MULTAS PER GENTES ET MULTA PER SAECULA

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AMICI MAGISTRO ET COLLEGAE SUO
IOANNI CHRISTOPHO KOZŁOWSKI DEDICANT

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(editors)

KRAKÓW 2018

The edition and publication of this book was funded by the Faculty of History at the Jagiellonian University in Kraków

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Proofreading: Steven Jones and authors
Translation of the Latin text on the cover: Tomasz Polański

Typesetting and layout: Elżbieta Fidler-Źrałka
Correction of figures: Urszula Bąk

Kraków 2018, Edition I

ISBN 978-83-948382-3-2 (Institute of Archaeology, Jagiellonian University in Kraków)
ISBN 978-83-64449-68-0 (Alter Publishing House)

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http://www.wydawnictwoalter.pl
E-mail: alter@wyd-alter.pl

JAGIELLONIAN UNIVERSITY
IN KRAKÓW

Printed in Poland

CONTENTS

The microlithisation of chipped stones in the Old World: Case-studies from the Crimea and northern Italy

Paolo Biagi, Elisabetta Starnini

Abstract: The progressive microlithisation of the chipped stone tools started to take place during the Upper Palaeolithic in both Europe and south Asia. This paper examines two case studies, though different, from the Crimean Peninsula and the Italian Alps where long, well radiocarbon-dated sequences have been excavated. It focuses mainly on microlithic geometric tools that became increasingly small around the beginning of the Early Holocene. Among microliths, lunates/crescents played a major role in many European cultures where they continued to be produced until the early metal ages, though of variable dimension and thickness, obtained with different knapping techniques. The general impression is that changes in economic subsistence and strategy led to the adoption of microlithic technologies. Among these are mobility, subsistence diversification, and risk minimisation.

Keywords: microliths; Upper Palaeolithic/Mesolithic; lithic technology; hunting strategies; environmental changes

Introduction

The production of tiny objects, often a miniature version of functional artefacts, is a well-known archaeological process called miniaturisation (Foxhall, Barfoed 2015). Miniature objects are generally non-functional, often embedding a symbolic significance (Flegenheimer *et al*. 2015). However, in most cases miniaturisation has little to share with microlithisation, which involves the production of very small, sometimes millimetric, chipped stone tools. Among them are geometric implements which are thought to have functioned as armatures (Lidén 1942), and among these latter are lunates/crescents that, in a few regions of Eurasia, started to be produced around the beginning of the Upper Palaeolithic (Palma di Cesnola 1966; Clarkson *et al*. 2009; Benazzi *et al*. 2011; Kozłowski 2014). First of normolithic size, they became increasingly smaller, frequently produced in some regions of Europe by the application of microburin technique, in the following millennia, until the beginning of the metal ages.

In prehistoric chipped stone assemblages the distinction between macroliths, normoliths and microliths is, first of all, a matter of size. Thus a metric analysis for distinguishing the pertinent dimensions of the chipped stone artefacts is absolutely necessary (Inizan *et al*. 1992). Though for some scholars size is a relative term, an implement that appears very small in one place may be considered relatively large in another (Kuhn, Elston 2002: 2).

In some regions, and during some periods, we can observe a technical choice for the production of small blanks, especially micro-bladelets (1.25-2.5 cm long), independently from the technical capacities of the raw material employed for their manufacture.

This paper explores the phenomenon of microlithisation of the chipped stone industries in the Old World. It focuses mainly on two mountain regions from which this event can be understood thanks to the excavation of accurately radiocarbon-dated long sequences: Crimea and northern Italy (Fig. 1).

In the archaeological literature microliths are defined as very small stone artefacts, usually made from sections of small blades (Whittaker 1994). They are otherwise called armatures, geometrics or inserts. They are represented by (blade) segments of various shapes among which are different types of lunates, triangles and trapezes. Their production implies the intentional splitting of a laminar blank (Valdeyron 2008; Hartz *et al*. 2010) with or without the use of the microburin technique (Inizan *et al*.

