

Lithic studies: an alternative approach to Neolithization

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ABSTRACT

Most models of Neolithization of the Balkans have focused on pottery, with little attention paid to other aspects of material culture. A distinctive feature of the Early Neolithic Karanovo I culture of Bulgaria is a flint industry characterized by 'macroblade' technology and widespread use of 'Balkan Flint' in conjunction with formal toolkits. The origins of this technology and the associated raw material procurement system are still unresolved. Balkan flint also occurs in Early Neolithic contexts outside the Karanovo I culture area, notably in the southern Balkans (Turkish Thrace) and in the lower Danube catchment (Carpathian Basin, Iron Gates, southern Romania and northern Bulgaria). The only securely identified outcrops of Balkan flint are in the Upper Cretaceous Mezdra Formation in the Pleven-Nikopol region of northern Bulgaria. One of the most challenging aspects of the Neolithization debate is to accommodate the evidence provided by lithic studies. Among outstanding questions are: (i) was Balkan flint used by the first ('pre-Karanovo') Neolithic communities in Bulgaria; (ii) what role did Balkan flint play in the Neolithization of Southeast Europe; (iii) did access to Balkan flint result in the emergence of a new laminar technology; (iv) how did the Early Neolithic Balkan flint exchange network compare to that based on obsidian, which developed in and around the Aegean Basin; and (v) what and where were the origins of the Balkan flint network and the formal tools associated with it?

KEYWORDS

Southeast Europe, Neolithization, lithic exchange networks, Balkan flint, formal toolkits

Introduction

One of the major obstacles to research on the Neolithization of Southeast Europe is a lack of information about the immediately Pre-Neolithic settlement of the region.

A comparison of the distribution of Upper Palaeolithic and Late Mesolithic cave sites suggests a major change in settlement pattern during the early Holocene with Late Mesolithic populations becoming concentrated in coastal areas and valleys of 'big' rivers, with resources sufficient to support fishing communities (typified by the Iron Gates sites). An important factor underlying this shift was the early Holocene expansion of closed canopy forest across much of the Balkans below 700m a.s.l., with a corresponding decline in human carrying capacity linked to the reduction in usable animal and plant biomass. Seen from this perspective the most likely 'hotspots' of Late Mesolithic settlement in Bulgaria were: (i) the Black Sea littoral (the virtual absence of Mesolithic sites along the present Black Sea coast can be attributed to sea-level rise and marine transgression since 6000 BC); and (ii) the Lower Danube valley where the absence of sites downstream of the Iron Gates most likely reflects a lack of research. Without the targeted surveys and rescue excavations ahead of dam construction in the 1960s and 1980s, what would we know of the Mesolithic of the Iron

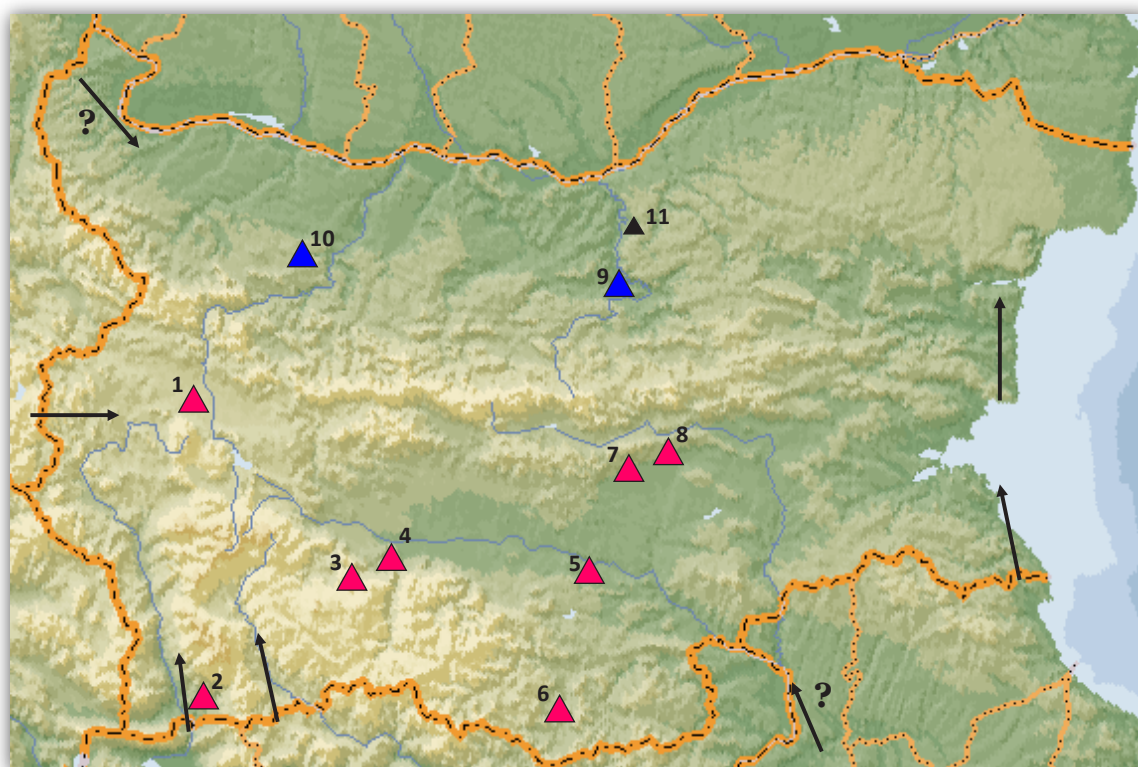


Fig. 1. Map of Bulgaria with the Early Neolithic sites mentioned in the text: 1 – Slatina (Sofia), 2 – Kovačevo; 3 – Rakitovo; 4 – Kapitan Dimitriev; 5 – Yabalkovo; 6 – Sedlare; 7 – Azmak; 8 – Karanovo; 9 – Dzhulyunitsa; 10 – Ohoden; 11 – Koprivets. Black arrows indicate routes of Neolithization proposed by various authors. (Revised after Gurova 2008, fig. 1)

Обр. 1. Карта на България с обозначение на раннеолитните селища, споменати в текста: 1 – Слатина (София), 2 – Ковачево; 3 – Ракитово; 4 – Капитан Димитриево; 5 – Ябълково; 6 – Седларе; 7 – Азмак; 8 – Караново; 9 – Джулюница; 10 – Оходен; 11 Копривец. Черните стрелки маркират пътищата на неолитизацията, предложени от различни автори (адаптирана по Gurova 2008, fig. 1)

Gates? (for more detailed discussion, see Gurova, Bonsall 2014).

Any discussion of the Neolithization of Southeast Europe needs to allow for the existence of Late Mesolithic fishing villages along the Black Sea coast and the Lower Danube and the possibility of trade/exchange networks operating among these communities, which included the exchange of lithic resources. Use of Lower Danube flint resources is attested much earlier in the Gravettian and Epigravettian of Temnata Cave in the form of raw material identical to that circulating among Early Neolithic groups and known as ‘Balkan flint’. This paper focuses on Balkan flint in the context of the Neolithization of the Balkans, with particular emphasis on securely dated Early Neolithic sites in Bulgaria with a well-documented Balkan flint component (fig. 1).

Searching for Pre-Neolithic assemblages

The only locality in Bulgaria from which material of potentially ‘Mesolithic’ date has been recovered is Pobitite Kamani (Dikilitash), near Varna, where a rich, heterogeneous collection of chipped stone artefacts was recovered from surface exposures over an area of ca 50

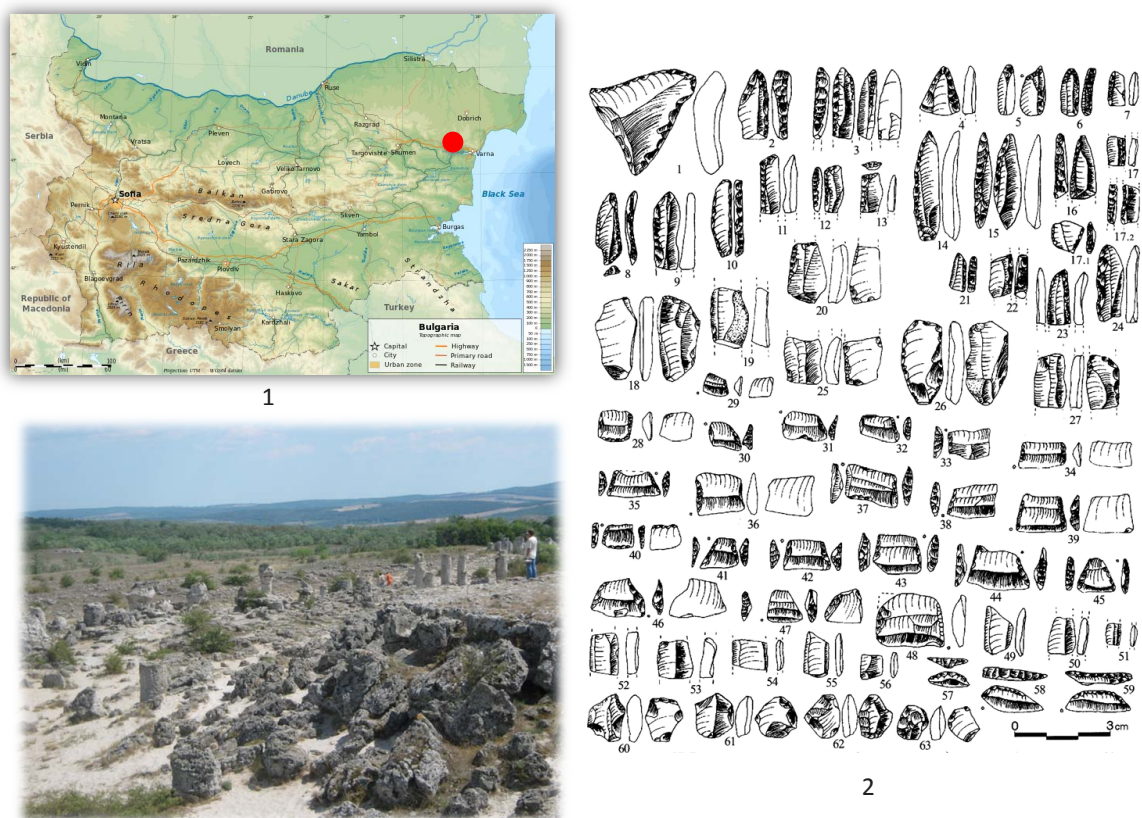


Fig. 2.1. Location and view of Pobitite Kamani (Dikilitash); 2 - flint industry from Dikilitash
(after Иванова, Цанова 2001, fig. VI)

