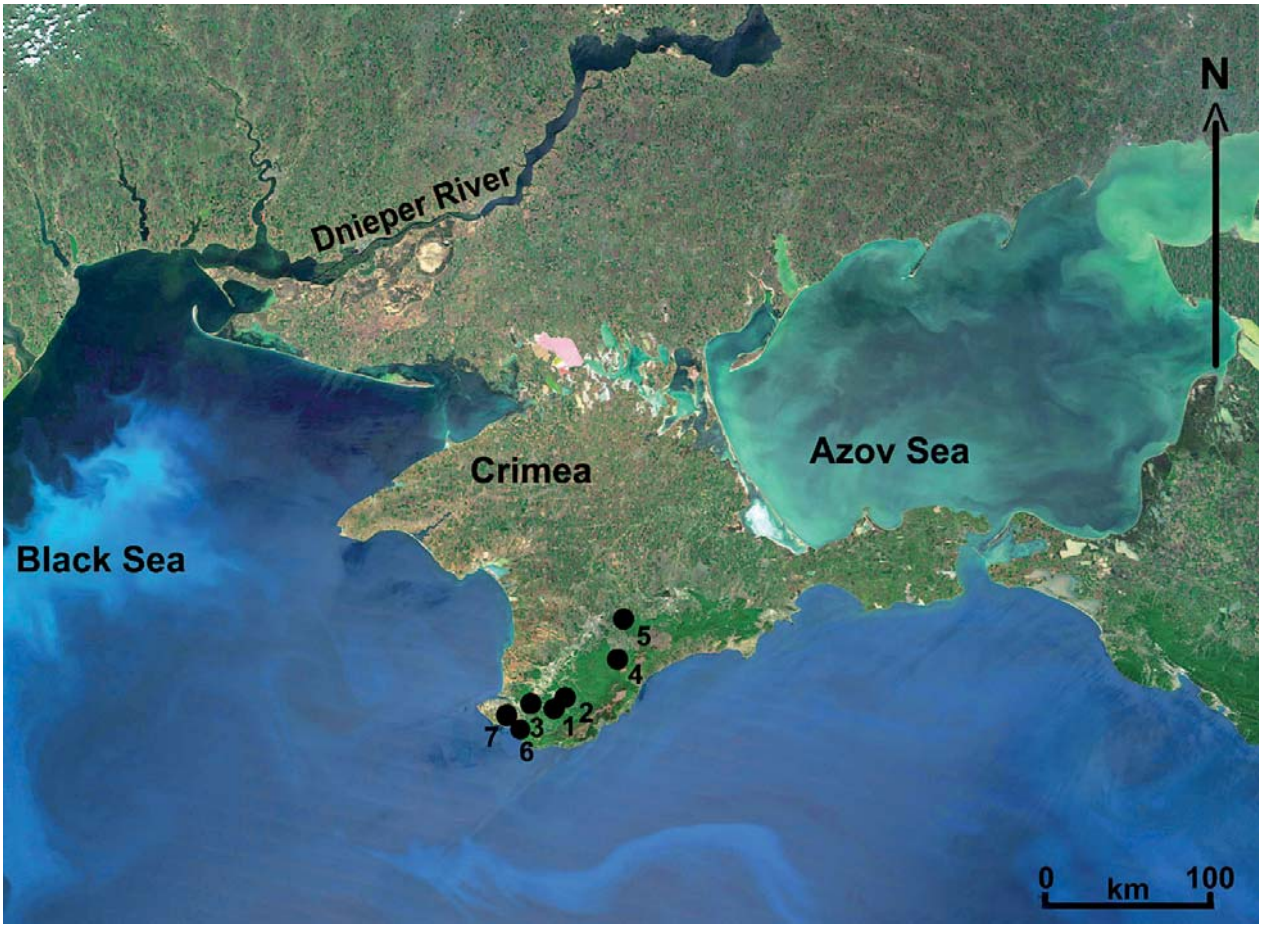

Fig. 1. Approximate location of the most important sites mentioned in the text. Shan-Koba (1), Murzak-Koba (2), Fat'ma-Koba (3), Grot Skalist'iy (4), Shpan-Koba (5), Laspi 7 (6), BBBP-2 and MM-2 (7) (drawing by P. Biagi).

detailed publication of the results (Бибиков et al. 1994), they still constitute the backbone of the North Pontic prehistory. Moreover they represent a fundamental resource for us to follow the events that took place in the region between the end of the Palaeolithic (Stepanchuk et al. 2009) and the beginning of the Neolithic (Бадер 1961).

It is unfortunate that, apart from a few exceptions (Телегін 1982, 46; Телегин 1985; Манько 2010, 250), the excavated sequences were not correlated with a good series of absolute dates. In effect just a few radiocarbon results were obtained from the Crimean rock-shelters and caves during the Soviet period (Телегин 1989). Most of the Late Palaeolithic and Mesolithic dates from the sites of the northern coast of the Black Sea were obtained later, mainly during the last two decades, in a few cases following specific programmes of investigation (Зализняк 1995; Biagi et al. 2007; Біаджі et al. 2008; Dolukhanov 2008; Biagi/Kiosak 2010).

As recently published (Benecke 2006; Biagi et al. 2014), the AMS dates from Shan-Koba in particular, helped reconstruct with better approximation the periods during which the site was settled, redefine the Late Palaeolithic and Mesolithic time-span covered by the cultural sequences of the entire region, and improve the sequential chronology of the Crimean chipped stone assemblages, mainly between the Allerød interstadial and the Early Atlantic period.

The history of research at the above rock-shelter and the varying interpretation of the cultural sequences suggested by different authors (Бонч-Осмоловский 1934; Мацкевой 1977; Коен 1991; Манько 2010) have already been discussed in a previous paper (Biagi et al. 2014). Nevertheless, Shan-Koba was considered to be the reference site for the Late Palaeolithic and Mesolithic cultural sequence of southern Ukraine for a long time. The site, eponymous of the same culture, was consid-

ered a typical case of the so-called 'single culture interpretation'. According to this theory, suggested by D. Ya. Telegin (Телегин 1966) one single community of hunter-gatherers exploited a restricted territory almost without interruption throughout the Late Palaeolithic and the entire Mesolithic. The Soviet archaeologists called this phenomenon Mountain-Crimean Culture (Gornokrimskaya).

More recently D. Telegin proposed a new subdivision for the Mesolithic cultures of southern Ukraine, and its neighbouring territories. According to the above author three 'cultural-ethnographic entities' (Telegin 1998, fig. 1), defined on the basis of typological characteristics of chipped stone tools, are represented in the region.

D. Ya. Telegin attributed the Mountain-Crimean Culture to the first of his 'entities', which he called Crimea-Belyi Les, the expansion of which covers four different well-defined spots, distributed between the Romanian course of the Danube (Cuina Turcului [Păunescu 1979]) and the Caucasus (Sosruko [Бадер/Церетели 1989]); the second Kukrek (Великова 1951), and the third Rogalik-Grebeniki (Станко 1972; Телегін 1982, 79; Stanko/Kiosak 2008/2009; Залізняк 2005, fig. 9). These 'entities' were defined independently from their chronology. They all were believed to have lasted for a long time, from the Late Palaeolithic onward and during the entire Mesolithic, with typological characteristics still present in the lithic assemblages at the beginning of the Early Neolithic (Telegin 1998, 96).

Describing the typology of the chipped stone tools of the above 'entities', D. Ya. Telegin pointed out the high percentage of microlithic lunates and notched bladelets in the Crimea-Belyi Les 'entity', of Kukrek inserts and truncated bladelets in the Kukrek, and trapezes in the Rogalik-Grebeniki (Telegin 1998, fig. 2; see also Нужный 1992, fig. 23 for Grebeniki).

The reason for the remarkable differences between the three complexes in the chipped stone tool repertoire was seen in the different territories exploited by the inhabitants of the three 'entities'. Nevertheless the basic chrono-typological subdivisions already suggested by other authors for the Late Palaeolithic and Mesolithic of the Crimean mountains (Телегин 1989; Бибиков et al. 1994), were re-proposed for the Crimea-Belyi Les 'entity'. The most characteristic are the systematic recurrence of lunates during the early stages of the Shan-Koba Late Palaeolithic and Mesolithic sequence, as represented in layers 6–4 of the same sequence (Нужный 1992, figs. 10–11) (Shan-Koba Culture [Бонч-Осмоловский 1934; Воеводский 1950]) and the appearance of trapezes in the upper layer 3 of the same series (Murzak-Koba Culture), Murzak-Koba (Коен 1994; Yanevich 1998, fig. 2; Нужный 1992, fig. 21), and other sites in the north-western Pontic region (Станко 1976), amongst which Laspi 7 (Zaliznyak 1998, fig. 3) is thought to have played an important role.