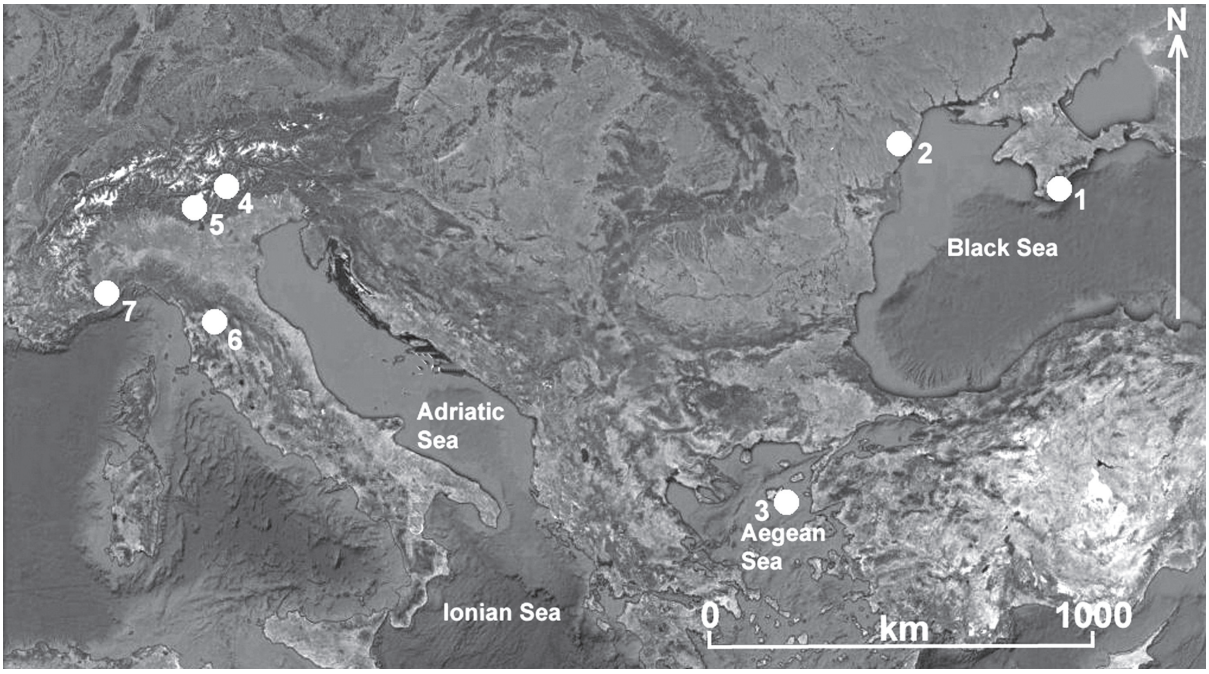

Fig. 1. Map showing distribution of the sites mentioned in the text: 1. Shan-Koba and other Crimean rock shelters; 2. Mirnoe; 3. Ouriakos; 4. Romagnano III and Colbricon; 5. Valmaione; 6. Querciola; 7. Arene Candide cave and Creppo rock shelter (drawing by P. Biagi).

1992: 69-70, Fig. 24; Nuzhniy 1992: Fig. 33) that was introduced at the end of the Upper Palaeolithic and employed until the Neolithic period.

Knapping experiments to study the way that microburins were made suggest that they were by-products of a gradual technological development by knappers trying to make arrowheads without a bulb of percussion, thus easier to haft. It has been suggested that the employment of this technique for the manufacture of geometric armatures was determined by practical, rather than cultural, social or environmental imperatives (De Wilde, De Bie1 2011). Although it has never been explained why other coeval cultures never utilised the microburin technique for the manufacture of geometric microliths (Cyrek 1981), in certain territories, like northern Italy for example, this method was employed up to the middle Neolithic (Chierici 1875).

It must be pointed out that in some regions of Europe, geometric microliths, among which are lunates and trapezes, continued to be produced without microburin blow technique until the early metal ages. For instance, crescent-shaped microliths obtained by backed, bipolar retouch are common to the Chalcolithic and Bell Beaker contexts of southern and central Europe (e.g. Barfield *et al*. 1995; Martini 1997; Bailly 2001; Sirakov *et al*. 2002). Though of slightly different size and width, they recall characteristic specimens of the Antalyan facies of the Aegean Final Epigravettian (Kaczanowska, Kozłowski 2013; Efstratiou *et al*. 2014) (Fig. 2). A further general feature of the geometric microliths is that they are comparatively standardised in shape, though their size might vary in time and space.

Since microliths are obviously too small to be used by themselves, they were set into wooden or bone handles or shafts in order to prepare composite tools (Clarke 1976; Oshibkina 2006), serving as barbs, tips or cutting edges (Domingo Martínez 2005; Fullagar *et al*. 2009; Yaroshevich *et al*. 2010; Chesnaux 2013). Though other functions have been suggested (Clarke 1976; Finlayson 2004: 224), most Mesolithic archaeologists interpret them as part of different types of hunting or fishing weapons (Lidén 1942; Saville 2004a: 188), other functions being restricted mainly to (Early) Neolithic trapezoidal Geometrics, as shown by the traceological analyses (Biagi 1995; Voytek 1995; Domboróczi *et al*. 2008-2009).

However, the presence of small, "microlithic" armatures does not give a microlithic character to the whole industry. This latter can be defined only after metric evaluation of the debitage of an assemblage, and the careful reconstruction of its associated operational schema (Elston, Brantingham 2002; Naudinot 2008).