Обр. 2.1. Местоположение и изглед към Побитите Камъни (Дикилиташ),
2 – кремъчна индустрия (по Иванова, Цанова 2001, fig. VI)

km² (fig. 2). Pobitite Kamani is generally regarded as a complex of sites, with material from various periods. Among the artefacts from Dikilitash is a series that has been attributed to a Levallois-Mousterian (Middle Palaeolithic) industry (Ivanova, Sirakova 1995, 44). Judging from illustrations in Ivanova and Tsanova (2001, Pl. VII) there are also several fragments of bifacial arrowheads, which in the Bulgarian prehistoric sequence cannot be earlier than late Chalcolithic and which became a diagnostic type in the Bronze Age (cf. Гюрова 2005). Most interest, however, has focused on the presence of microliths, which include trapezes, triangles, segments, and backed and truncated bladelets. Gatsov (1982, 1989) compared the straight- and arch-backed microliths with the material from Cuina Turcului in the Iron Gates, concluding there was a 'Tardigravettian' or 'Epi-Tardigravettian' component among the Dikilitash finds. Ivanova and Tsanova (Иванова, Цанова 2001, 50) described the same material as 'Tardigravettian', while Kozłowski (1982, 149) described it as 'early and middle Epipalaeolithic'. While there may be differences in the terminology used, all these authors seem agreed that the straight- and arch-backed microliths from Pobitite Kamani are Late Pleistocene and/or very Early Holocene in date. Of more immediate interest is whether the Dikilitash 'palimpsest' has a Late or Final Mesolithic component. Among the microliths illustrated by Gatsov (1982, pl. II) are a number of symmetrical trapezes made on blades, which he interpreted as Late Mesolithic (Гатцов 1984: 16). Although blade and trapeze industries are known from very late Mesolithic (post-6700 cal BC) contexts along the Adriatic

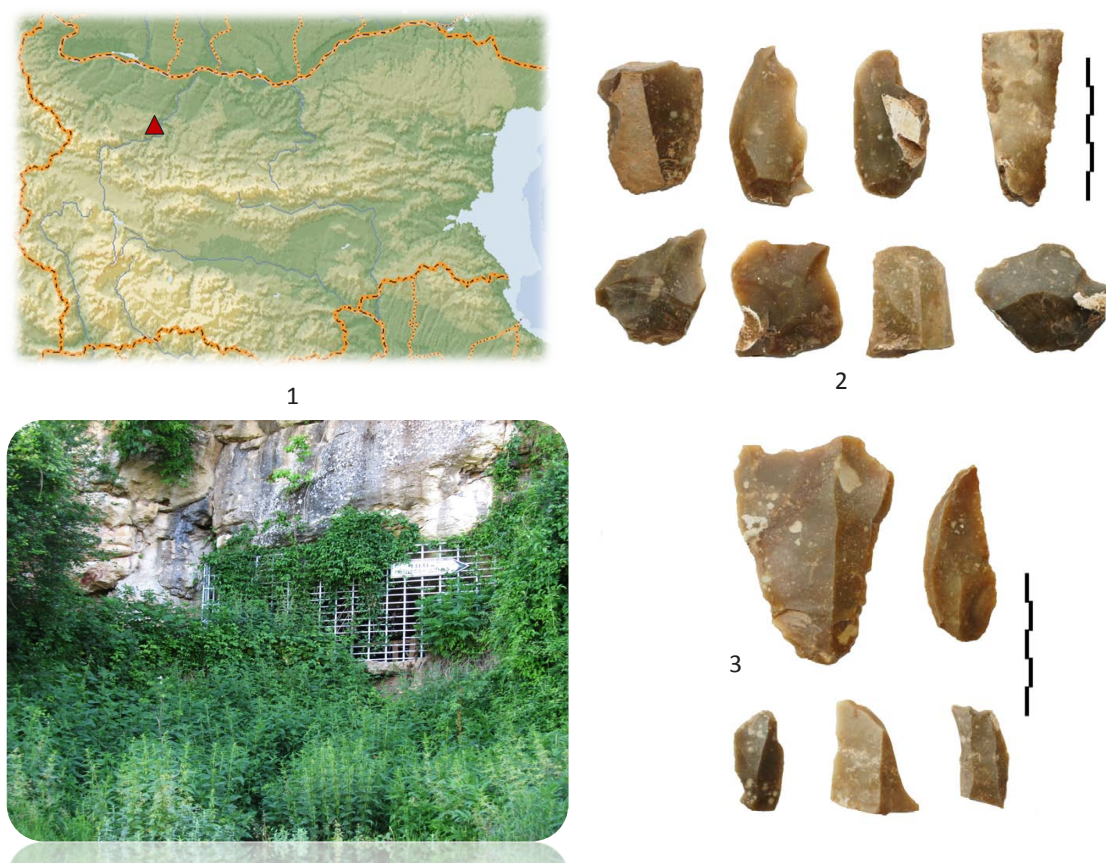


Fig. 3.1. Location and view of Temnata Cave; 2 – BF artefacts from Gravettian levels;
3 – BF artefacts from Epigravettian levels. Photos by M. Gurova

Обр. 3.1. Местоположение и изглед към пещерата Темната дупка; 2 – артефакти от 'Балкански флинт' от граветските пластове; 3 – артефакти от 'Балкански флинт' от епиграветските пластове. Снимки М. Гюрова

rim of the Balkans (Perrin 2012) and in the steppe zone to the northwest of the Black Sea, especially the Late Mesolithic Grebenyky culture (Biagi, Kiosak 2010), in the Balkans east of the Dinaric mountains (including the Iron Gates) symmetrical trapezes made on blades are only well documented in the early and middle Neolithic (for the situation in Bulgaria see Гюрова 2005; Zlateva-Uzuniva 2009; Gurova 2014a).

Arguably better (if circumstantial) evidence for the former presence of Late Mesolithic sites along the Bulgarian Black Sea coast is the distribution of so-called 'bullet cores' from which blades or bladelets were removed by pressure. In the wider Black Sea region there are two groups of sites with bullet cores. Along the Turkish Black Sea coast and south Marmara bullet cores occur in Epipalaeolithic sites of the Ağacli group and Early Neolithic sites of the Fikirtepe culture, while to the north of the Black Sea bullet cores occur in late Mesolithic contexts over an extensive region between the Siret River and the Crimean Peninsula (Gatsov 2007). The absence of sites with bullet cores in the intervening region along the western side of the Black Sea, repeatedly stressed by Gatsov (2007, 126), may be a consequence of the drowning of the Black Sea coastal plain by the post-glacial marine transgression.

Apart from the techno-typological characteristics of the flint artefacts there is another trajectory to be considered, namely that of the raw material procurement strategy and distribution network. This aspect of Bulgarian prehistoric (and especially Pleistocene) as-

semblages has been approached only fragmentarily. An exception is the detailed study of raw materials from the Gravettian sequence of Temnata Cave undertaken by Maciej Pawlikowski. His conclusions about flint types were summarized thus:

The source of the wax-yellow BG-Te-F4 flints remains unknown. Field studies and the distribution of artefacts during the Early Neolithic allow to suggest its origin from north-western Bulgaria, south-western Romania or north-eastern Yugoslavia (Iron Gate area). This hypothesis must be supported by more detailed field investigations (Pawlikowski 1992, 286).

In fact, this is one of the most specific professional observations about what is called Balkan flint. Unfortunately, after Pawlikowski's research no relevant geoarchaeological research was performed on the subject for almost two decades. The 'wax-yellow' flint identified by Pawlikowski and coded as BG-Te-F4 is macroscopically identical to the flint that later became known and widely used in the specialized literature as 'Balkan flint' (fig. 3).

Balkan flint toolkits as a proxy for Neolithization

Researchers have adopted different approaches to the spread of the Neolithic, but by far the most common has been based on pottery form, fabric and decoration (Николов 1987, 1990; Lichardus-Itten 1993; Stefanova 1996, 1998; Lichardus-Itten et al. 2006; Nikolov 2007), sometimes combined with the detailed analysis of radiocarbon dates (Boyadzhiev 2006) or observations on the palaeoenvironmental conditions (Чохаджиев 2002). The most exhaustive overview of the Neolithic period, including its initial steps and stages (incorporating observations on the flint assemblages) was provided by Todorova and Vaysov (Тодорова, Вайсов 1993).

Chipped stone industries have tended to be overlooked in discussions of the Neolithization of Southeast Europe, in favour of pottery. There have been notable exceptions, however, including publications by Janusz Kozłowski (1982), Ivan Gatsov (1993, 2000, 2009) and Maria Gurova (Гурова 2009; Gurova 2008, 2011a, 2011b, 2012a, 2012b; Gurova, Bonsall 2014). Their research has revealed no close connection between Early Neolithic chipped stone assemblages from Bulgaria and those from northwest Anatolia in contrast to the inter-regional similarities in the ceramic assemblages, and this highlights the importance of a multi-faceted approach to the Neolithization of the Balkans.

Gurova's research on the Neolithization of the Balkans has been concerned primarily with the role of Balkan flint. An important outcome of her analysis of the Early Neolithic assemblages from both tells (Karanovo, Azmak and Kapitan Dimitriev) and 'flat' settlements (Kovačevo, Yabalkovo, Rakitovo, Slatina, Dzhulyunitsa) in Bulgaria was the identification of a distinctive 'formal toolkit' made of Balkan flint (Gurova 2008, 2009, 2011a, 2011b, 2012a, 2012b, 2014b). This toolkit comprises (i) medium to long, regular blades with uni- or bilateral semi-abrupt retouch (from marginal to high and steep) and sometimes with rounded or pointed ends (so-called 'Karanovo blades'), and (ii) sickle inserts. A majority of the artefacts in these toolkits exhibit macro- and micro-wear traces of use, most notably the sickle inserts (figs. 4–5). Production of the blade blanks was by indirect percussion (punch technique) and the retouching was by pressure flaking using an organic stick. However, with very few exceptions, neither blanks nor debitage from blank production are represented among the assemblages.