The Late Palaeolithic and Mesolithic Sequence of the Crimean Mountains

As mentioned above, the sequence of the Late Palaeolithic/Mesolithic of Crimea was defined mainly on the remains of material culture and the radiometric results from four sites: Shan-Koba, Murzak-Koba, Fat'ma-Koba, and Grot Skalist'iy, although the sequences recently brought to light from the rock-shelters of Buran-Kaya III (Janevich 1998; Yanevich et al. 2009; Péan et al. 2013), Shpan-Koba (Benecke 1999; Nuzhniy 1998, fig. 1), Vishennoe (Демиденко 2003) and Sy-At III (Nuzhniy 1998, fig. 2) introduced very important changes, especially regarding the final stages of the Crimean Late Palaeolithic and the Preboreal Early Mesolithic. It is important to point out the key role played by the detailed study of the geometric microliths in the interpretation of the above sequences, the definition of the territories covered by the different cultural aspects, the hunting methods adopted by the last hunter-gatherers, and the techniques used for shafting many types of geometric microliths (Нужный 1992).

The Late Palaeolithic sequence of Grot Skalist'iy (Манько 2010; 2013, 15–43) has been radiocarbon-dated between 13.500±150 BP (Ki-13.152) and 11.200±120 BP (Ki-13153) on unidentified animal bones. Although the six dates available from the site are not in stratigraphic sequence, we can suggest that the rock-shelter was inhabited roughly between the Bølling and Allerød interstadials (Hoek 2008). The most characteristic geometric microliths from layer III consist of lunates

obtained by abrupt, bipolar retouch with the microburin technique.

The Shpan-Koba Culture, represented from layer II of the homonymous rock-shelter, yielded a basically microlithic chipped stone assemblage consisting of 'specific asymmetrical triangles processed with abrupt or semi-abrupt retouch on the longer part and abrupt or bipolar ones on the base. Sometimes these triangles were manufactured in the microburin technique' (Nuzhniy 1998, 107). All the five radiocarbon dates reported by V. O. Man'ko (Манько 2013, tab. 2) from the Shpan-Koba Culture layer II of the same site, fall between 9730±50 BP (KIA-3687) and 9150±150 BP (Gin-6276). Layer II is stratified between layer III, attributed to the Shan-Koba Culture, radiocarbon-dated between 10.210±80 BP (Ki-5823) and 9760±60 BP (KIA-3686), and layer I, attributed to the Murzak-Koba Culture, dated between 7600±45 BP (Ki-5821) and 6780±40 BP (Ki-5822). All the results above are from unidentified animal bones.

The Shpan-Koba sequence is of primary importance because it yielded a cultural aspect, first defined by A. A. Yanevich (Яневич 1993), never recognized by the earlier excavators of the Crimean rock-shelters. This aspect is considered to represent at least part of the Preboreal Early Mesolithic of Crimea. Most authors agree that its origin is to be sought in the Final Epigravettian of the steppe zone of southern Ukraine (Яневич 1993; Nuzhniy 1998, 107 contra Манько 2013, 242).

The Shan-Koba Sequence

Shan-Koba is a 25 m long and 6m wide rock-shelter that opens in the Kubalar-Dere valley, a small tributary of the Baidar River that flows from the mountain slopes of south-eastern Crimea. It was discovered by S. A. Trusova and S. N. Bibikov in 1927, and excavated by G. A. Bonch-Osmolovskiy in 1928, and S. N. Bibikov in 1935–1936 (Бибиков et al. 1994).

The sequence recorded by A. Bonch-Osmolovskiy (Бонч-Осмоловский 1934) consists of six layers, three of which (6, 4 and 3) were 'ashy', rich in material culture remains and archaeological structures, separated by the 'intermediate' layers 5 and 2. According to the typological characteristics of the chipped stone assemblages, Layers 6–4, were attributed to the 'Azilian', Layer 3 to the 'Tardenoisian with trapezes', following the French terminology in use at that time (see also Gimbutas 1956, 14). A few years later a Neolithic layer (1a) was discovered in the western part of the shelter (Бибиков 1940b), while layer 1 was attributed to the Bronze Age (*fig. 2*).

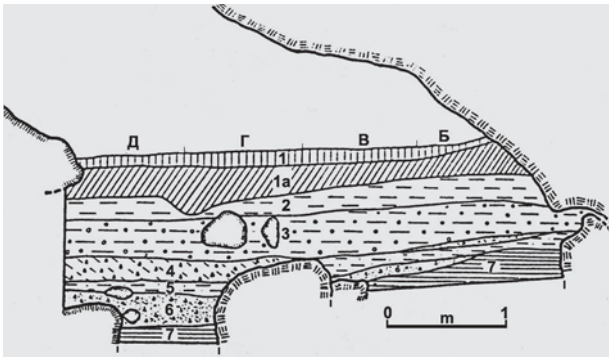

Fig. 2. Shan-Koba: Section through the deposits excavated in 1936 (from Бибиков et al. 1994, fig. 11) (redrawn by P. Biagi).

The excavators subdivided Layer 3 into four spits, the uppermost of which yielded a few structures, a thick fireplace, Helix middens (Бибиков 1941), and a pit filled with Helix fragments close to a flint knapping area. Spits 3 and 4 showed evidence for a few habitation structures, among which are a clay-surfaced fireplace delimited by a semi-circle of pebbles, around which five large stones were placed, and a pit for baking Helix.

Layer 4 did not yield archaeological features. The chipped stone artefacts were recovered from a sub-rectangular surface of some 34m². The microliths consist of lunates, seven scalene triangles and one trapeze produced in microburin technique. As reported above, following the French terminology in fashion at that time (see for instance Станко 1966 for the use of the term Tardenoisian in the North Pontic region), they were attributed to the Azilian, as well as those from lower-lying Layer 6.

Layer 5 as well did not yield any structures. The chipped assemblage from this 'intermediate' horizon consists of 102 artefacts, among which are mainly lunates, although a few trapezes and triangles were also recovered.

Layer 6 was excavated into six spits. Two fireplaces were found in spits 2 and 3 near a wide, elongated heap of bones, close to a flint-knapping