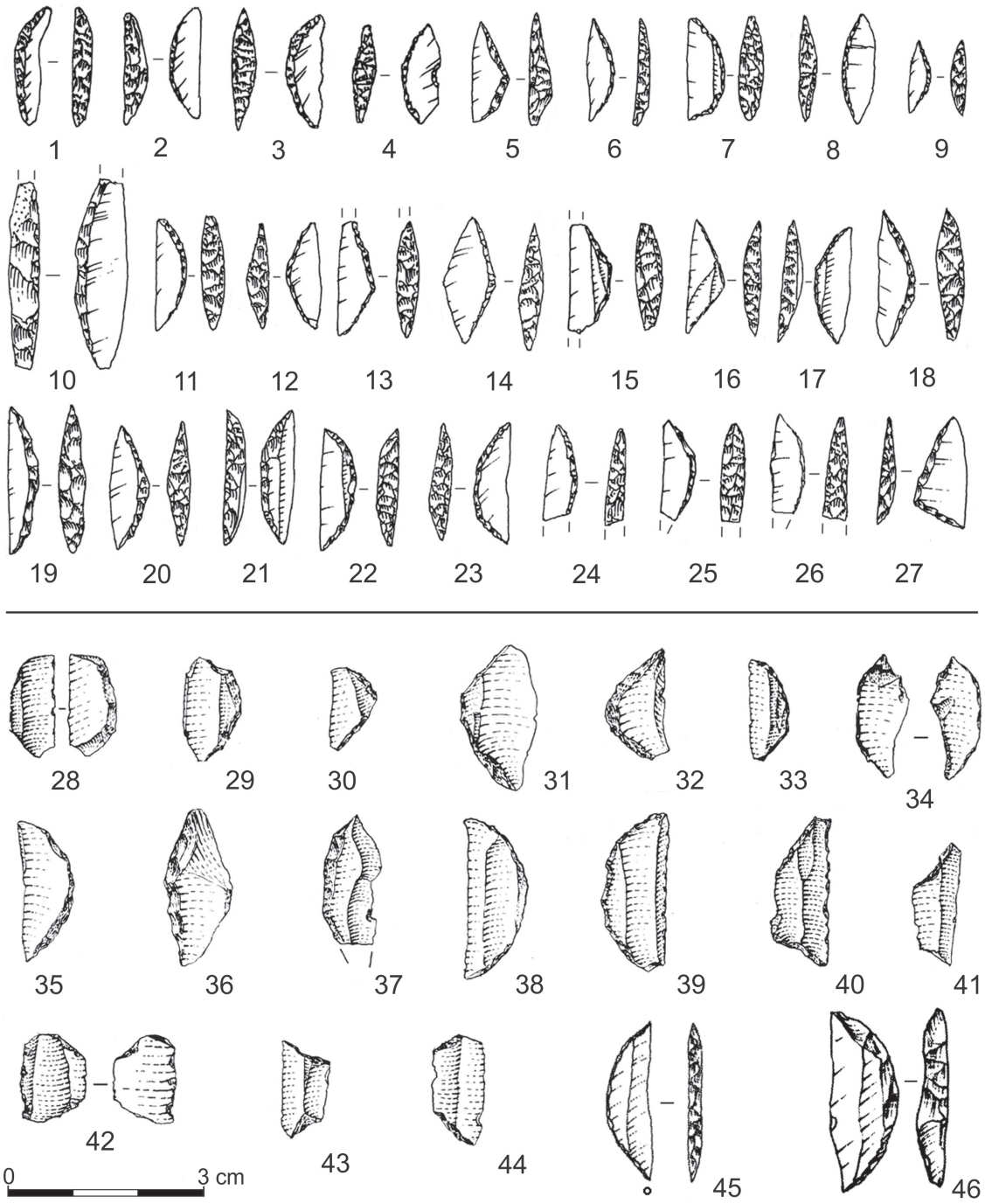

Fig. 2. Microlithic lunates and other geometrics from the Epipalaeolithic site of Ouriakos in the island of Lemnos (Greece) (1-27) and the Chalcolithic sites of Querciola (28-44), Creppo rock shelter (45) and Arene Candide cave – Italy (46)(after Efstratiou *et al*. 2014 and Martini 1997).

Overview of the appearance of microlithisation in the Old World and its chronology

Microlithic artefacts and assemblages made their first appearance in Europe, Africa, and Asia during the late Pleistocene (Mellars *et al*. 2013). By the last glacial maximum (LGM), some 20,000 to 18,000 years BP, the great majority of the Upper Palaeolithic and Epipalaeolithic chipped stone assemblages contained a substantial microlithic component (Kuhn, Elston 2002: 1).

In Europe, the production of diminutive blanks and tools coincided with the arrival of Anatomically

Modern Humans whose Aurignacian technology produced characteristic "Dufour" microbladelets, which were often retouched and turned into backed points (Kuhn 2002). Though we know that the earliest manufacture of bladelets started even earlier, undoubtedly with the proto-Aurignacian (Roussel, Soressi 2014), the tendency to produce microlithic implements increased especially towards the end of the western European Upper Palaeolithic when Gravettian and Epigravettian cultures developed (Straus 2002; Pesesse 2013). In some cases even the minuscule burin spalls were used as blanks for tools, with cores resembling burins and vice-versa (Inizan *et al*. 1992: 71-72).

However, it is only during the Mesolithic, when the glaciers formed during the LGM had retreated, that a number of Eurasian cultures systematically produced microlithic tools (Whittaker 1994). Some archaeologists put in relationship the whole process with the invention, adoption and spread of a new hunting weapon, i.e. the bow and arrow (Clark 1963), whose head could be armed with microlithic inserts (Fischer 1989; Rozoy 1968; 1989; 1992; Caspar, De Biel 1996). In some cases geometric microliths were used to arm not only weaponry, but also barbed points and harpoons for hunting and fishing (Clark 1954; Larsson, Sjöström 2010; Lozovskaya, Lozovski 2013; Zhilin 2014) as well as for other purposes (Clarke 1976).