Fig. 4. Early Neolithic formal toolkits from BF: A – Slatina; B – Rakitovo; 1 – Yabalkovo; 2 – Rakitovo; 3 – Slatina; 4 – Kovachevo. Figure by M. Gurova

Обр. 4. Раннеолитни диагностични оръдия от 'Балкански флинт' от: А – Слатина; В – Ракитово; 1 – Ябълково; 2 – Ракитово; 3 – Слатина; 4 – Ковачево.

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Previous researchers have referred to the Early Neolithic repertoire as a 'macroblade industry'. Kozłowski (1982, 149) noted the distinctive character of the Karanovo I-Anzabegovo-Vršnik blade industry based on yellowish-brown flint from the 'Pre-Balkan Platform' (i.e. Balkan flint), but ruled out the possibility of a local origin in the preceding Epipalaeolithic. Yet subsequently he was forced to conclude that, "the origin of the macroblade industry is one of the most puzzling questions of the Balkan pottery Neolithic" (Kozłowski 2007, 49). Gatsov, on the other hand, persistently sought an external (Anatolian?) origin for the Bulgarian Early Neolithic blade industry (Gatsov 2000, 2006, 2009).

Fragments of large, regular blades were occasional finds in Neolithic levels at Franchthi and Argissa in Greece dating back to *ca* 6600 cal BC (Perlès 2001, 2004). Made from high quality 'silex blond' rather than Balkan flint, they have not been found in Greece north of Thessaly. Moreover, a technological analysis by Pelegrin (2006) suggested they were produced by lever pressure rather than punch technique. Therefore, the problem of the origin of the Balkan Early Neolithic 'macroblade' tradition remains unresolved – for more detailed discussion, see Gurova (2008, 2012b).

Early Neolithic sites with Balkan flint artefacts among their chipped stone assemblages are widely distributed in Southeastern Europe (fig. 6). They occur throughout Bulgaria, in Serbia including Vojvodina (Kozłowski 1982; Šarić 2003, 2004; Borić 2007; 2008;

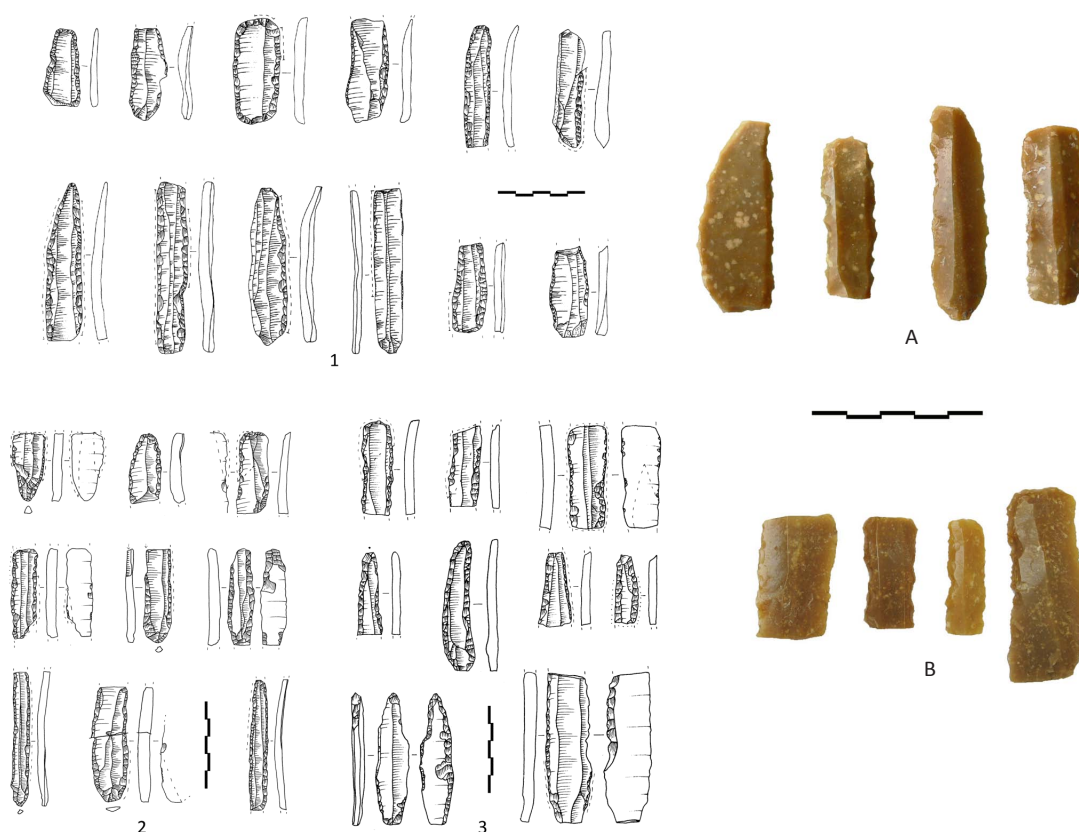


Fig. 5. Early Neolithic formal toolkits from BF: 1 – Karanovo; 2 – Yabalkovo; 3 –Kovačevo. A – sickle inserts from Kovačevo; B – from Yabalkovo. Figure by M Gurova

Обр. 5. Раннонеолитни диагностични оръдия от 'Балкански флинт' от: 1 – Караново; 2 – Ябълково; 3 – Ковачево. А – елементи от сърп от Ковачево; В – от Ябълково.

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Bogosavljević-Petrović, Marković 2012; Bogosavljević-Petrović, Starović 2013), Macedonia (Biagi, Starnini 2010b; Dimitrovska 2012; ДИМИТРОВСКА 2013); southern Romania (Bonsall 2008; Crandell 2008, 2013), and southeast Hungary (Biagi, Starnini 2010b). The distribution corresponds closely with what has been termed the 'First Temperate Neolithic' (Nandris 1970, 2007) comprising the Karanovo I-II, Starčevo, Criș and Körös cultures. Not all sites, however, possess the formal toolkit as defined by Gurova (2008). Formal toolkits of Balkan flint are a diagnostic feature of the Early Neolithic flint assemblages of the Karanovo I and II cultures in southern Bulgaria (figs. 7–10). Formal tools are virtually absent, however, from the major Early Neolithic sites of northern Bulgaria (beyond the Balkan Mountains) – Ohoden and Dzhulyunitsa, both interpreted by their discoverers as belonging to the final stage of the 'monochrome phase' of the Neolithic (so-called Proto-Starčevo horizon), which has no close affiliation with the classical Early Neolithic Karanovo I culture (Еленски 2008, 98; Ганецовски 2009, 55). Likewise, beyond Bulgaria formal tools do not occur in all Early Neolithic sites where Balkan flint was used. But they were found, for example, at Anzabegovo (Elster 1977) and other settlements in Macedonia such as Rug Bair, Tumba Madzari and Mramor (Dimitrovska 2012; ДИМИТРОВСКА 2013) in Macedonia; at the Starčevo culture site of Golokut (Kozłowski 1982, fig. 11–12) and some other sites in Serbia (Bogosavljević-Petrović, Starović 2013, Pl. II).



Fig. 6. BF at the inter-regional scale: 1 – formal tools from the Early Neolithic site of Uğurlu (Gökçeada) (after Erdoğan 2014, fig. 14); 2 – formal tools from Aşağı Pınar (eastern Thrace)(after Özdoğan 2011b, fig. 6); 3 – BF raw material from Murfatlar and Ovidiu, Romania (after Crandell 2013, fig. 5); 4 – formal tools from Zuniğer and Tumba Madzhari (after Димитровска 2013, fig. 22); 5 – BF artefacts from Grivac, Tečić and Vršac-At (Starčevo culture, below) and Belovode (Vinča culture, above) (after Bogosavljević-Petrović, Marković 2012, fig. 6)

Обр. 6. 'Балкански флинт' в над-регионален мащаб. 1 – диагностични оръдия от неолитното селище Uğurlu (Gökçeada) (по Erdoğan 2014, fig. 14); 2 – диагностични оръдия от Aşağı Pınar (Източна Траркия)(по Özdoğan 2011b, fig. 6); 3 – суровини от 'Балкански флинт' от Murfatlar и Ovidiu, Румъния (по Crandell 2013, fig. 5); 4 – диагностични оръдия от Zuniğer и Tumba Madzhari (по Димитровска 2013, fig. 22); 5 – артефакти от 'Балкански флинт' от Grivac, Tečić и Vršac-At (култура Старчево – долу) и Belovode (култура Винча – горе) (по Bogosavljević-Petrović, Marković 2012, fig. 6)

Of particular interest is the presence of formal tools of Balkan flint among some Early Neolithic assemblages in Turkish Thrace. At Hoca Çeşme Balkan flint formal tools occur in phase II (Özdoğan 2008, 154; Gatsov 2009, 77–78), and at Aşağı Pınar in layers 6 and 7 (Özdoğan 2011a, fig.6) (fig. 6.2; table 1).

However, the most surprising find of Balkan flint is the formal toolkit repertoire from the site of Uğurlu on the island of Gökçeada (Imbros) (Guilbeau, Erdoğan, 2011; Erdoğan 2014). Among the ca 1000 lithics from phase IV, 11 are Balkan flint formal tools ('Karanovo blades') (fig. 6.1; table 1).