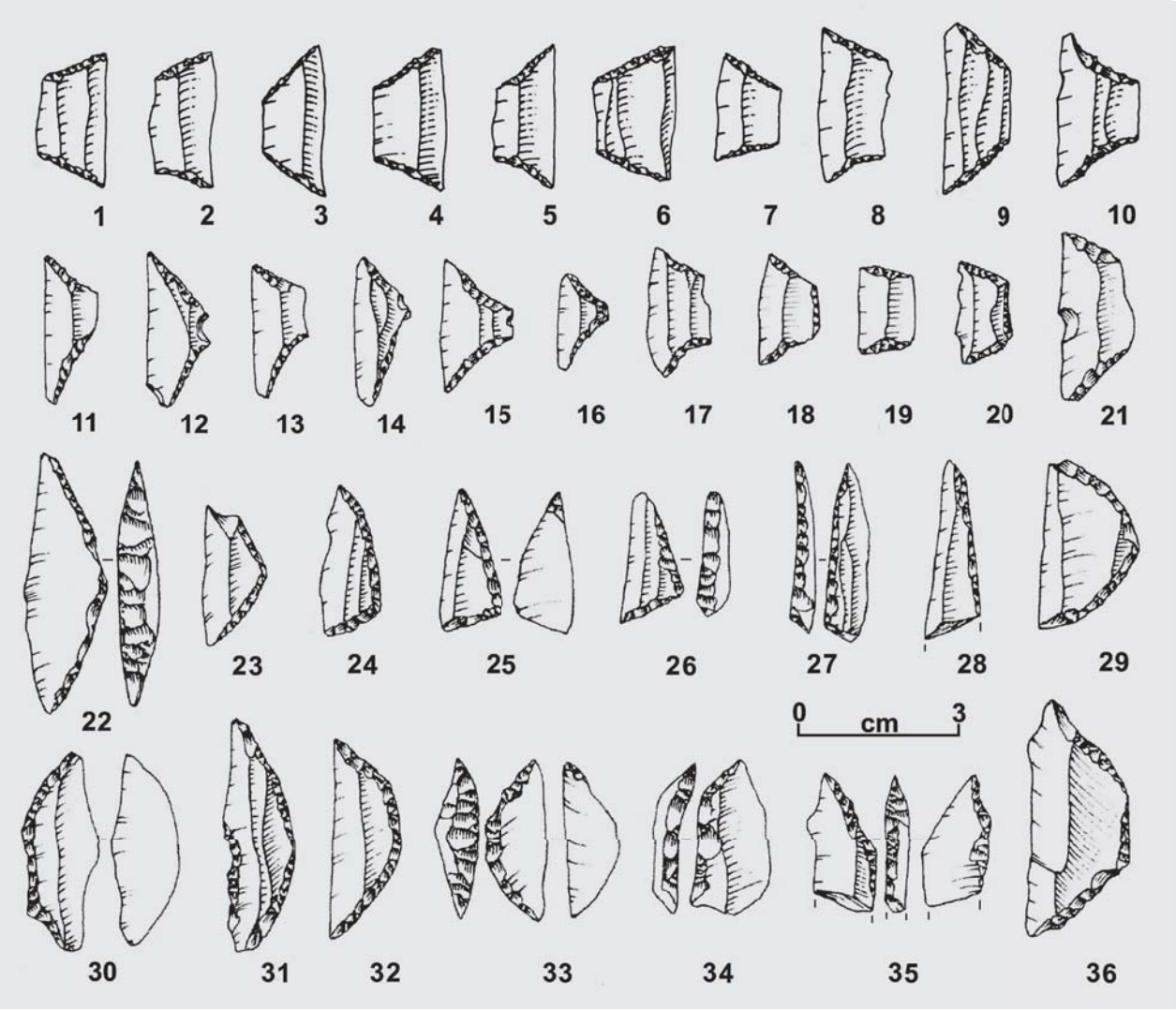

Fig. 3. Characteristic geometric microlithic types from Mirnoe (no. 1 – 10), and Shan-Koba Layer 3 (no. 11 – 21), Layer 4 (22 – 29) and Layer 6 (30 – 36) (from Biagi/Kiosak 2010, fig. 6, and Biagi et al. 2014, figs. 4 – 6) (drawings by P. Biagi, inking by G. Almerigogna).

area. A Helix midden, charcoals, bone fragments and flints were found below a 'cover' of large stones in spit 4. This layer yielded a very rich chipped stone assemblage (*fig. 3*), represented by different types of abrupt retouched points, geometric lunates and triangles (Бибиков et al. 1994).

Two contrasting radiocarbon results were first obtained from unidentified bones from spit 1 of Layer 6: 9910±180 BP (Ki-11805) and 11.260±190 BP (Ki-11806) (Манько 2010, tab. 2).

Shan-Koba AMS Chronology

During the last decade 16 samples were submitted for AMS dating to Kiel (KIA: 12 tooth samples) and Groningen (GrA: four bone samples) radiocarbon laboratories.

The results from both series are presented together in *table 1*. Given that the scope of this paper is the Late Palaeolithic and Mesolithic sequence, comments on the samples from Layers 1 (Bronze Age?) to 2 (Neolithic?) are not discussed.

The results obtained from both laboratories show that Layer 6 was settled between the end of the Bølling and the end of the Allerød oscillations. The five AMS dates from this layer, some 1.20 m thick, are not in a sequence. This makes the attribution of the finds to the Bølling or older Dryas problematic. The samples were collected from a well-defined area of the shelter, some 3 × 3 m wide (*fig. 4D and 4E*).

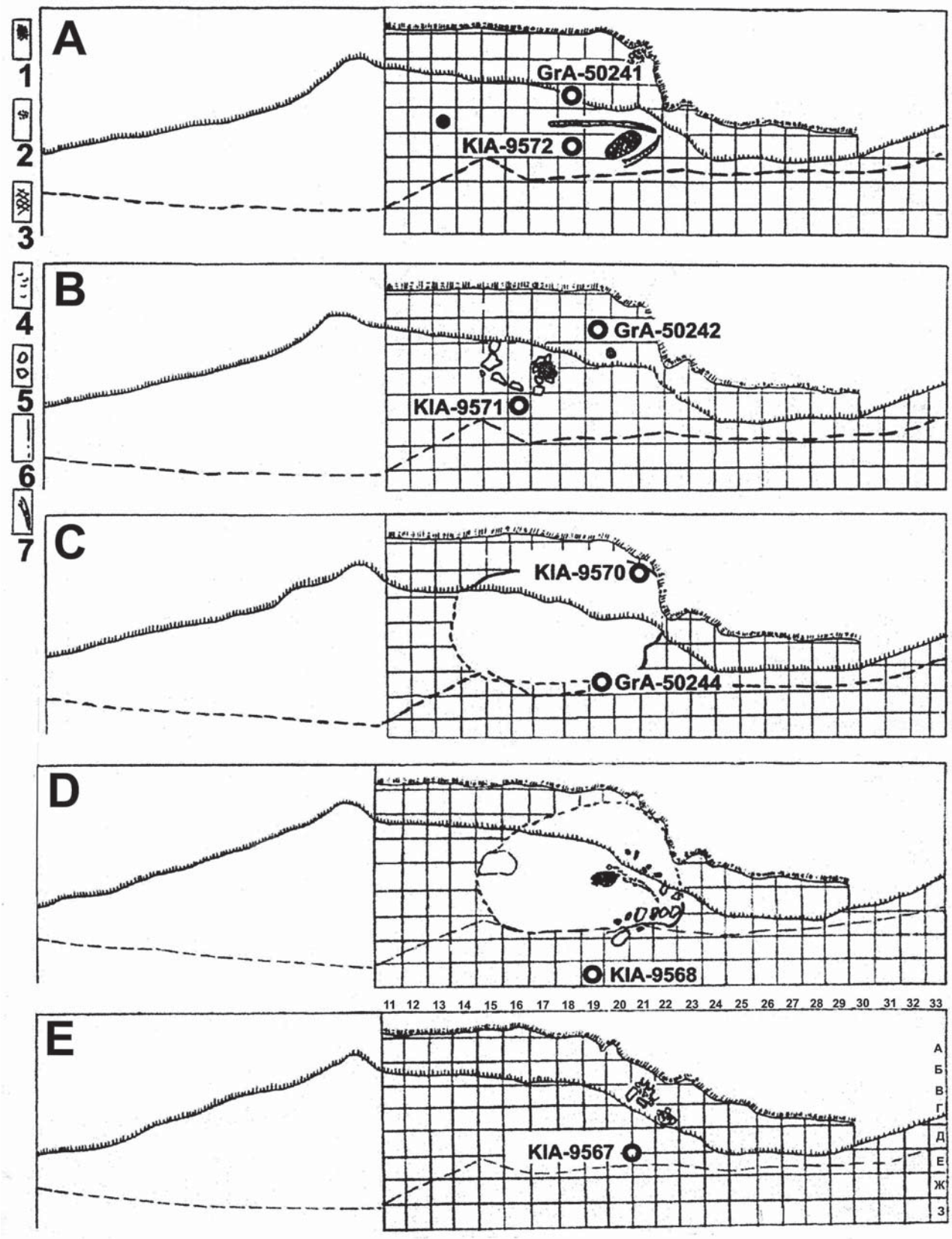

Fig. 4. Shan-Koba: Horizontal distribution of the AMS-dated samples from Layer 3, spit 2 (A), Layer 3, spit 3 (B), Layer 4 (C), Layer 6, spit 2 (D) and Layer 6, spit 3 (E). Hearths (1 and 2), hearth pit (3), land snails (4), stones (5), limit of the cultural layer (6), heap of land snails (7) (excavation plans from Бибиков et al. 1994, figs. 23 and 24; redrawn by P. Biagi).