This hunting innovation was favoured by the rapid climatic and environmental changes that took place at the onset of the Holocene, the consequent development of a thicker forest cover, the disappearance of some large mammal prays and pachyderms in favour of smaller and faster games (Aaris-Sørensen 1980; Jochim 2008: 209). The apex of microlithisation of the lithic assemblages is represented indeed by the early Mesolithic in France and Italy for example, especially the Sauveterrian (Rozoy 1971; 1978), a culture that spread over a few regions of Western Europe during the Preboreal and Boreal periods (Plisson *et al*. 2008).

However, as reported above, geometric microlithic armatures are tools of *longue durée* since they have been produced in some regions, and with variable shapes, by archaeological cultures from the Upper Palaeolithic until the Copper Age. As identical geometric types were represented throughout very different periods performing different functions, caution must be invoked regarding the interpretation of single surface finds: a trapeze does not make a Mesolithic site everywhere in Europe.

The Crimean Peninsula

The occurrence of geometric chipped stone tools of microlithic dimension was first reported by K.S. Mereshkovskiy (1880: 137) from the cave of Kizil'-Koba in the Crimea at the end of the 1800s. At present the Crimea is considered one of the most important regions for the study of the last hunter-gatherers of south-east Europe, due to the presence of caves and rock-shelters from which long sequences of this period have been excavated (Telegin 1982; 1989; Bibikov *et al*. 1994; Nuzhnyi 1998), and in some cases accurately radiocarbon-dated (Benecke 2006; Biagi, Kiosak 2010; Man'ko 2010; Biagi 2016). The recovery of microlithic tools in the Crimea, already at the end of the eighteenth century implies that, although not clearly reported by the author, the retrieving methods he employed during excavation were quite advanced.

The geometric microliths that K.S. Mereshkovskiy illustrated in his paper (Mereshkovskiy 1880: Fig. IV; Fig. 3) are mainly trapezoidal arrowheads of Murzak-Koba type (Yanevich 1998), an aspect that characterises the Late Mesolithic, Early Atlantic period in the region (Telegin 1982). In the aforementioned paper the author compared his microliths with other finds from Italy, France and the Caucasus. Later, the south Russian and Crimean sites with microlithic assemblages were included in the distribution of the Tardenoisian culture by M.C. Burkitt (1926: 18) when he discussed the south-easternmost spread of this Mesolithic complex, characterised by "pigmy industries" (see also Saville 2004b: 8). The same author pointed out the occurrence of similar industries in India and even "*Australia, or elsewhere in far distant lands*", although these latter were not considered chronologically attributable to what he called the Transitional culture (Burkitt 1925; 1926: 16). Quite a similar view of the problem was presented by D.A. Lacaille (1954) a few years later.

The complexity of the Upper Palaeolithic and Mesolithic sequence of southern Ukraine, and the Crimea in particular, has been discussed in several papers (Stanko 1976; Zaliznyak 1995; 2009; Telegin 1998; Marks, Monigal 2004). In this region the microlithisation of the chipped stone assemblages (Nuzhnyi 1992), started already during the Aurignacian (Demidenko *et al*. 1998), slowly increased until the Epigravettian (Stanko *et al*. 1989; Olenkovskiy 2008; Nuzhnyi 2015), reached its apex during the Early Mesolithic Shpan culture (Yanevich 1993; Nuzhnyi 1998), and continued until the first appearance of trapezoidal geometric tools during