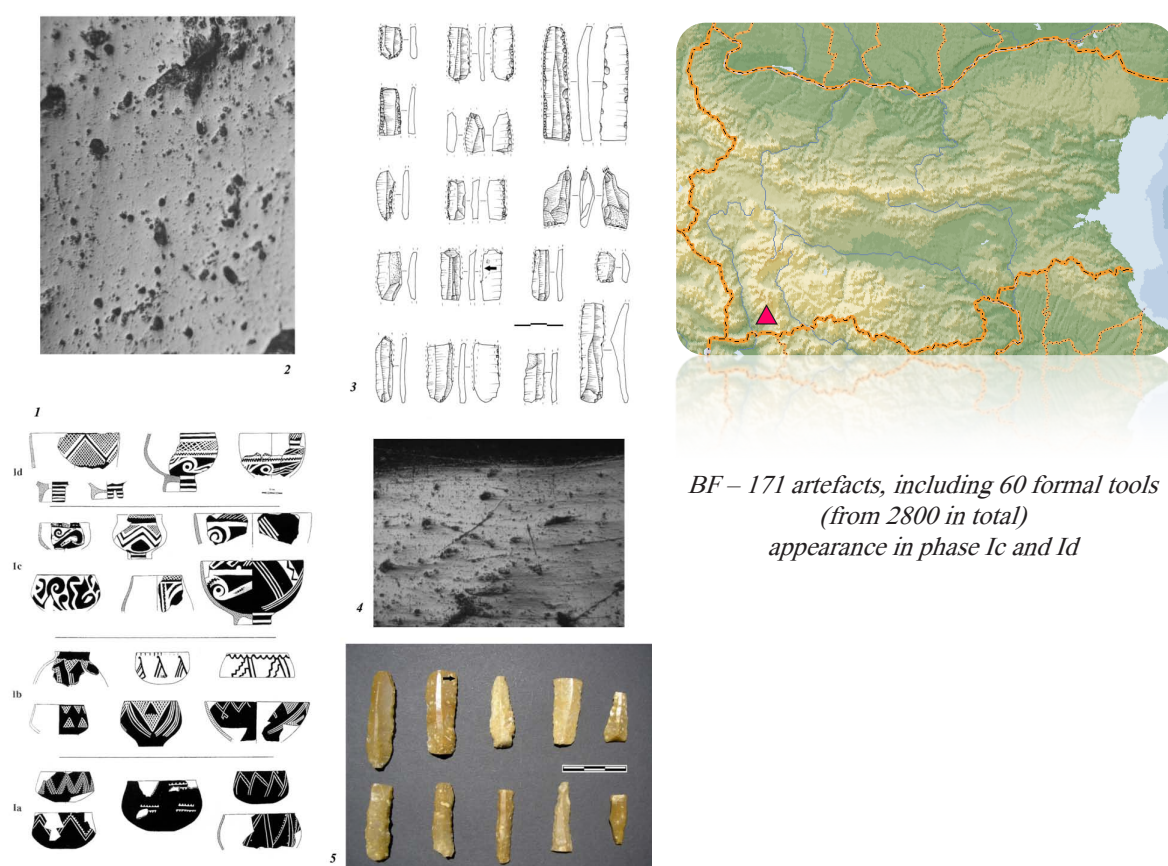


Fig. 7. Kovačevo: location and information about BF artefacts; 1 – white-painted pottery forms and decoration (after Demoule, Lichardus-Itten 2001, fig. 7); 2 – microphotograph of the cereal polish (x 100), see the arrow on the picture 5; 3 – flint artefacts (debitage and tools); 4 – microphotograph of the cereal polish (x 100), see the arrow on the drawing above; 5 – formal flint toolkit (including sickle inserts).

Figure by M. Gurova

Обр. 7. Ковачево: местоположение и информация относно артефактите от 'Балкански флинт'; 1 – бялорисувана керамика – форми и декорация (по Demoule, Lichardus-Itten 2001, fig. 7); 2 – микрофотография на излъскване от сърп (x 100), виж стрелката на фотография 5; 3 – артефакти (дебитаж и оръдия); 4 – микрофотография на излъскване от сърп (x 100), виж стрелката на рисунката горе; 5 – диагностични оръдия от 'Балкански флинт' (вкл. елементи от сърп).

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Balkan flint in its geological context

Considerable uncertainty and disagreement surrounds the provenance of the Balkan flint found on Early Neolithic sites across Southeast Europe.

In his study of Neolithic sites in western Bulgaria, Gatsov adopted Pawlikowski's (1992) suggestion of a northwest Bulgarian origin for the 'high quality yellow (or wax-coloured) flint with white or grey spots' (Gatsov 1993: 40–41). Subsequently, research by Gatsov and the geologist Vsevolod Kurčatov on the rich lithic assemblages from Tells Karanovo and Azmak (belonging to the Karanovo I culture) led them to conclude that the abundance of Balkan flint (ca 80% of all chipped stone artefacts) was due to the proximity of local outcrops, which they 'identified' (more in theory than fact) in the region of the Sveti

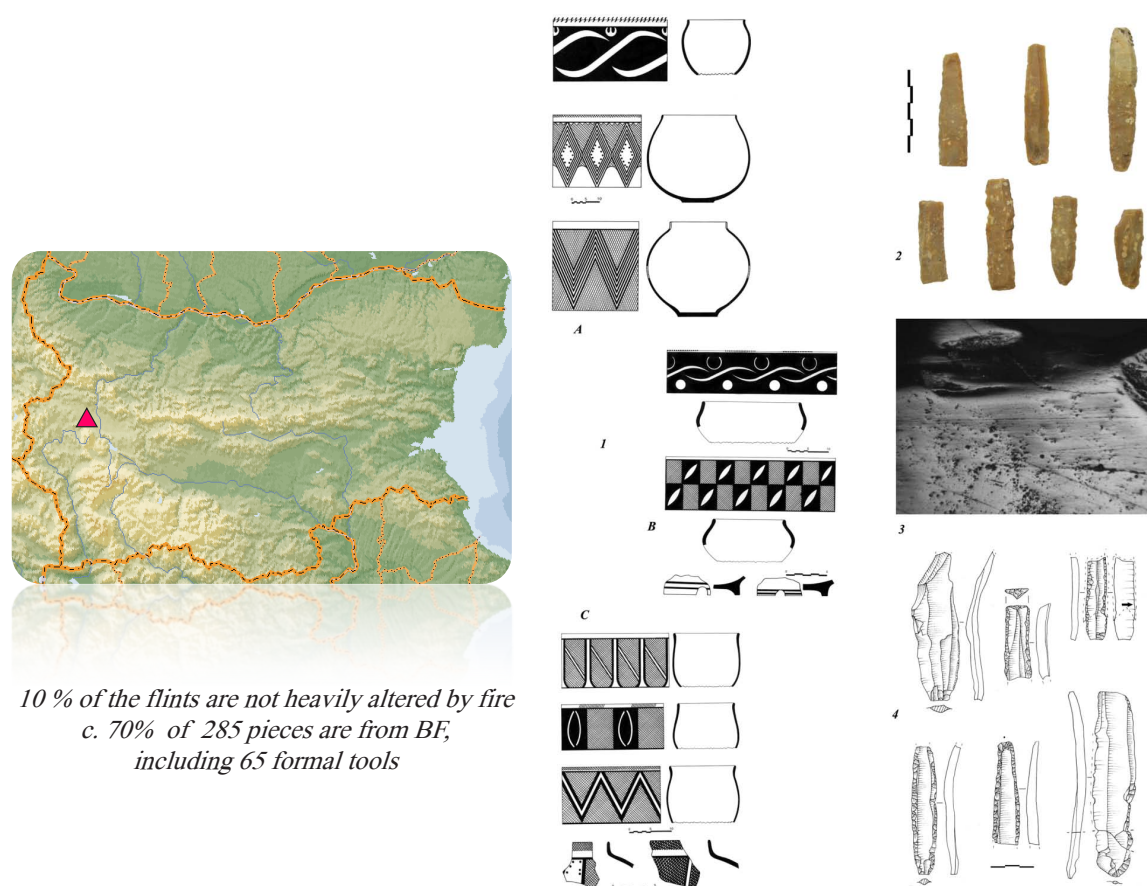


Fig. 8. Slatina: location and information about BF artefacts; (A-C) – white-painted pottery styles of decoration (after Николов 1992, figs. 61, 63, 64); 2 – formal flint toolkit; 3 – microphotograph of the cereal polish (x 100), see the arrow on the drawing below; 4 – flint artefacts (blade and tools). Figure by M. Gurova

Обр. 8. Слатина: местоположение и информация относно артефактите от ‘Балкански флинт’;
(А-С) – бялорисувана керамика – орнаментални мотиви (по Николов 1992, фиг. 61, 63, 64); 2 –
диагностични оръдия от ‘Балкански флинт’; 3 – микрофотография на излъскване от сърп (x 100)
виж стрелката на рисунката долу; 4 – кремъчни артефакти (пластини и оръдия).

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Iliia Hills in eastern Thrace, not far from the tells (Gatsov, Kurčatov 1997, 215). This interpretation has been cited repeatedly, but never substantiated.

Did the Balkan flint used by Early Neolithic communities across the Balkans come from one or more sources on the Moesian platform in northern Bulgaria, as argued by Nachev (Начев 2009) and, if so, where were those sources located? This question has prompted several attempts to provenance flint raw materials using petrological and/or trace element analyses.

Research by Nachev has shown there to be significant accumulations of flint concretions in limestone formations of the Moesian Platform in northern Bulgaria (fig. 11). The two principal types of flint are Ludgorie flint found in Lower Cretaceous limestones and Moesian flint found in Upper Cretaceous chalk (Gurova, Nachev 2008; Начев 2009).

After initial attempts at petrological (thin section) characterization of ‘Balkan flint’ samples proved unsuccessful (Gurova, Nachev 2008), trace element analyses of archaeological samples from Early Neolithic sites and geological samples from outcrops of Moesian and Ludgorie flints were attempted using laser ablation inductively coupled plasma