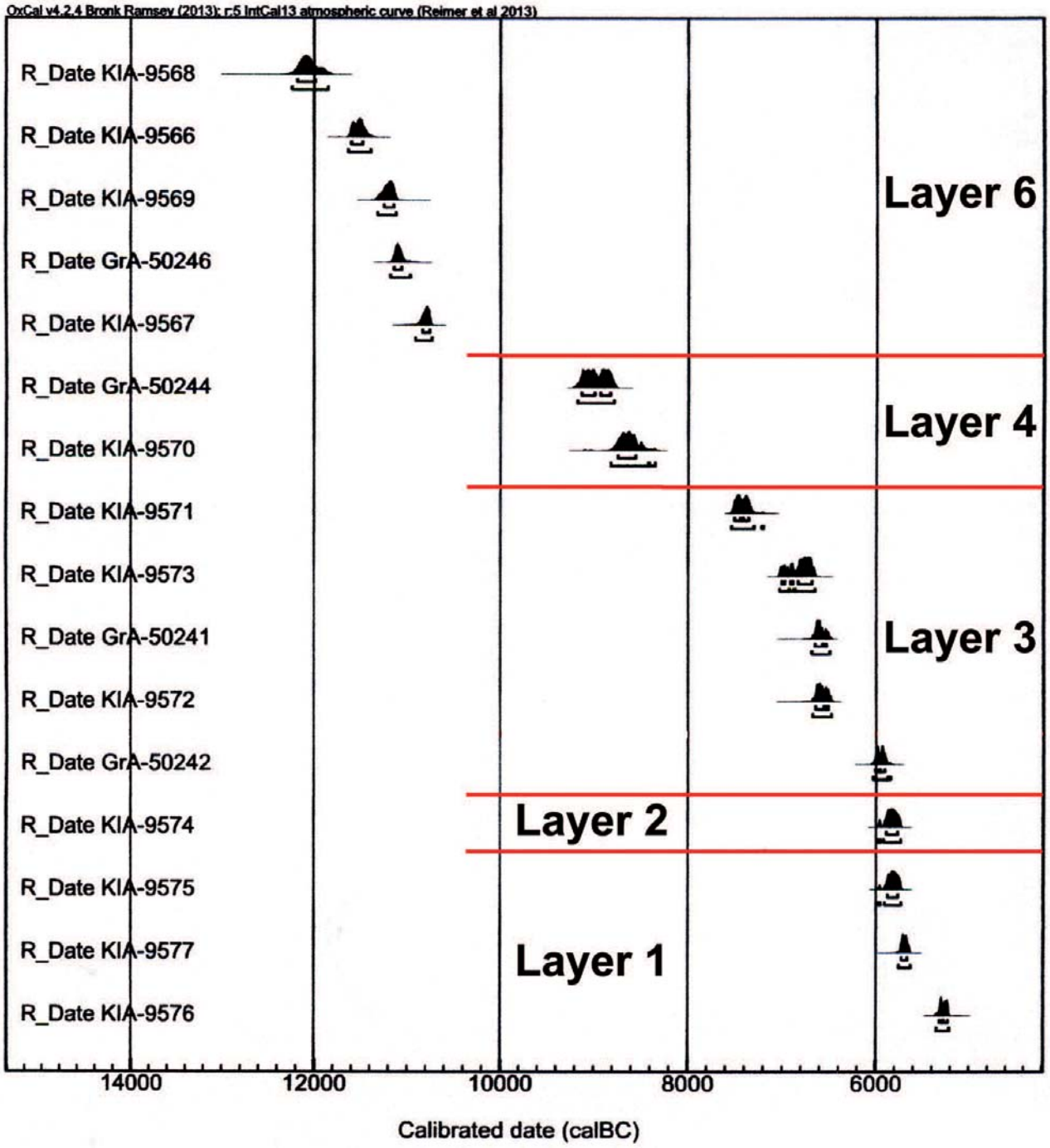

Fig. 5. Shan-Koba: cumulative diagram of the calibrated KIA and GrA AMS dates.

Two samples from two distinct squares of Layer 4 yielded similar Late Preboreal results (Bos et al. 2007). The spit provenance of one of the specimen is unknown (*fig. 4C*).

Four samples from Layer 3 are to be attributed to the Atlantic period, while KIA-9571 to the Boreal. They come from five squares, and different spits, of the central part of the shelter (*fig. 4A* and *4B*). Also in this case they are not in accordance with the sequence described by the excavators.

The cumulative diagram of the calibrated dates (*fig. 5*) shows evident gaps between the first (Layer 6), second (Layer 4) and third group of dates (Layer 3). They suggest that at least this part of the shelter was not settled for very long periods (Biagi et al. 2014). This evidence contrasts with the data obtained from the study of the chipped stone assemblages from layer 4 and the 'lower part' of Layer 3, which, according to D. Nuzhniy, were disturbed and contained also typical Shpan-Koba types (Nuzhniy 1998, 105).

The Pollen Cores from South-West Crimea

A series of pollen cores made in south-western Crimea, yielded important results not only for the study of the vegetation changes that took place in the region from the end of the Pleistocene to the present (Cordova et al. 2001; Cordova/Lehman 2003; Cordova 2007), but also for the human impact on the landscape during the Boreal, Mesolithic period (Cordova/Lehman 2005).

Pollen cores of major archaeological interest were extracted from Balka Bermala and Balka Yukarina, at some 150m of altitude. The two dry valleys are located in the Heraklean peninsula, east of Sevastopol, some 2km from the present coastline, 40 to 100km south-west of the rock-shelters discussed in this paper.

Chernozem soils were recorded at different depths from cores BBBP-2 and MM2 (*fig. 6*). The bottom of BBBP-2 chernozem, AMS-dated to 8550±40 BP (Beta-156479?) and 8070±40 BP (Beta-127551), and MM2, dated to 8342±70 BP (T-16421), yielded typical Murzak-Koba chipped stone implements (Cordova/Lehman 2005, 267).

The pollen diagram BBBP-2, shows that during the above period chernozem soils began to accumulate (pollen zone 4), and a steppe-like landscape started to establish, indicating the beginning of 'a continental cool and dry climate' that led to environmental conditions similar to those of the present (Cordova/Lehman 2005, 270). The data provided by the two cores allow us to correlate the presence of Murzak-Koba Mesolithic hunter-gatherers with the second half of the Boreal, when important climatic/environmental changes were taking place and affected the way of life of the last hunter-gatherers.

Discussion

AMS dates comparable to those from the lowermost chernozem soils containing Murzak-Koba artefacts at BBBP-2 and MM-2 were obtained from other archaeological sites of Crimea and the north-western Pontic region (*tab. 2*). The two new AMS dates from the rock-shelter of Laspi 7 in Crimea, and those from Mirnoe, west of Odessa (Станко 1982), are indicative in this respect (*fig. 7*). They clearly show that different types of trapezoidal arrowheads started to be produced by Late Boreal hunter-gatherers of different cultural traditions, Murzak-Koba and Grebeniki for example (Biagi/Kiosak 2010, 34).

The three groups of dates mentioned above partly fill a long gap within the Mesolithic sequence of Shan-Koba shelter (*fig. 8*). They demonstrate that the Murzak-Koba hunter-gatherers, who settled in Shan-Koba layer 3, where undoubtedly not the first to produce innovative types of trapezoidal arrowheads in the Crimean peninsula. This fact opens new questions regarding the possible sediment mixing observed by D. Nuzhniy (see above) from the Mesolithic layers 4 and 3 of Shan-Koba, and the chronology of the earliest Atlantic occupation of the same site. The available radiocarbon assays show that trapezoidal geometrics made their earliest appearance in Crimea at Laspi 7, layer D (Biagi/Kiosak 2010, tab. 1 and 3), suggesting that the Murzak-Koba Culture developed in subsequent stages in a way similar to that suggested by A. A. Yanevich (Yanevich 1998, fig. 2).

The question of the origin of the Mesolithic cultures with trapezes has already been taken into consideration by different authors in recent