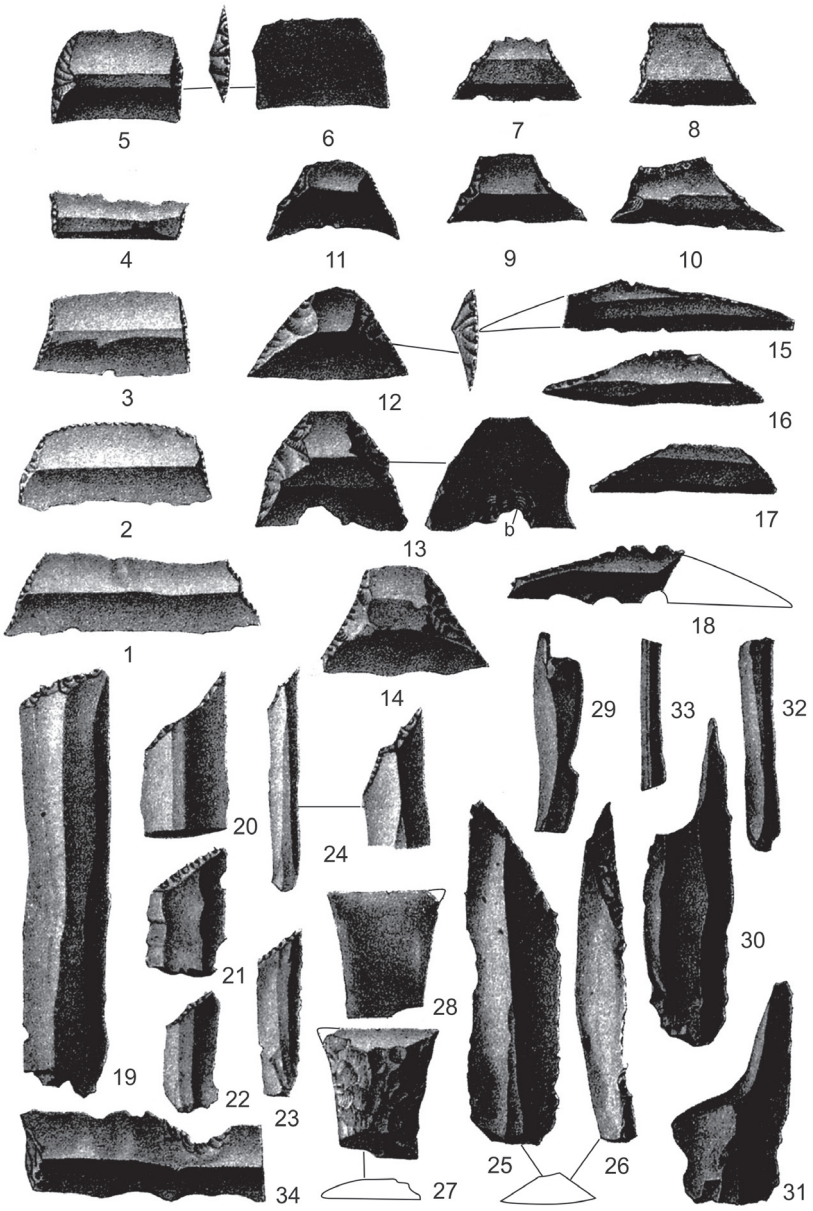

Fig. 3. Trapezoidal geometric microliths, and other chipped stone tools recovered from the cave of Kizil'-Koba in the Crimea in the 1880s (after Mereshkovskiy 1880: Fig. IV).

the second half of the Boreal period (Biagi *et al*. 2014; Biagi 2016) when the Grebeniki (Stanko 1982) and Murzak-Koba hunter-gatherers began to establish their settlements in the region (Yanevich 1998; Zaliznyak 1998).

The reason why the microlithisation of the chipped stone tools took place in the north-western Black Sea region, and developed into an impressive variety of different types of geometric implements according to chronology, landscape characteristics, and woodland cover, has been explained with the different techniques employed for hunting bison at the end of the Pleistocene (Krasnotutsky 1996; Krotova 2013), and aurochs during the Mesolithic in the south Ukrainian steppe (Bibikova 1975; Stanko 2003). Quite a different picture has nevertheless emerged from the study of the faunal remains from Shan-Koba rock-shelter in the Crimea (Fig. 4), where the subsistence economy of the inhabitants was based on hunting red deer and boar during the Allerød interstadial, wild horse and wild ass in the Younger Dryas (Benecke 2006).

According to the techno-typological and the metrical analyses developed on the Late Palaeolithic to Early Neolithic chipped stone assemblages of the Ukraine (Nuzhnyi 1992; 1998: 116) the changes in the hunting techniques adopted in the two aforementioned territories between the end of the Pleistocene and the beginning of the Holocene can be suggested analysing the characteristics of the chipped stone tools and debitage retrieved from the Crimean caves and rock-shelters. Here the beginning

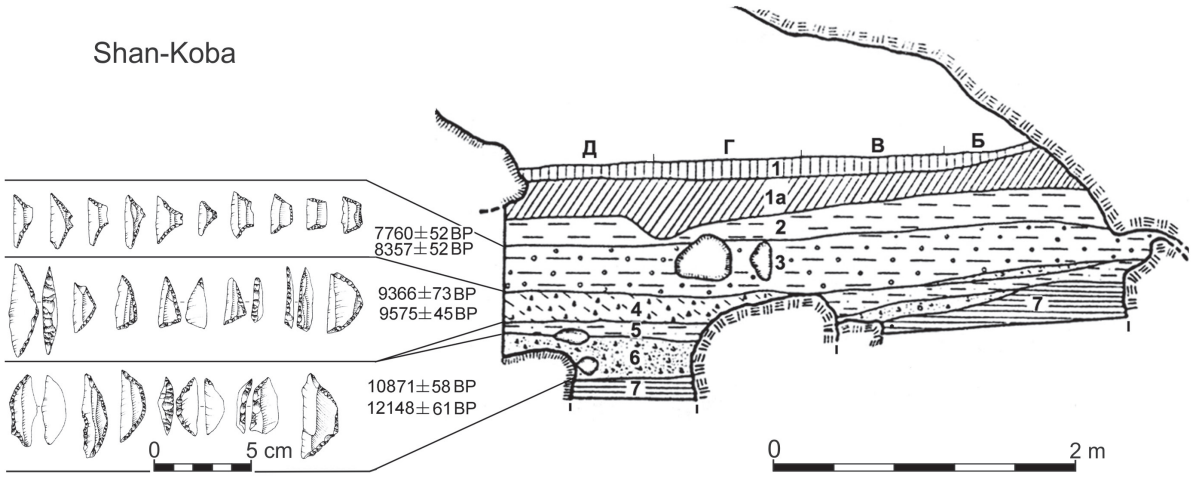

Fig. 4. Profile of the cave Shan-Koba in the Crimea with characteristic types of geometric microliths from the AMS-dated layers 3, 4, and 6 (after Bibikov *et al*. 1994 with modifications, drawing by P. Biagi and E. Starnini).

of the "geometrisation" process of the hunting weapons, from elongate or straight backed points to lunate inserts, is thought to have taken place during the development of the Pre-boreal Shan-Koba culture (Bibikov *et al*. 1994; Biagi *et al*. 2014).