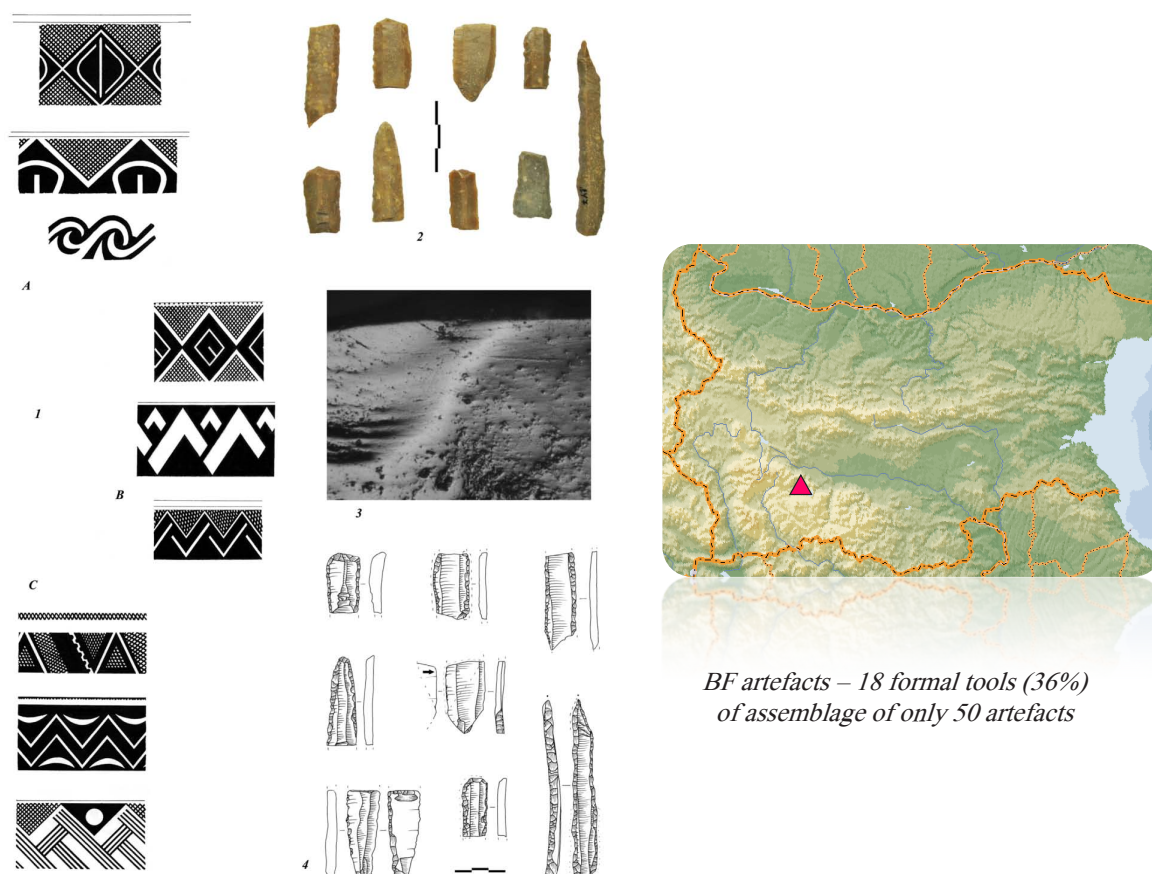


Fig. 9. Rakitovo: location and information about BF artefacts; 1 – white-painted pottery decoration: A – Rakitovo style; B – mixed style; C – Thracian style (after Радунчева et al. 2002, figs. 86-88); 2 – formal flint toolkit; 3 – microphotograph of the cereal polish (x 100), see the arrow on the drawing below; 4 – flint artefacts (tools). Figure by M. Gurova

Обр. 9. Ракитово: местоположение и информация относно артефактите от 'Балкански флинт'; 1 – бялорисувана керамика – орнаментални мотиви: А – стил Ракитово; В – комбиниран стил; С – Тракийски стил (по Радунчева и др. 2002, фиг. 86-88); 2 – диагностични оръдия от 'Балкански флинт' 3 – микрофотография на излъскване от сърп (x 100), виж стрелката на рисунката долу; 4 – кремъчни артефакти (оръдия). Изготвил – М. Гюрова

mass spectrometry (LA-ICP-MS) and an electron probe microanalyzer (EPMA). The small number of pieces analyzed, however, did not allow the provenance(s) of the archaeological samples to be identified with certainty (Bonsall et al. 2010).

In 2011 a more extensive project focused on the identification of flint sources used by prehistoric communities in northern Bulgaria and northeast Serbia was undertaken, which combined geochemical fingerprinting (using LA-ICP-MS) with thin section petrography. This project was sponsored by the America for Bulgaria Foundation (ABF) and co-ordinated by the American Research Center in Sofia (ARCS) in a partnership with Cardiff University¹. A much larger number of samples was collected for analysis, comprising artefacts from important Early Neolithic settlements and comparative geological samples.

In 2011 a field survey was undertaken in central and northwest Bulgaria, in collaboration with geologists from Kraków and Sofia, during which 30 chert and flint outcrops were

1 Co-PIs of the project: Dr Maria Gurova (Bulgaria) and Dr Dušan Borić (UK)

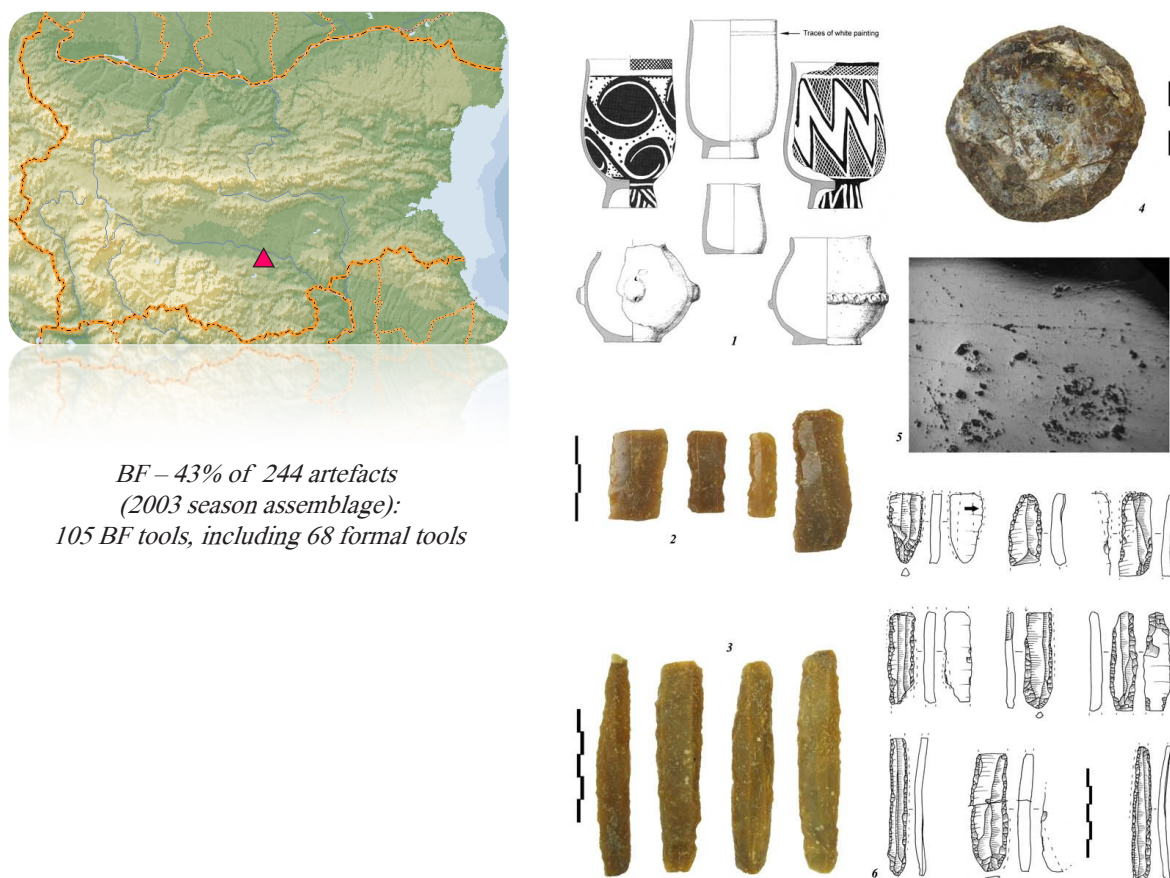


Fig. 10. Yabalkovo: location and information about BF artefacts; 1 – pottery forms and white-painted decoration (after Leshtakov et al 2007., fig. 10, scale 1:4); 2 and 3 – formal flint toolkit (2 – sickle inserts); 4 – flint hammerstone re-sharpened in 'discoid' form artefact; 5 – microphotograph of the cereal polish (x 100), see the arrow on the drawing below; 6 – flint artefacts (tools).

Figure by M. Gurova

Обр. 10. Ябълково: местоположение и информация относно артефактите от 'Балкански флинт'; 1 – бялорисувана керамика – форми и декорация (по Leshtakov et al 2007., fig. 10, scale 1:4); 2 and 3 – диагностични оръдия от 'Балкански флинт' (2 – елементи от сърп); 4 – кремъчна чукалка трансформирана в изделие с 'дисковидна' форма; 5 – микрофотография на излъскване от сърп (x 100), виж стрелката на рисунката долу; 6 – кремъчни артефакти (оръдия). Изготвил – М. Гюрова

discovered and documented, as well as 6 archaeological sites (Гюрова и др. 2012a, 2012b, 2012c).

Of the Balkan flint outcrops identified, the most promising are:

- Zhernov, south of Nikopol on the River Osam (fig. 12), where abundant flint nodules occur in a secondary position together with artefacts. Evidently the site of a large workshop, the dating is uncertain but undoubtedly it represents extraction and processing of secondary flint deposits (derived from the Mezdra Formation) at some stage of the Holocene.
- Ali Koch Baba in the south of Nikopol has primary deposits of Balkan flint nodules. These occur in chalky limestone, also belonging to the Upper Cretaceous Mezdra Formation (fig. 13). Artefacts were also found adjacent to the outcrop; they lack diagnostic cultural characteristics, although the site was published by Biagi and Starnini as a source and workshop(s) of Balkan flint with evidence of Neolithic