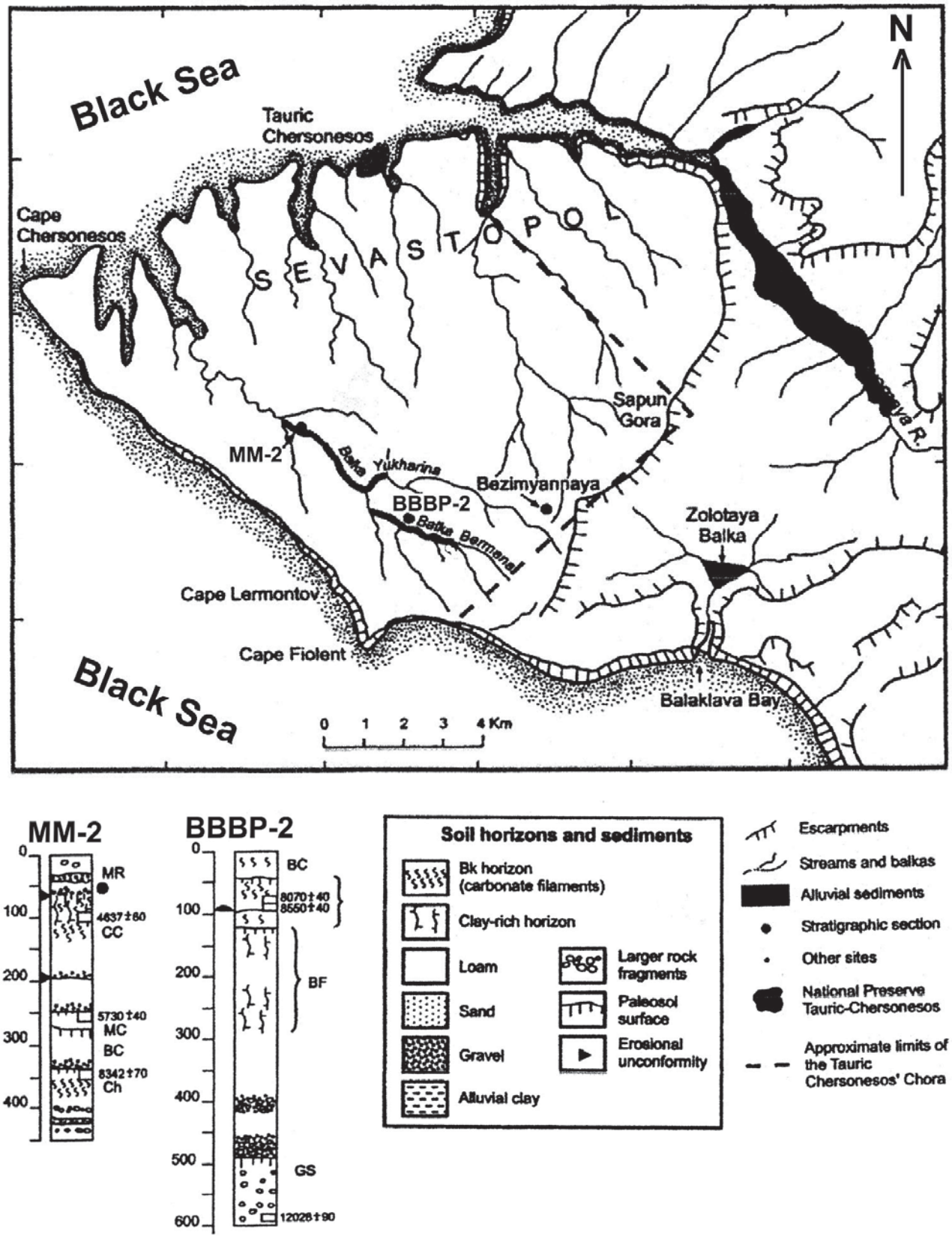

Fig. 6. Heraklean peninsula: schematic representation of the BBBP-2 and MM-2 pollen profiles with the indication of the most important radiocarbon dates. Soil characteristics: Maedow rendzina (MR), Calcic cinnamon (CC), Meadow cinnamon (MC), Brown cinnamon (BC), Meadow chernozem (Ch), Alluvial brown forest (BF), and Alluvial grey soil (GS) (from Cordova/Lehman 2005, figs. 2, 4 and tab. 4) (redrawn by P. Biagi, with variations).

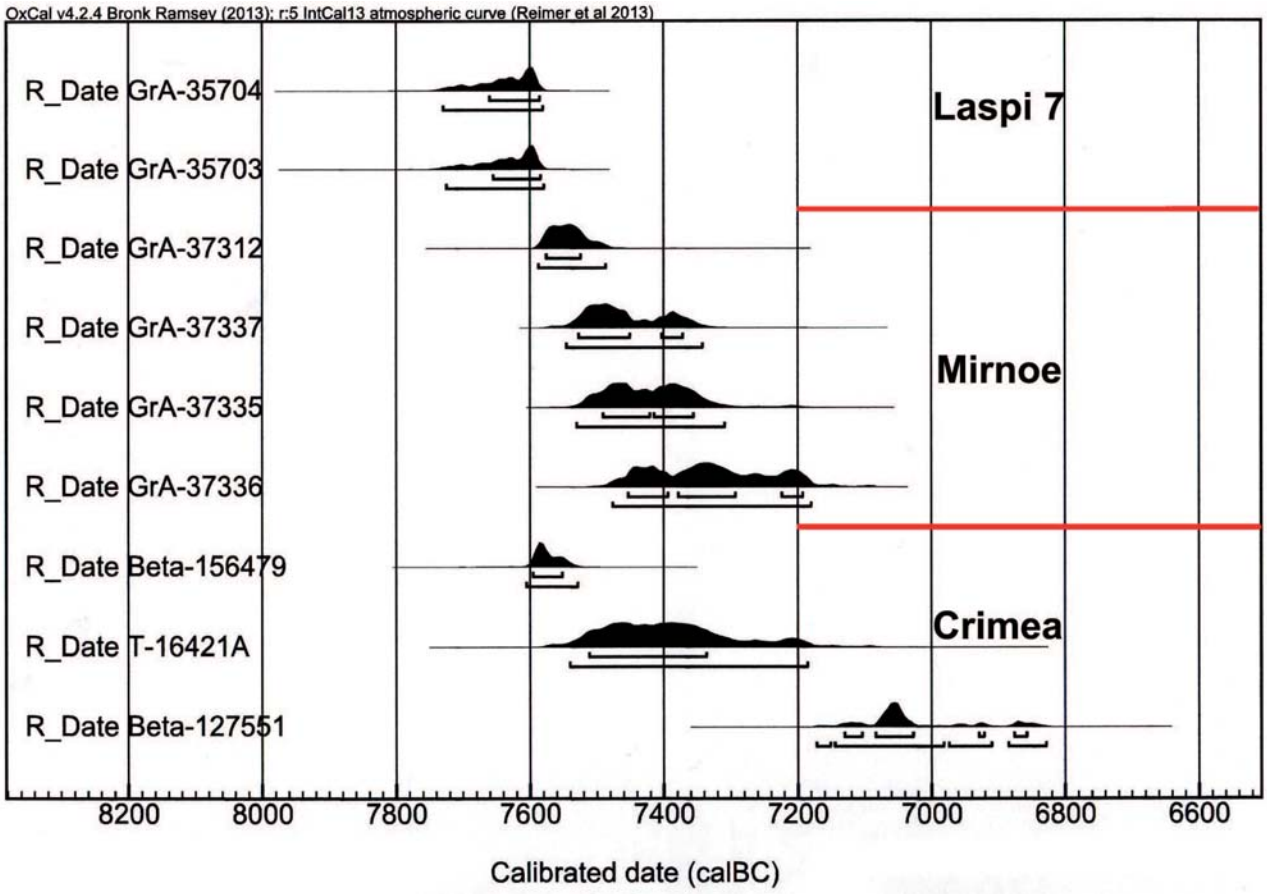

Fig. 7. Calibrated dates from Laspi 7, Mirnoe, and BBBP-2 and MM-2 pollen cores.

years (Clark 1958; 1980; Galimova 2006; Antony 2007). It is now clear that the problem cannot be solved without the support of good sets of AMS dates, even from those sites from which Mesolithic trapezes have been recovered from well-stratified complexes in important geographical regions, among which is the rock-shelter of Chokh in Daghestan (Амирханов 1987).

According to the dates presented above the invention of trapezoidal arrowheads for hunting purposes during the Boreal period should be re-proposed from the Crimean and north-western Pontic hunter-gatherer sites. The rate of spread of the sites with trapezoidal geometric hunting weapons across the Balkan peninsula is difficult to follow, because of the scarcity of Mesolithic sites in some areas, and the very limited number of dates (Perrin et al. 2009; Bonsall 2008, 263), a situation that does not seem to have improved during the last years (Merkyte 2003; Boroneanţ 2005).

Furthermore the results presented in this paper contradict the hypothesis put forward by L. Zaliznyak (1998, 139; Залізняк 2005, 119), according to which the Grebeniki Culture 'developed under the strong influence' of the Early Neolithic Criş Culture of the Carpathian basin and its related regions. The neolithisation of the Balkan peninsula took place during the last two centuries of the 8th mill. BP (Biagi et al. 2005; Krauss et al. 2014), as the available AMS dates indicate, some fifteen centuries later than the earliest appearance of Mesolithic trapeze industries along the northern coast of the Black Sea.