Northern Italy

Analysing the European Upper Palaeolithic industries, first E. Piette and later H. Breuil, at the beginning of the last century, proposed the term *Leptolithique* (literally "tiny stone", from the ancient Greek words *leptós* and *lithos*) to define the lithic assemblages of this époque, recognizing their progressive tendency towards microlithisation (Laplace 1966; Palma di Cesnola 1989). Following this input, and introducing both careful retrieval methods and a systematic typological classifications for the taxonomy of artefacts, the French scholar G. Laplace developed in the 1960's a new approach for the study of the stone industries from the interglacial Würm II-III to the beginning of the post-Glacial period, "*c'est-à-dire d'un Leptolithique au sens large englobant le Paléolithique supérieur et le Mésolithique traditionnels.*" (that is a *Leptolithique* in a broad sense, including the traditional Upper Palaeolithic and the Mesolithic) (Laplace 1966: 10). The same author pointed out the importance of the employment of statistic typometric analyses, indicating the method developed by A. Bohmers and A. Wouters (1958) as the one that "*pourra être appliquée avec fruit à l'étude des variations de grandeurs relatives*" (shall be fruitfully applied to study the variability of relative sizes) (Laplace 1966: 30). Thanks to a research stay granted by the Ecole Française at Rome G. Laplace systematically studied the lithic assemblages belonging to the Italian *Leptolithique* according to his statistical method (Laplace 1964).

In the late 1960s the Italian school of early prehistory following both the processual approach of the New Archaeology (Binford 1962; Clarke 1968) and the typo-technological approach of the French Palaeolithic school (Tixier 1963; Laplace 1966; Martini 2005), developed several studies especially regarding the typometric and statistical analysis of chipped stone assemblages (Bietti 1981; 1991). In particular B. Bagolini (1968) proposed a method for the metric evaluation of the lithic industries, assuming as paradigm that the dimensional distribution of the complete blanks could be a good chrono-cultural marker. The graphic representation of the measures taken from complete, unretouched artefacts (blanks) in forms of scatterplots and histograms became a standard, providing useful indications regarding dimensional changes within the different cultural traditions. In particular, the dimensional range for small bladelets/flakelets and microbladelets/microflakelets was empirically set respectively between 6-4 cm, and 4-2 cm of length/width, and for hypermicroliths below 2 cm (Bagolini 1971).

When this analytical method was applied to the Mesolithic complexes of northern Italy discovered and excavated at the end of the 1960s in the Alpine arc (Broglio 1971; 1973; Bagolini, Dalmeri 1987; Clark 2000), it showed clearly the microlithic and hypermicrolithic character of the debitage (Bagolini 1971).

In particular, A. Broglio applied the typological and structural analysis proposed by G. Laplace (Laplace 1964) to the study of the chipped stone tools from the rock shelter sequences of the Adige Valley occasionally discovered at the end of the 1960s. The excavations carried out at the rock shelter Romagnano III, a few kilometres south of Trento, revealed the most "complete" Mesolithic stratigraphy of northern Italy. The Preboreal and Boreal Sauveterrian sequence with hypermicrolithic and microlithic tools (Flor *et al*. 2011) was excavated below an early Atlantic complex characterised by trapezoidal armatures, later attributed to the Castelnovian (Broglio 1971; 1973; 1992; Alessio *et al*. 1983; Broglio, Kozłowski 1983) (Fig. 5).

More recently researches were conducted in the south-central Alps. At Valmaione, in the Alps of central Valcamonica, north of Brescia, two high-altitude seasonal camps radiocarbon-dated to the Preboreal were excavated (VM1 and VM2). The careful recovery strategy employing micromesh water sieving of the whole sediment permitted the retrieval of several hypermicrolithic artefacts, among which are hypermicroburins measuring just a few millimetres (Biagi 1997) (Fig. 6). The analysis of the faunal remains from the final Epigravettian and Mesolithic sites of north-eastern Italy help interpret the variability of the hunting strategies employed by the last hunter-gatherers who settled in the territory between the end of the Pleistocene and the beginning of the Atlantic period (Boscato, Sala 1980; Clark 2000). The progressive decrease of the role played by ibex in the meat diet of the Final Palaeolithic hunters, and the reversed increase of red and roe deer bone remains during the Mesolithic amelioration stages follow the changes observed in the microlithic armatures that may be linked to variations in the hunting techniques, following changes to the landscape and forest cover that took place at the beginning of the Holocene (Pini *et al*. 2016).