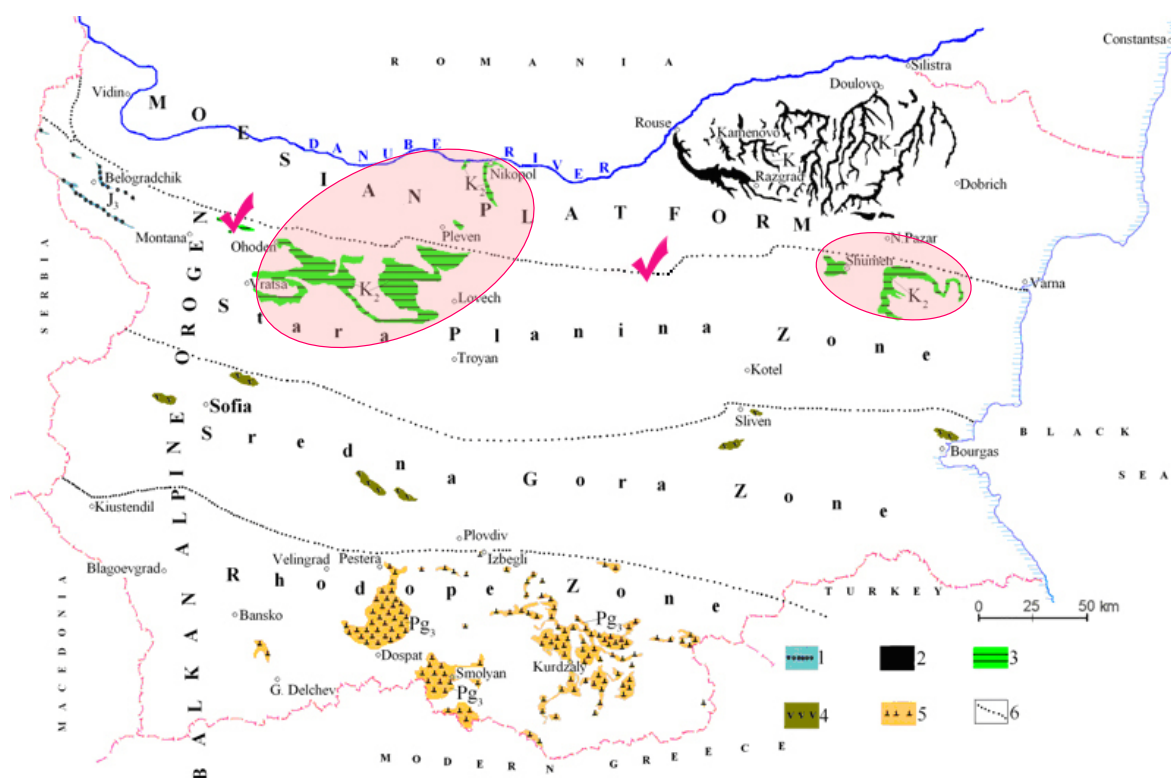


Fig. 11. Geological map of main flint-bearing rock formations in Bulgaria. Selected from the legend: 2 – Low Cretaceous (Aptian age) limestones with siliceous concretions (K1a) – Ludogorie flint (Dobrudzha flint); 3 – Upper Cretaceous chalk and chalky limestones (Campanian and Maastrichtian age) with siliceous concretions (K2cp-m) – Moesian flint. The sites of Ohoden and Dzhulynitsa are also marked (adapted from Gurova, Nachev 2008, fig. 5)

Обр. 11. Геологическа карта на основните флинт-съдържащи свити в България. Подбрано от легендата: 2 – долнокредни (аптски) варовици с флинткови конкреции (K1a) – Лудогорски флинт (Добруджански флинт); 3 – горнокредни варовици (пиещца креда) (кампански и маастрихтски) с флинткови конкреции (K2cp-m) – Мизийски флинт. Селищата Оходен и Джулюница са отбелязани (адаптирана по Gurova, Nachev 2008, fig. 5)

exploitation (Biagi, Starnini 2010a, 2010b, 2011; see also Gurova 2012a, 37–8).

- To the west and southwest of Nikopol along the road (II-34) to Pleven and upstream to the Danube there are many geological exposures with flint concretions similar to Ali Koch Baba. Some of them were recorded during the field survey, as were numerous secondary placer deposits of flint nodules on the Danube bank near Nikopol (Gurova 2012a, fig.13).

All the flint outcrops described above belong to the western part of the Moesian Platform and have produced material that could be described as Balkan flint.

In 2012 the survey work was extended into northeast Bulgaria, in order to locate and sample outcrops of Ludogorie flint (Гюрова и др. 2013a, 2013b), some of which (Kriva reka flint) shows a close visual resemblance to Balkan flint, and this type of flint was previously suggested by M. Gurova (2008) as a potential source of the Balkan flint found in Early Neolithic sites.

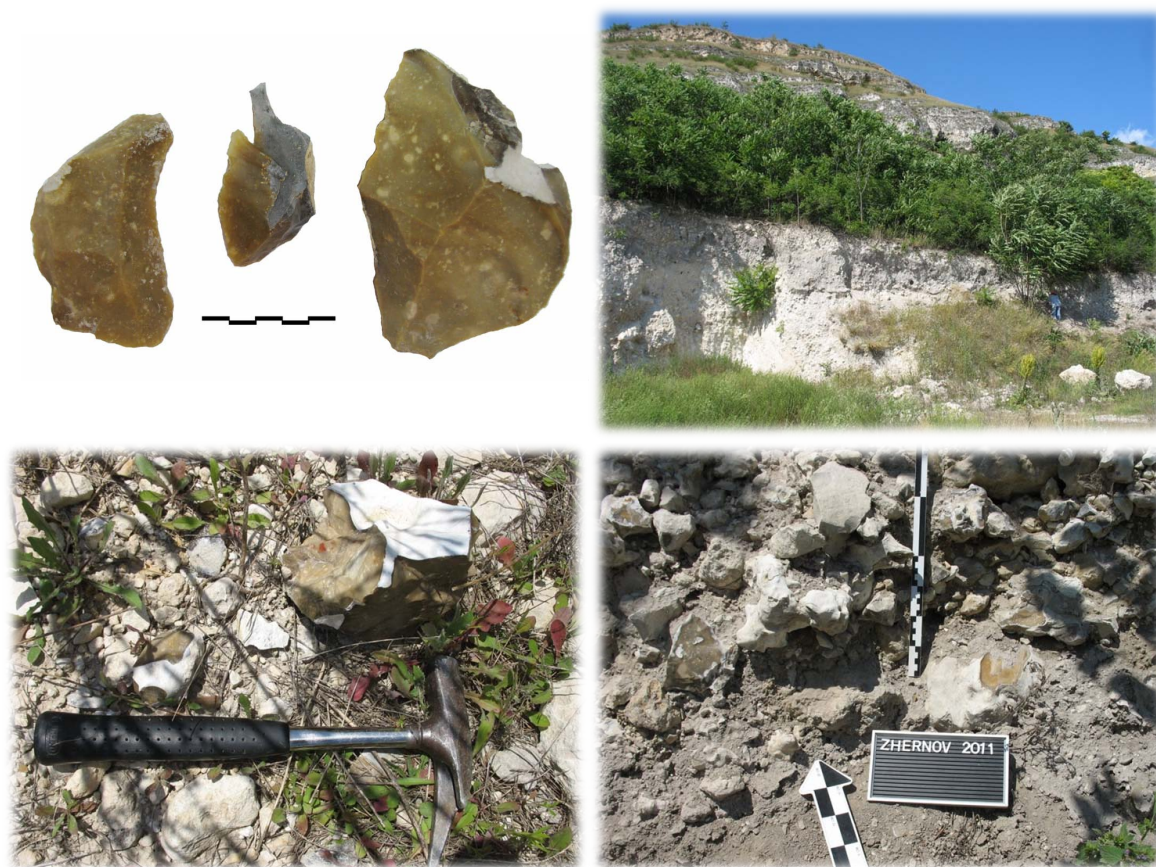


Fig. 12. BF outcrops near Zhernov (south of Nikopol), flint nodules in a secondary position and artefacts.

Photos by M. Gurova

Обр. 12. Находище на 'Балкански флинт' до с. Жернов (южно от Никопол), вторични (преотложени) флинтнови конкреции и артефакти. Снимки М. Гюрова

In all, 55 sites (archaeological and geological) were visited and recorded during two years of surveys; many raw material samples were collected for analysis as well as some new comparative archaeological samples from Chalcolithic sites in Bulgaria. Representative samples of flint – more than 80 for LA-ICP-MS and 66 for micro-petrography – were analyzed².

Until now it has not been possible to establish unequivocally the provenance of the Balkan flint artefacts among the known raw material outcrops. Macroscopically, most of the Balkan flint found on Early Neolithic sites shows a close similarity to raw materials in the Nikopol-Pleven region. The analyses undertaken for the above-mentioned project have convincingly demonstrated: (i) most archaeological Balkan flint samples originate from primary and secondary deposits of the Upper Cretaceous Mezdra Formation in the vicinity of Nikopol; (ii) the geochemistry and groundmass characteristics of the archaeological Balkan flint differ significantly from the Ludogorie flints of northeast Bulgaria – both the Ravno and Kriva reka types (Andreeva et al. 2014).

There is a small outcrop of Upper Cretaceous rocks with Moesian flint in the Shumen district (southwest of Novi Pazar), but no analyses have yet been undertaken that would

² The results of the 2011 survey and analyses are in preparation for publication by the team members. The results from the research in northeast Bulgaria are already published (Andreeva et al. 2014)



*Fig. 13. BF outcrops in Nikopol (Ali Koch Baba), flint nodules in a primary context in chalky limestone.
Photos by M. Gurova*

Обр. 13. Находище на 'Балкански флинт' в Никопол (Али Коч Баба), флинтнови конкреции в първична позиция. Снимки М. Гюрова

facilitate comparison with the results from the ARCS-Cardiff project. It should be borne in mind, however, that Shumen was suggested as a possible source of the 'yellow spotted silex' (Balkan flint) found on some Early Neolithic sites in northern Serbia (Voytek 1987).

A Balkan flint distribution scenario³

Having identified a reliable source of Balkan flint, the unavoidable question is to reconstruct the Early Neolithic Balkan flint procurement strategy and network distribution, at least for Bulgaria. A major obstacle to this is the lack of secure workshops for Balkan flint, in the outcrop areas as well as household workshops in settlement contexts (with the exception of Slatina, where unfortunately the workshop area was destroyed by fire – cf. Гацов 1992; Gurova 2012b).