Summary

This paper discusses the AMS chronology of Shan-Koba, a rock-shelter excavated in Soviet times in the mountains of Crimea. The new results show that the Late Palaeolithic/Mesolithic sequence is not 'continuous' as previously suggested. The site was settled during specific periods of the end of the Palaeolithic, Boreal and Atlantic. The gap ob-

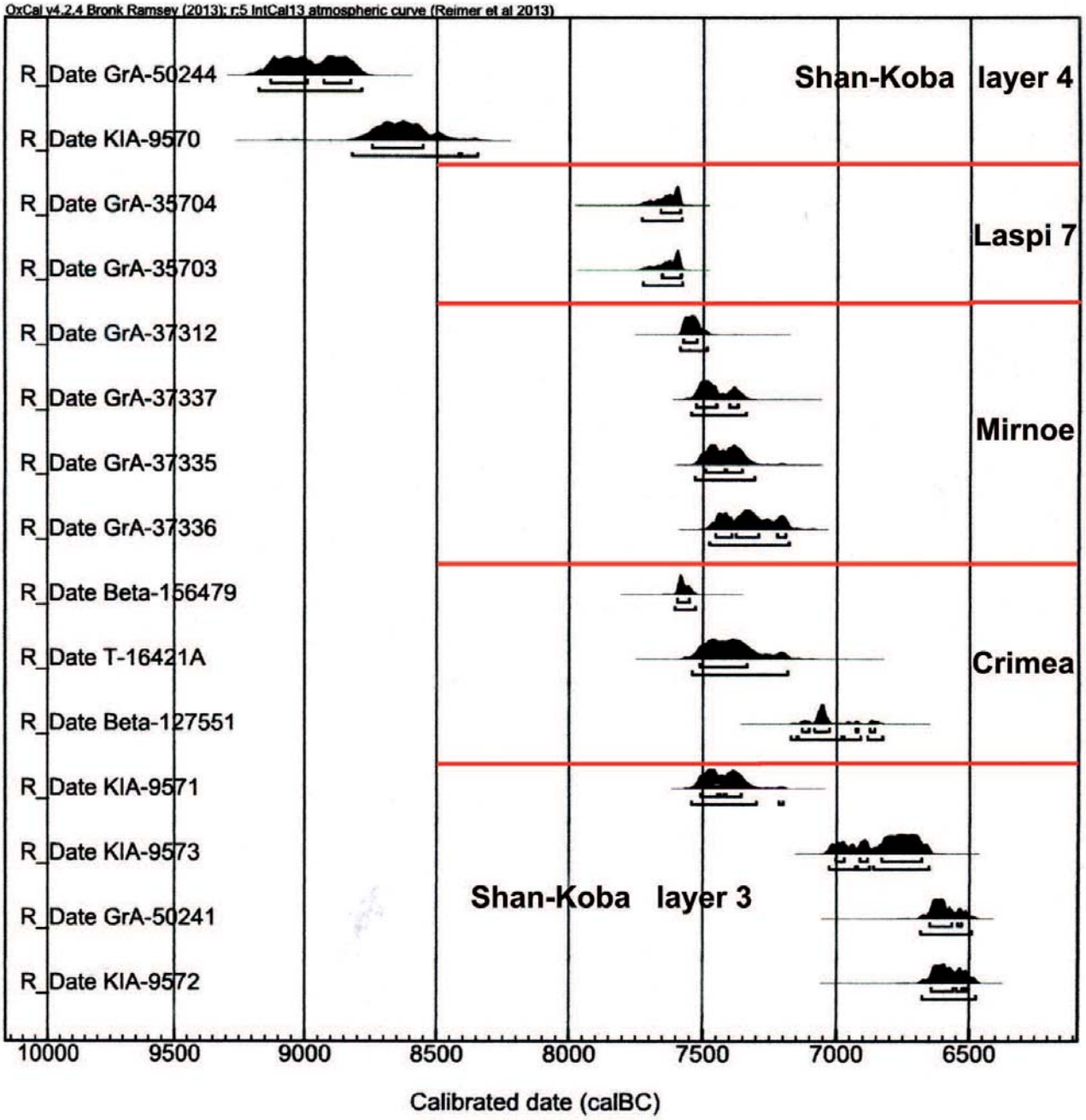

Fig. 8. Cumulative diagram of the calibrated dates from Shan-Koba, Layers 3 and 4, and those from Laspi 7, Mirnoe, BBBP-2 and MM-2 pollen cores.

served in the Mesolithic chronology of the shelter is filled with other radiometric results recently obtained from both north-western Pontic sites, and two pollen cores extracted from the Heraklean peninsula. It is during the second half of the Boreal that Mesolithic assemblages with trapezoidal arrowheads make their first appearance in the region, during a period of climatic variations that led to the formation of chernozem soils and a steppe-like landscape. The above data contribute to the study of the Late Mesolithic blade and trapeze assemblage in south-eastern Europe.

Paolo Biagi
Ca' Foscari University
Department of Asian and North African Studies
Ca' Cappello, San Polo 2035
I-30125 Venezia
pavelius@unive.it

Lab number	Layer	Spit	Square	Depth	Material	$\Delta^{13}C$	Uncal BP	Cal BC	Reference
KIA-9576	1a	Unkn.	?	Unkn.	Boar tooth	Unpubl.	6301±36	5277±37	Benecke 2006
KIA-9577	1	Unkn	19/б	Unkn.	Boar tooth	Unpubl.	6811±40	5698±29	Benecke 2006
KIA-9575	1a	Unkn.	15/б	Unkn.	Red deer tooth	Unpubl.	6944±44	5827±53	Benecke 2006
KIA-9574	2	Unkn.	14/а	Unkn.	Red deer tooth	Unpubl.	6954±46	5837±56	Benecke 2006
GrA-50242	3	3–3	19/б	90–100	Unident. bone	-20.19	7075±45	5958±41	Biagi et al. 2014
KIA-9572	3	2	18/д	Unkn.	Boar tooth	Unpubl.	7760±52	6581±56	Benecke 2006
GrA-50241	3	3–2	18/в	80–90	Unident. bone	-20.07	7775±45	6593±51	Biagi et al. 2014
KIA-9573	3	1	19/в	Unkn.	Boar tooth	Unpubl.	7915±45	6838±124	Benecke 2006
KIA-9571	3	3	16/д	Unkn.	Red deer tooth	Unpubl.	8357±52	7431±64	Benecke 2006
KIA-9570	4	Unkn.	20-21/а-б	Unkn.	Red deer tooth	Unpubl.	9366±73	8637±93	Benecke 2006
GrA-50244	4	4–4	19/е	100–110	Bone tool	-20.42	9575±45	8982±124	Biagi et al. 2014
KIA-9567	6	3	20-21/д-е	Unkn.	Red deer tooth	Unpubl.	10871±58	10889±84	Benecke 2006
GrA-50246	6	Unkn.	18/е	170–180	Bone tool	-20.12	11170±45	11127±116	Biagi et al. 2014
KIA-9569	6	1	19/ж	Unkn.	Boar tooth	Unpubl.	11299±53	11247±100	Benecke 2006
KIA-9566	6	4	20-21/д-е	Unkn.	Red deer tooth	Unpubl.	11645±59	11584±137	Benecke 2006
KIA-9568	6	2	19/з	Unkn.	Boar tooth	Unpubl.	12148±61	12229±237	Benecke 2006

Tab. 1. Shan-Koba: List of the recent KIA and GrA AMS dates. Calibrations at 1σ according to Danzeglocke et al. 2014.

Lab number	Site	Layer	Square	Depth	Material	$\Delta^{13}C$	Uncal BP	Cal BC	Reference
GrA-35704	Laspi 7	D	18	cm 170	Ulmus	-24.51	8625±40	7643±42	Biagi/Kiosak 2010
GrA-35703	Laspi 7	D	18	cm 170	Pomoideae	-26.52	8620±40	7639±40	Biagi/Kiosak 2010
GrA-37312	Mirnoe	PII	Д22	—	Wild horse	-21.36	8475±45	7547±25	Біаджі et al. 2008
GrA-37337	Mirnoe	PI	Б5	—	Wild horse	-21.13	8385±45	7453±62	Біаджі et al. 2008
GrA-37335	Mirnoe	PIII	В1	—	Ungulate	-19.93	8350±45	7428±58	Біаджі et al. 2008
GrA-37336	Mirnoe	PI	Г24	—	Aurochs	-19.39	8280±45	7332±99	Біаджі et al. 2008
Beta-156479	BBBP-2	—	—	cm 90	Sediment	-27.1	8550±40	7576±18	Cordova/Lehman 2005
T-16421A	MM-2	—	—	cm 350	Sediment	-17.2	8342±70	7399±89	Cordova/Lehman 2005
Beta-127551	BBBP-2	—	—	cm 90	Sediment	-26.7	8070±40	7009±77	Cordova/Lehman 2005

Tab. 2. List of the AMS dates from Laspi 7, Mirnoe, and BBBP-2 and MM-2 pollen cores. Calibrations at 1σ according to Danzeglocke et al. 2014.

Bibliography

Antony 2007: D. W. Antony, Pontic-Caspian Mesolithic and Early Neolithic Societies at the Time of the Black Sea Flood. A Small Audience and Small Effect. In: V. Yanko-Hombach/A. S. Gilbert/N. Panin/P. M. Dolukhanov (eds.), The Black Sea Flood Question Changes in Coastline, Climate and Human Settlement (Berlin 2007) 345–370.

Benecke 1999: N. Benecke, Die Tierreste aus dem mesolithischen Abri Špan'-Koba in Krimgebirge. Beiträge zur Archäozoologie und Prähistorischen Anthropologie 2, 1999, 71–90.