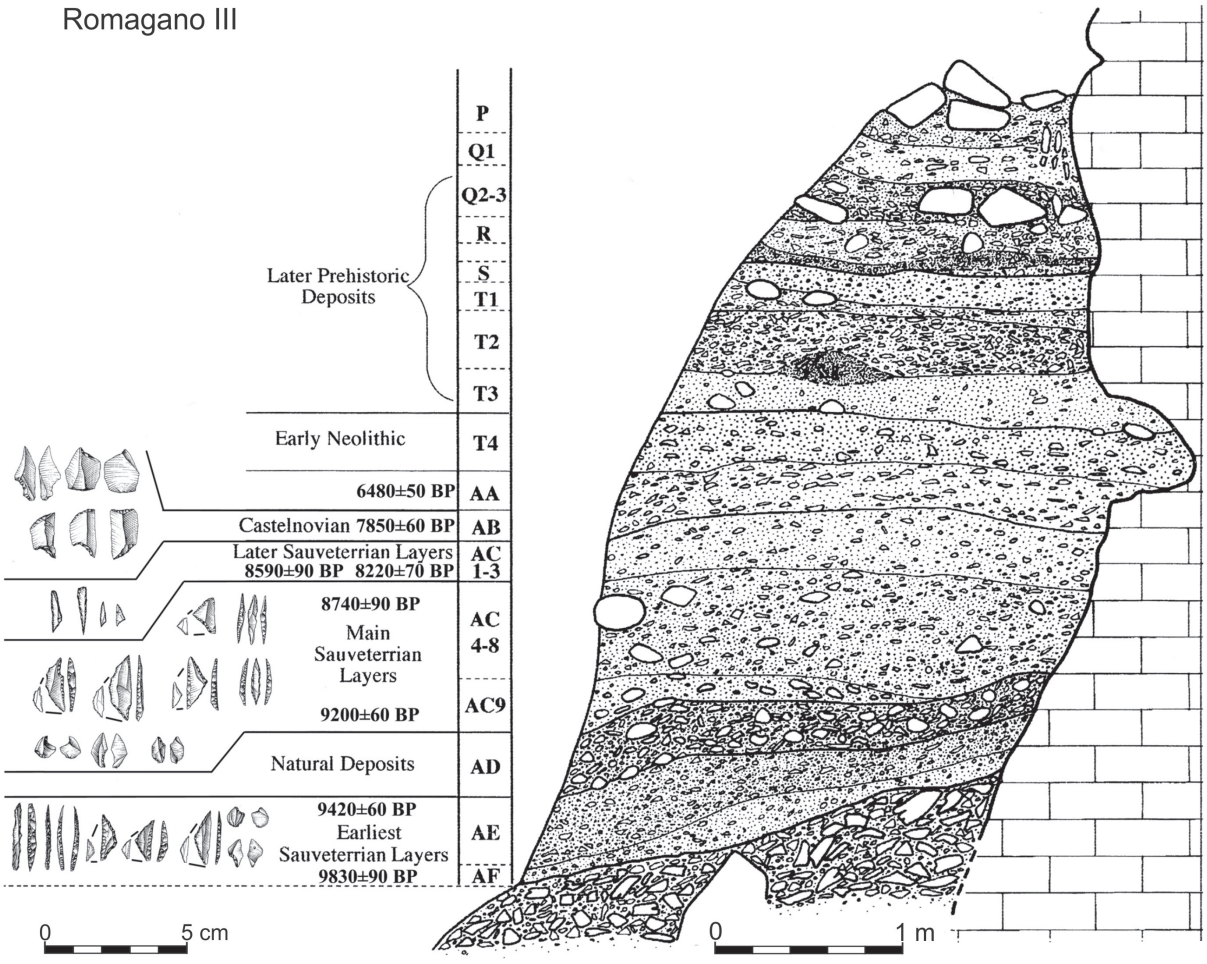

Fig. 5. Profile of the rock shelter Romagnano III in the Trentino (northern Italy) with characteristic types of geometric microliths from the radiocarbon-dated Mesolithic sequence (after Broglio 1973 and Clark 2000 with modifications, drawing by E. Starnini).