However some theoretical observations can be made starting with the fact that in south Bulgaria there are no Balkan flint outcrops, but ALL early Neolithic sites of the Karanovo I culture (even Sedlare in the Rhodopes, which has a very particular local raw material industry) possess Balkan flint formal toolkits among their assemblages. In contrast, the sites of Ohoden and Dzhulyunitsa in north Bulgaria had much easier access to the Balkan flint

³ The views expressed in this section should be attributed to the first author (MG)

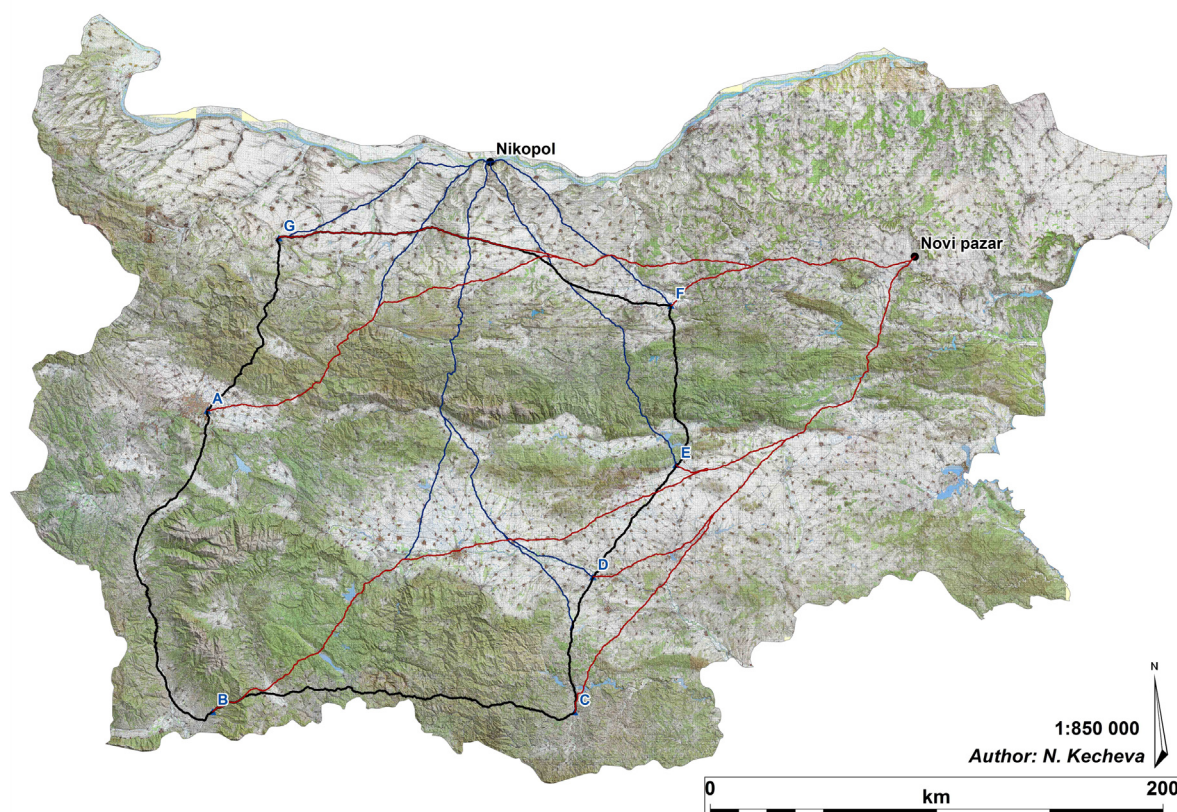


Fig. 14. GIS modelling of circulation of BF from Nikopol (documented sources) and Novi Pazar (with Moesian flint in the vicinity – possibly BF?) to the early Neolithic sites with BF and between the sites themselves. Figure by N. Kecheva

Обр. 14. GIS модел на движение на 'Балкански флинт' от Никопол (документирани находища) и Нови Пазар (с близки находища на Мизийски флинт – 'Балкански флинт' ?) към неолитните селища с 'Балкански флинт' и между отделните селища.

Изготвил – Н. Кечева

deposits but there are virtually no formal toolkits made of Balkan flint, the assemblages consisting mainly of debitage items and rare tools (as shown for Ohoden by Zlateva-Uzunova 2009).

According to the re-considered concepts of Neolithic diffusion the earliest and the subsequent evolved stage of the Balkan Neolithic may be related to the second 'wave' of the continuous spread of the new lifeway accompanied by a variable set of Neolithic packages. Chronologically this massive movement from northwest Anatolia is dated to ca 6400 BC (Özdoğan 2011a, 26) but in fact its unavoidable impact by the 8.2 ka climatic event and the available ^{14}C dataset suggest a later chronological range for the establishment of Early Neolithic settlements in the Balkans ca 6200–6000 cal BC (see Bonsall 2007; Nikolova 2007). This pre-Karanovo I substratum could be envisaged as reaching central-north Bulgaria from northwest Anatolia (Marmara region) along the Black Sea coastline (Özdoğan 2006, 27; 2011b, S426–7).

What is undeniable is the fact that as a consequence of this massive migration Early Neolithic settlements were founded in the Balkans among which the most relevant to our enquiry are Koprivets and Dzhulyunitsa, both interpreted as possessing 'monochrome pot-

tery' assemblages with strong affiliations with northwest Anatolia (Еленски 2008; Тодорова, Байсов 1993; last in Özdoğan 2011a, 2011b, 2013). The site of Koprivets reveals an archaic and amorphous flake-oriented industry with a sparse tool repertoire⁴ based on the local, low quality, silicified Aptian limestones from the Kovachevo geological formation (Russe district) (Гюрова и др. 2013a). It is worth noting that further fieldwork on the site (Байсов, Попов 2014) has revealed an abandoned flint assemblage (debitage) indicating a workshop of local flint with sporadic Balkan flint artefacts.⁵ The site of Dzhulyunitsa located close to Koprivets differs from the latter in its use of Balkan flint and evolved blade manufacture (vide supra and fig. 7). One explanation could be that Anatolian migrants, following their route along the Black Sea coast and then penetrating inland reached first the vicinity of the Rusenski Lom river (suitable for settling) and established their settlement at Koprivets using the raw material source in the immediate vicinity. Later on (and additionally subjected to the effect of the 8.2 ka event?) this population or branches of the first settlers began a movement to other uninhabited territories offering better environmental conditions, including raw material sources. During the continuous movement knowledge of a high quality raw material and the easiest methods of its supply have been accumulated and prepared to be involved into the practice at the more permanent habitat. In this respect many goods (including high quality flints) could be adopted into the household and initial exchange/trade networks.

Dzhulyunitsa site is more or less equidistant from both the Nikopol and Shumen outcrops (between 60 and 90 km) and this type of site seems to be a potential centre for Balkan flint blank (mainly blade) manufacture and distribution among the settlements in Bulgaria at a pre-Karanovo I phase of the Neolithic (fig. 15). This is a working hypothesis previously presented in some articles of M. Gurova (Гюрова 2009; Gurova 2012a, 2012b). The hypothesis is based on the assumption that the settlement of Dzhulyunitsa (and other as yet undiscovered sites in the vicinity of the Balkan flint outcrops) was not based on a typical subsistence agricultural economy (reflected in the lack of sickle inserts), but rather craft specializations such as flint knapping. Once the settlers from Dzhulyunitsa knew the advantages of these flints for domestic/household needs, they could take advantage of this acquisition by incorporating its products in the network of intra- and inter-regional exchange of goods, exotica and social messages. In the context of raw material procurement strategy and network exchange, it is worth recalling that: i) during the Neolithic the prevalence of exogenous material became common; ii) distances between 400–500 km for high quality raw material acquisition also became common (Binder, Perlès 1990, 260). The following statement by Catherine Perlès is worth noting:

Les paramètres d'analyse peuvent être regroupés autour de quatre thèmes, 1: la *distribution des sources* et les savoir-faire nécessaire à leur exploitation, l'*organisation de la production*, notamment en termes de savoir-faire, d'investissement technique, de degré de spécialisation, d'investissement stylistique, etc., les *paramètres de consommation* des produits – origine et quantité sur un site donné, répartition au sein du site, usage –, et, enfin, les *paramètres de distribution* des produits– connaissances et savoirfaire nécessaires à la distribution de produits, quantité en circulations, distances maximales de circulation, décroissance des quantités quand on s'éloigne des sources, etc. (Perlès 2012, 541).

4 Personal observation of the first author (MG) during the study of the material by R. Zlateva

5 This material is still unpublished but its study is obviously interesting in the context of pre-Karanovo flint industries

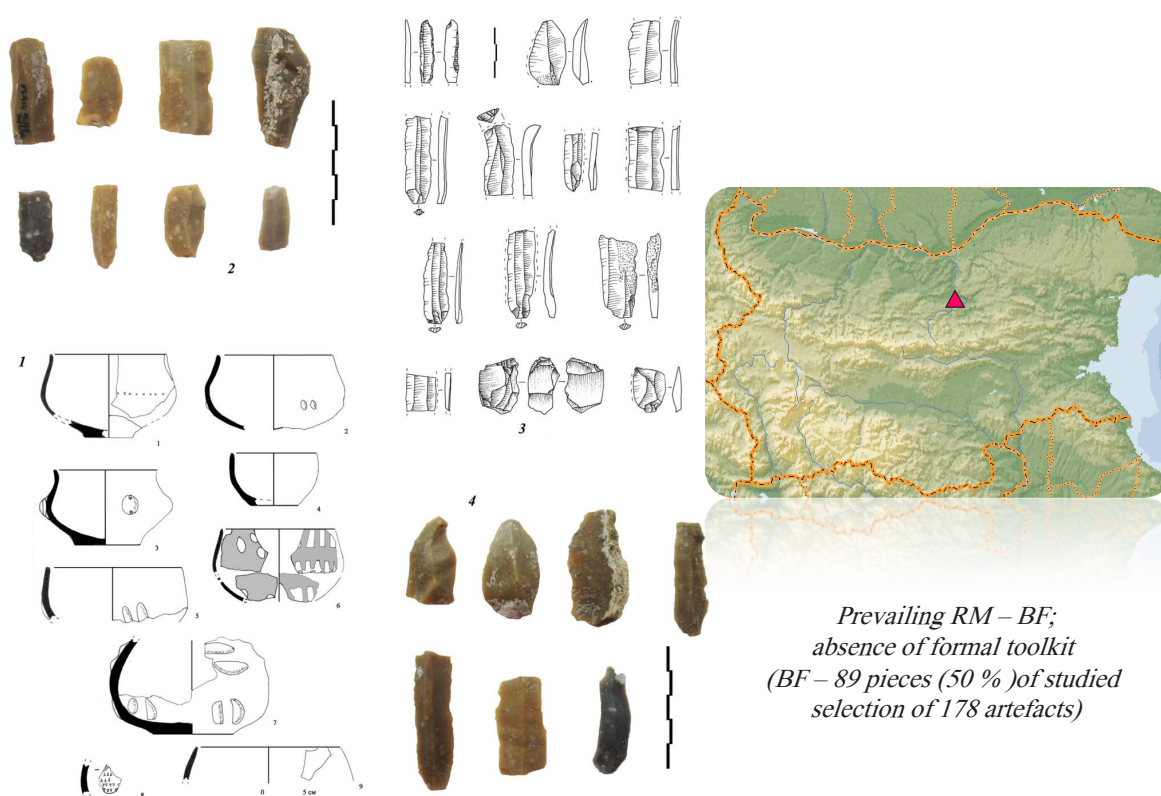


Fig. 15. Dzhulyunitsa: location and information about BF artefacts; 1 – pottery forms and decoration (after Еленски 2006, fig. 7); 2 and 4 – flint artefacts (visual aspect); 3 – flint artefacts (morpho-typological aspect).