Benecke 2006: N. Benecke, Zur Datierung der Faunensequenz am Abri Šan-Koba (Krim, Ukraine). Beiträge zur Archäozoologie und Prähistorischen Anthropologie 5, 2006, 12–15.

Biagi/Kiosak 2010: P. Biagi/D. Kiosak, The Mesolithic of the Northwestern Pontic Region. New AMS Dates for the Origin and Spread of the Blade and Trapeze Industries in Southeastern Europe. Eurasia Antiqua 16, 2010, 21–41.

Biagi et al. 2005: P. Biagi/S. Shennan/M. Spataro, Rapid Rivers and Slow Seas? New Data for the Radiocarbon Chronology of the Balkan Peninsula. Prehistoric Archaeology and Anthropological Theory and Education 6/7, 2005, 43–51.

Biagi et al. 2007: P. Biagi/S. K. Kozłowski/L. L. Zaliznyak, Old Problems and New Perspectives for the Radiocarbon Chronology of the Ukrainian Mesolithic? In: V. Yanko-Hombach (ed.), Extended Abstracts IGPC 521-481 Joint Meeting Field Trip IGPC 521 'Black Sea Mediterranean Corridor during the Last 30ky: Sea-Level Change and Human Adaptation' (2005–2009), IGPC 481 'Dating Caspian Sea-Level Change' (2003–2007) (Moscow 2007) 27–30.

Biagi et al. 2014: P. Biagi/A. G. Khlopachev/D. M. Kiosak, The Radiocarbon Chronology of the Shan-Koba Rock-Shelter. A Late Palaeolithic and Mesolithic Sequence in the Crimean Mountains (Ukraine). Diadora 28, 2014, 7–20.

Bonsall 2008: C. Bonsall, The Mesolithic of the Iron Gates. In: G. Bailey/S. Spiniks (eds.), Mesolithic Europe (Cambridge 2008) 238–279.

Boroneanţ 2005: A. Boroneanţ, The Tardenosian in Romania – a False Problem? Studii de Preistoire 2, 2005, 17–46.

Bos et al. 2007: J. A. A. Bos/B. van Geel/J. van der Plicht/S. J. P. Bohncke, Preboreal Climate Oscillations in Europe. Wiggle-Match Dating and Synthesis of Dutch High-Resolution Multi-Proxy Records. Quaternary Science Reviews 26, 2005, 1927–1950.

Bronk Ramsey/Lee 2013: C. Bronk Ramsey/S. Lee, Recent and Planned Development of the Program OxCal. Radiocarbon 55.2/3, 2013, 720–730.

Clark 1958: J. G. D. Clark, Blade and Trapeze Industries of the European Stone Age. Proceedings of the Prehistoric Society 24, 1958, 24–42.

Clark 1980: G. Clark, Mesolithic Prelude (Edinburgh 1980).

Cordova 2007: C. E. Cordova, The Holocene Mediterranization of the Southern Crimean Vegetation. Palaeoecological Records, Regional Climate Change, and Possible Non-Climatic Influences. In: V. Yanko-Hombach/A. S. Gilbert/N. Panin/P. M. Dolukhanov (eds.),The Black Sea Flood Question. Changes in the Coastline, Climate and Human Settlement (Berlin 2007) 319–344.

Cordova/Lehman 2003: C. E. Cordova/P. H. Lehman, Archaeopalynology of Synanthropic Vegetation in the Chora of Chersonesos, Crimea, Ukraine. Journal of Archaeological Science 30, 2003, 1483–1501.

Cordova/Lehman 2005: C. E. Cordova/P. H. Lehman, Holocene Environmental Change in Southwestern Crimea (Ukraine) in Pollen and Soil Records. The Holocene 15.2, 2005, 263–277.

Cordova et al. 2001: C. E. Cordova/A. R. Rybak/P. H. Lehman, Vegetation Patterns and Conservation Issues in Southern Crimea. Post-Soviet Geography and Economics 42.5, 2001, 362–385.

Danzeglocke et al. 2014: U. Danzeglocke/O. Jöris/B. Weninger, CalPal 2014 Cologne Radiocarbon Calibrations and Paleoclimate Research Package. Radiocarbon Laboratory, Cologne University, Cologne.

Demidenko 2014a: Yu. E. Demidenko, Crimean Upper Palaeolithic. In: C. Smith (ed.), Encyclopedia of Glob-

al Archaeology (New York 2014) 1782–1791.

Demidenko 2014b: Yu. E. Demidenko, Siuren I Rockshelter. From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea. In: C. Smith (ed.), Encyclopedia of Global Archaeology (New York 2014) 6711–6721. doi: 10.1007/978-1-4419-0465-2_1867.

Dolukhanov 2008: P. Dolukhanov, The Mesolithic of European Russia, Belarus, and the Ukraine. In: G. Bailey/P. Spiniks (eds.), Mesolithic Europe (Cambridge 2008) 280–301.

Dolukhanov et al. 2009: P. M. Dolukhanov/S. V. Kadurin/E. P. Larchenkov, Dynamics of the Coastal North Black Sea Area in Late Pleistocene and Holocene and Early Human Dispersal. Quaternary International 197.1/2, 2009, 27–34. doi:10.1016/j.quaint.2008.04.002.

Galimova 2006: M. Galimova, Final Palaeolithic-Early Mesolithic Cultures with Trapezia in the Volga and Dnieper Basins. The Question of Origin. Archaeologia Baltica 7, 2006, 136–147.

Gimbutas 1956: M. Gimbutas, The Prehistory of Eastern Europe Part I. Neolithic, Neolithic and Copper Age Cultures in Russia and the Baltic Area. American School of Prehistoric Research, Bulletin 20 (Cambridge 1956).

Hoek 2008: W. Z. Hoek, The Last Glacial-Interglacial Transition. Episodes 31.2, 2008, 226–229.

Janevich 1998: A. A. Janevich, Buran-Kaya 3. Neue Angaben zur Kulturgliederung des Jungpaläolithikums der Krim. Préhistoire Européenne 13, 1998, 133–148.

Krauss et al. 2014: R. Krauss/N. Elenski/B. Weninger/L. Clare/C. Çakırlar/P. Zidarov, Beginnings of the Neolithic in Southeast Europe. The Early Neolithic Sequence and Absolute Dates from Džuljunica-Smărdeš (Bulgaria). Documenta Praehistorica 41, 2014, 51–77.

Merkyte 2003: I. Merkyte, The Mesolithic Syndrome in Southeastern Europe. Acta Archaeologica 74, 2003, 307–317.

Nuzhniy 1998: D. Nuzhniy, The Ukrainian Steppe as a Region of Intercultural Contacts Between Atlantic and Mediterranean Zones of European Mesolithic. Baltic-Pontic Studies 5, 1998, 102–119.

Păunescu 1979: A. Păunescu, Cercetările Archeologice de la Cuina Turcului-Dubova (Jud. Mehedinţi). Tibiscus 5, 1979, 11–56.

Péan et al. 2013: S. Péan/S. Puaud/L. Crépin/S. Prat/A. Quiles/J. van der Plicht/H. Valladas/A. J. Stuart/D. G. Drucker/M. Patou-Mathis/F. Lanoë/A. Yanevich, The Middle to Upper Palaeolithic Sequence of Buran-Kaya III (Crimea, Ukraine). New Stratigraphic, Palaeoenvironmental, and Chronological Results. Radiocarbon 55.2/3, 2013, 1454–1469.

Perrin et al. 2009: T. Perrin/G. Marchand/P. Allard/D. Binder/C. Collina/O. G. Punchol/N. Valdeyron, Le second Mésolithique d'Europe occidentale.Origines et gradient chronologique. Annales de la Fondation Fyssen 24, 2009, 160–176.

Schen et al. 2012: A. Schen/C. Geörg/A. Schulz/J. Burger/N. Benecke, The Arrival of Domestic Animals in South-East Europe as Seen from Ancient DNA. In: E. Kaiser/J. Berger/W. Schier (eds.), Population Dynamics in Prehistory and Ancient History. New Approaches by Using Stable Isotopes and Genetics. Berlin Studies of the Ancient World 5 (Berlin 2012) 45–54.

Stanko 2007: V. N. Stanko, Fluctuations in the Level of the Black Sea and Mesolithic Settlement of the Northern Pontic Area. In: V. Yanko-Hombach/A. S. Gilbert/N. Panin/P. M. Dolukhanov (eds.), The Black Sea Flood Question Changes in Coastline, Climate and Human Settlement (Berlin 2007) 371–385.