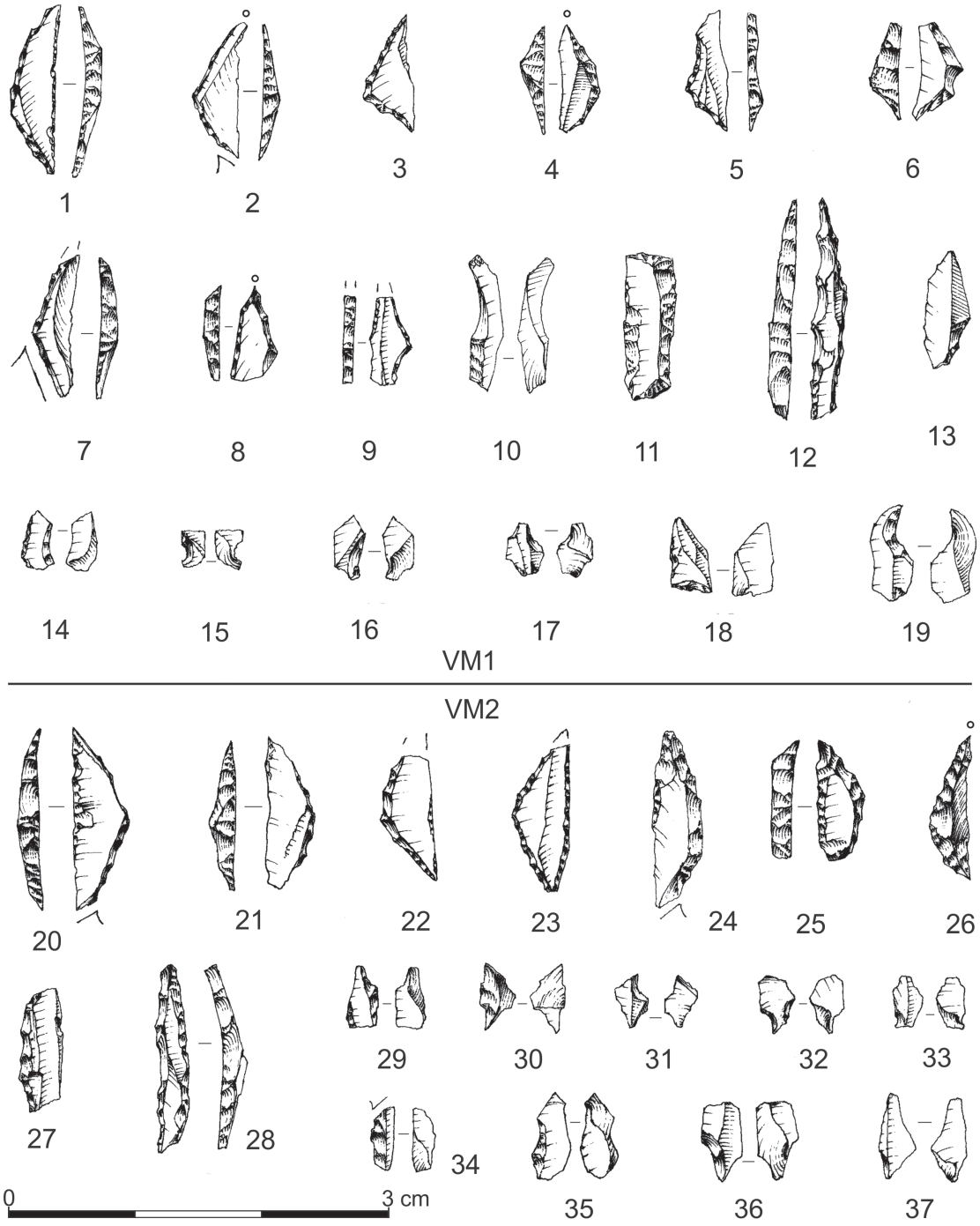

Fig. 6. Hypermicrolithic geometric tools and microburins from the Preboreal Mesolithic sites of Valmaione 1 and 2 in the Alps of central Valcamonica (northern Italy) (after Biagi 1997 and unpublished material, drawing by G. Almerigogna).

Discussion

Based on a critical evaluation of the available evidence, we can conclude that the beginning of the microlithisation process (i.e. the progressive shrinking of the implement size) within the chipped stone tool production in the Old World can be traced back to the beginning of the Upper Palaeolithic. However, it is only at the end of the Palaeolithic period and in particular at the very beginning of the Holocene that the last hunter-gatherers of Europe were capable to produce microlithic industries. Their millimetric dimensions show a high technological control of the production stages, from the detachment of hyper-micro blanks to the retouch of hyper-micro armatures (Nuzhnyi 1992). It is only employing

a proper retrieval technique that is the use of water-sieving with micrometric mesh, that the deposits of this age can be properly investigated. The two case studies presented in this paper, although different also in the story of the archaeological research carried out in the two regions of southern Europe are emblematic in this respect since, thanks to the richness and reliability of the results obtained from the excavations carried out in the two mountain regions, they provide an important contribution to the interpretation of the still poorly understood phenomenon of microlithisation.

It has already been pointed out that the absence of microlithic implements from early Upper Palaeolithic industries such as the Aurignacian and Gravettian assumed for many years was indeed a bias due in large part to the unemployment of fine sieving techniques in early excavations (Meshveliani *et al*. 2004: 143). Present-day researches using more careful recovery procedures have shown that artefacts of microlithic size are present in most, if not all the Upper Palaeolithic assemblages (Nuzhnyi 2000; Kuhn, Elston 2002: 3), and that micro-debitage analysis plays an important role in the interpretation of the activities practised within different areas of the same site (Okazawa 1999).

As far as concerns explanations of this phenomenon, there is a common ground among the various economic, strategic, and historic reasons invoked by archaeologists for the adoption of microlithic technologies, among which are mobility, subsistence diversification, and the more general notion of risk minimisation (Kuhn, Elston 2002: 4).

Acknowledgements

The authors are very grateful to T.B. Ballin (Bradford University) for the useful suggestions to improve the text and the linguistic revision of the English manuscript.

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