Stanko 2009: N. V. Stanko, Formation Dynamics of the Population of the Northwestern Pryčornomorja Steppe in the Upper Paleolithic and Mesolithic. Quaternary International 197, 2009, 8–11.

Stanko/Kiosak 2008/2009: V. N. Stanko/D. Diosak, The Late Mesolithic Settlement of South-Western Ukraine. Attidella Società per la Preistoria e Protostoria della Regione Friuli-Venezia Giulia 17, 2008/2009, 27–100.

Stepanchuk et al. 2009: V. N. Stepanchuk/I. V. Sapozhnikov/M. I. Gladkikh/H. S. Ryzhov, Ukrainian Upper Palaeolithic Between 40/10.000 BP. Current Insights into Environmental-Climatic Change and Cultural Development. In: F. Djindjian/J. Kozłowski/N. Bicho (eds.), Le concept de territoires dans le Paléolithique supérieur européen. BAR International Series 1938 (Oxford 2009) 63–74.

Telegin 1998: D. Telegin, Mesolithic Cultural-Ethnographic Entities in Southern Ukraine. Genesis and Role in Neolithization of the Region. Baltic-Pontic Studies 5, 1998, 85–101.

Yanevich 1998: A. A. Yanevich, The Neolithic of Mountainous Crimea. Baltic-Pontic Studies 5, 1998, 146–159.

Yanevich et al. 2009: A. Yanevich/S. Péan/M. Créoin/M. Lázničkova-Galetova/S. Prat/V. Prysyajnuk, Upper Palaeolithic Settlements in Buran-Kaya 3 (Crimea, Ukraine). New Interdisciplinary Researches of the Layers 5–2, 6–1 and 6–2. Archaeological Almanac 20, 2009, 187–2002.

Zaliznyak 1998: L. Zaliznyak, The Late Mesolithic Subbase of the Ukrainian Neolithic. Baltic-Pontic Studies 5, 1998, 120–145.

Амирханов 1987: Х. А. Амирханов, Чохское поселение. Человек и его Культура в Мезолите и Неолите Горного Дагестана (Москва 1987).

Бадер 1961: Н. О. Бадер, О соотношении культуры верхнего Палеолита и Мезолита Крыма и Кавказа. Советская Археология 4, 1961, 9–25.

Бадер/Церетели 1989: Н. О. Бадер/Л. Д. Церетели, Мезолит Кавказа. In: Л. В. Кольцов (ed.), Мезолит СССР (Москва 1989) 93–105.

Бибиков 1940a: С. Н. Бибиков, Грот Мурзак-Коба. Новая позднепалеолитическая стоянка в Крыму. Советская Археология 5, 1940, 159–178.

Бибиков 1940b: С. Н. Бибиков, К вопросу о Неолите в Крыму. Краткие сообщения Института истории материалной культуры 4, 1940, 26–31.

Бибиков 1941: С. Н. Бибиков, Об использованни улиток Helix в позднепалеолитическое время. Материялы исследования по археологии 2, 1941, 141–142.

Бибиков 1946: С. Н. Бибиков, Позднепалеолитическое поселение в навесе Шан-Коба и гроте Мурзак-Коба в Крыму. Краткие сообщения Института истории материалной культуры 13, 1946, 126–130.

Бибиков 1959: С. Н. Бибиков, Раскопки в навесе Фатма-Коба в 1959 г. Краткие сообщения института археологии АН УССР 8, 1959, 114–121.

Бибиков 1966: С. Н. Бибиков, Раскопки в навесе Фатма-Коба и некоторые вопросы изучения Мезолита Крыма. У истоков древних культур (эпоха Мезолита) (Москва 1966) 138–143.

Бибиков et al. 1994: С. Н. Бибиков/В. Н. Станко/В. Ю. Коен, Финальный Палеолит и Мезолит Горного Крыма (Одесса 1994).

Біаджі et al. 2008: П. Біаджі/В. Н. Станко/Д. В. Кіосак, Нові радіовуглецеві даті поселленя Мирне. Наукові праці, серія історичні наукі спецвитук 83, 2008, 33–37.

Бонч-Осмоловский 1934: Г. А. Бонч-Осмоловский, Итоги изучения Крымского палеолита. Труды междуиародной конференции Ассоциаций по изученню Четвертичново периода Европы (Ленинград 1934) 114–173.

Великова 1951: Е. А. Великова, Эпипалеолитическая стоянка Кукрек в Крыму. Краткие сообщения о докладах и полевых исслеованиях Института истории материалной культуры 36, 1951, 87–95.

Воеводский 1950: М. В. Воеводский, Мезолитические культуры Восточной Европы. Краткие сообщения Института истории материалной культуры 31, 1950, 110–119.

Демиденко 2003: Ю. Э. Демиденко, Верхний Палеолит Крыма. Индустриально-хронологическая вариабельност. Археологически записки 3, 2003, 36–50.

Громова/Громов 1937: В. И. Громова/В. И. Громов, Материалы к изучению палеолитической фауны Крыма в связи с некоторыми вопросами стратиграфии. Труды советской секции ассоциации по изучению Четвертичного периода 1, 1937, 52–93.

Залізняк 2005: Л. Залізняк, Фіналний Палеоліт і Мезоліт континенталиої України. Кам'яна доба України 8 (Київ 2005).

Зализняк 1995: Л. Л. Зализняк, Фінальний палеоліт України. Археологія (Київ) 1, 1995, 3–21.

Коен 1991: В. Ю. Коен, Фінальний палеоліт Горного Крыма. Автореферат дисертації кандидата історичних наук (Київ 1991).

Коен 1994: В. Ю. Коен, Шан-Кобинская культура (к проблеме хронологии и периодизации финального Палеолита горного Крыма). Археологический алманах 3, 1994, 245–260.

Манько 2010: В. А. Манько, Случаи интерстратификации в слоях пачки 3 стоянки Грот Скалистый и вопрос о происхождении крымского финального Палеолита. Stratum plus 1, 2010, 245–262.

Манько 2013: В. О. Манько, Фінальний Палеоліт – Неолит Криму. Культурно-історичний процес (Київ 2013).

Мацкевой 1977: Л. Г. Мацкевой, Мезолит и Неолит Восточного Крыма (Київ 1977).

Нужный 1992: Д. Ю. Нужный, Розвиток мікролітичної техніки в кам'яному віці (Київ 1992).

Станко 1966: В. Н. Станко, Мезолитическая стоянка Гиржево в Одесской области. Советская археолоия 2, 1966, 96–103.

Станко 1972: В. Н. Станко, Типы памятников и локалные культуры в Мезолите северного причерномрья. Материалы и Исследования по Археологии СССР 198 = Палеолит и Мезолит СССР 7, 1972, 252–261.

Станко 1976: В. Н. Станко, Периодизация памятников Мезолита Северново Причерномория. Материалы по археологии Северново Причерномория 8, 1976, 15–21.

Станко 1982: В. Н. Станко, Мирное. Проблема Мезолита степей Северного Причерноморья (Kiyv 1982).

Телегин 1966: Д. Я. Телегин, Мезолит Левобережной Украины и его место в сложении днепровско-донецкой неолитческой культуры. Материялы и исследования по археологии 126, 1966, 99–107.

Телегін 1982: Д. Я. Телегін, Мезолітичні пам'ятки України (Київ 1982).

Телегин 1985: Д. Я. Телегин, Памятники эпохи Мезолита на территории Украинской ССР (Карта местонахождений) (Київ 1985).

Телегин 1989: Д. Я. Телегин, Мезолит Юго-Запада СССР (Украина и Молдавия). In: Л. В. Кольцов (ed.), Мезолит СССР (Москва 1989) 106–124.

Яневич 1993: О. О. Яневич, Шпанська мезолітична культура. Археологія (Київ) 1, 1993, 3–15.

This volume provides an insight into the current state of archaeological research in Southeast Europe and its adjacent regions, spanning chronologically from the Aurignacian to the beginning of the Neolithic period. In ten contributions by leading experts in this field, specific topics in regions ranging from the Aegean Sea, the Carpathians, and Western Anatolia to the Apennine Peninsula and Central Europe are presented. This book represents the proceedings of an international workshop, held in May 2014 in Tübingen as a part of the work of the Collaborative Research Centre 1070 ResourceCultures.

The research activities of Raiko Krauss are focused upon the timespan between the Neolithic and the Bronze Age within Central and South-East Europe. Harald Floss is a renowned expert of the Palaeolithic in Europe and a specialist in the study of the transition from the last Neanderthals to Early modern humans. Both teach at the University of Tübingen.

EBERHARD KARLS
UNIVERSITÄT
TÜBINGEN

rk SFB 1070
RessourcenKulturen.

ISBN 978-3-946552-01-7