Figure by M. Gurova

Обр. 15. Джулюница: : местоположение и информация относно артефактите от 'Балкански флинт'; 1 – керамични форми и декорация (по Еленски 2006, фиг. 7); 2 и 4 – кремъчни артефакти (визуални белези); 3 – кремъчни артефакти (морфо-типологически аспект). Изготвил – М. Гюрова

Being probably not particularly interested in formal toolkit utilization, the flint knappers and tradesmen from Dzhulyunitsa may have decided at a later stage to dedicate their efforts to the acquisition and circulation of the raw material, becoming autonomous from the immediate consumers of the flint tool production. The real producers of the formal tools could be the enclaves of the (pre-?) Karanovo I culture in Thrace with whom the Central-north Bulgarian population established contact at the time of, or rather before, white-painted pottery was locally 'invented' and largely distributed... "as a result of the need for consolidation and self-identification of the newly formed community whose immigrants probably had come from various sites in the original Anatolian area" (Nikolov 2007, 187). An explanatory model of distant communication-and-exchange networks in the Neolithic Balkans was assumed by Tsonev to include from the early stage of the Neolithic, the distribution of high quality flint raw materials of northeast Bulgarian origin (Цонев 2008).

Geographically, it is easy to envisage the distribution of flints from the Nikopol region along the Danube into Serbia and Romania, as suggested by Nachev (Начев 2009). As for tracing the itinerary through the Balkan Mountain chain to reach south Bulgaria where

the archaeological sites possessing Balkan flint toolkits are located, a challenging attempt was to test the application of GIS modeling and as can be seen in fig. 14 this is an intriguing alternative deserving further investigation.

On the other hand, pre-Neolithic exploitation of the Balkan flint sources along the Ossam and Danube rivers (near Nikopol) could be anticipated (in spite the absence of discovered Mesolithic enclaves in the Lower Danube valley downstream of the Iron Gates (see above; also Gurova, Bonsall 2014). Along-river communities based on fishing and Balkan flint procurement may have existed at the end of VII millennium BC, in which case unavoidable interaction would have occurred between these Balkan flint workers and the new settlers from the neighbouring regions who needed raw material for their toolkits. When, where and how precisely Balkan flint started to be distributed and worked for different purposes: intact nodules, cores, blanks and formal tools is still an enigma, but it is certain that the manufacture of Balkan flint (the whole *chaîne opératoire*) was performed beyond the known settlements. In the context of inter- and supra-regional changes, movement and trade of goods and exotica, Balkan flint could have played a varying role in household and subsistence activities: from substantial (among industries of Tells Karanovo and Azmak) through important (among all other early Neolithic sites in Bulgaria) to marginal (among sites with very scarce presence of Balkan flint – as, e.g., Sedlare). On the other hand in the sphere of exotica and social symbols (see Chapman 2007) even a small quantity of Balkan flint artefacts would certainly have been appreciated as a valuable acquisition.

From what has been said above, it follows that it is crucial to include documentation and consideration of Balkan flint in research into the prehistory of Bulgaria and adjacent regions. The emergence and diffusion of the earliest Neolithic enclave should not be envisaged beyond the trajectory of Balkan flint and its implication in the gradual Neolithization of the Balkans.

Discussion: Balkan flint and the Neolithization of Southeast Europe?

Balkan flint has come to be regarded as a key marker of the spread of the Neolithic across Southeast Europe, with some authors (e.g. Biagi, Starnini 2013) suggesting that the archaeological distribution reflects the main Neolithization routes. The reality is more complex, as a consideration of the dating evidence reveals.

The earliest securely dated occurrence of Balkan flint in an Early Neolithic context is at Dzhulyunitsa in northern Bulgaria, where artefacts of Balkan flint occur from the beginning of the occupation sequence *ca* 6050 cal BC (fig. 15). A potentially earlier occurrence of Balkan flint is at the 'Proto-Starčevo' site of Blagotin in the valley of the West Morava in Serbia, where a Neolithic settlement seems to have been established before 6100 cal BC (Whittle et al. 2002). A small number of Balkan flint artefacts were recovered in excavations at Blagotin, but their position within the occupation sequence was not reported (Šarić 2003). Blagotin and Dzhulyunitsa are both situated within the Danube catchment, where Early Neolithic use of Balkan flint was widespread by *ca* 6000 cal BC, based on evidence from sites in southern Romania (Dinan, Nica 1995; Biagi et al. 2005), the Iron Gates (Borić 1999, 2007; Bonsall 2008) and the Carpathian Basin (Biagi, Starnini 2013, fig. 1 & 3).

To the south of the Balkan Mountain range in Macedonia, southern Bulgaria, Turkish Thrace and on the island of Gökçeada in the northeast Aegean, the appearance of Balkan flint in Neolithic contexts appears to have been somewhat later than in the Danube catchment, after 6000 cal BC (table 1).

Site	Phase	Approximate age range (cal BC)
Karanovo (BG)	I.1	5850–5675
Azmak (BG)	I-1	5900–5700
Slatina (BG)		5780–5680
Kovačevo (BG)	Ic–d	<5900
Hoca Çeşme (TR)	II	5890–5700
Aşağı Pinar (TR)	layers 6–7	5750–5600
Uğurlu (Gökçeada, TR)	IV	ca 5880

Table 1. Earliest occurrence of Balkan flint artefacts in Neolithic sites south of the Balkan mountain range. The age ranges shown are based on Bayesian modeling of available ^{14}C dates, allowing for a possible ‘old wood effect’ in bulk charcoal dates (e.g. Bln-4339, Bln-4336 from Karanovo I.1; Bln-293, Bln-291 from Azmak I-1). Data from: Görsdorf, Boyadziev 1996; Evin 2002; Görsdorf 2005; Reingrüber, Thissen 2005; Higham et al. 2011; Erdogü 2011)

Табл. 1. Най-ранна поява на артефакти от ‘балкански флинт’ в неолитни селища южно от Стара планина. Посоченият хронологически обхват се основава на Бейзиевия (Bayesian) модел на съществуващите ^{14}C дати, което позволява да се отчете възможността за ‘ефект на стара дървесина’ при датите от комбиниран въглен (напр. Bln-4339, Bln-4336 от Караново I.1; Bln-293, Bln-291 от Азмак I-1). Данните са взети от: Görsdorf, Boyadziev 1996; Evin 2002; Görsdorf 2005; Reingrüber, Thissen 2005; Higham et al. 2011; Erdogü 2011)

Neolithic sites in the southern part of the Balkan Peninsula that are older than 6000 cal BC do not contain Balkan flint. At Kovačevo in southwest Bulgaria, Balkan flint is absent from the earliest phase (Ia) of the Neolithic dated to ca 6050 cal BC (Gurova 2008). Similarly, in mainland Greece Balkan flint is not present on Early Neolithic sites, where other high quality lithic materials (e.g. ‘silex blond’ and Melian obsidian) were used for the production of regular blades (Perlès 2001; Pelegrin 2006). Even in later, Greek sites Balkan flint is not certainly present; the ‘honey flint’ found at sites in northern Greece dating to the 5th millennium BC (Kourtesi-Philippakis 2009) is most likely Lower Cretaceous Lugorie flint from northeastern Bulgaria, which achieved a wide distribution during the Chalcolithic.

If the development of the Balkan flint distribution network did indeed “follow the main routes of Neolithization” (Biagi, Starnini 2013) then this raises the possibility that one of the routes of Neolithization of Bulgaria was from the north, which would be consistent with Özdoğan’s suggestion of an early northward expansion of farming along the (now submerged) Black Sea coastal plain and then along the Danube (Özdoğan 2006, 2011b).

The Balkan flint distribution system was one of two major lithic exchange networks operating in Southeast Europe during the Early Neolithic, which were symptomatic of interaction spheres that probably played a crucial role in the Neolithization of their respective regions (fig. 16). To the south of the Balkan flint province, obsidian from outcrops on the island of Melos was traded throughout the Aegean and neighbouring coastal areas of mainland Greece and western Anatolia. Perlès (1990, 2004, Perlès et al. 2011) and Reingrüber (2011) have highlighted some of the key features of the Melian obsidian network: (i) the system was already in place well before the Neolithic, although it seems to undergo significant expansion during the Early Neolithic; (ii) obsidian from Melos was transported over distances of up to 300 km, and necessarily involved water transport; and (iii) the obsidian trade probably involved specialist knappers who acquired the material from its sources on Melos and distributed it mainly in the form of blades and bladelets.

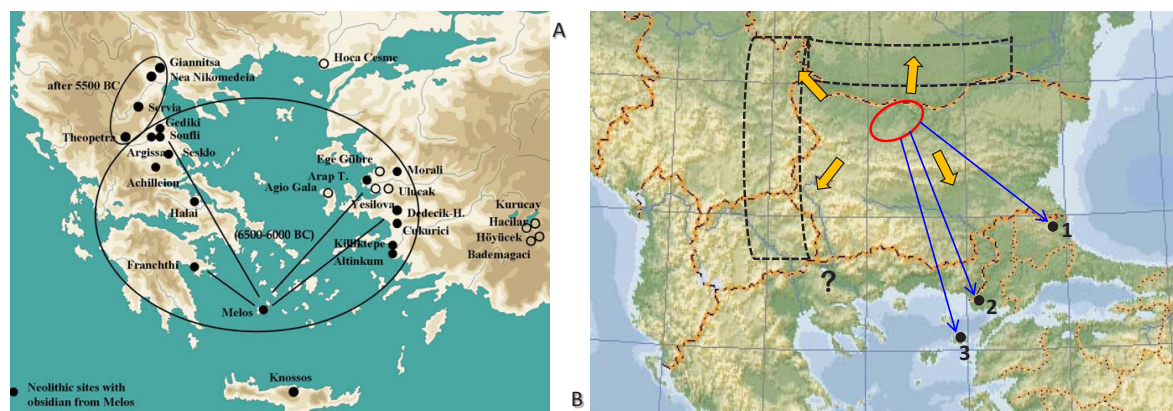


Fig. 16. Map of raw material distribution in the Neolithic: A – Melian obsidian in the Aegean (after Reingruber 2013, fig. 15); B – source area and directions of the BF distribution; 1 – Aşağı Pinar, 2 – Hoca Çeşme, 3 – Uğurlu (by M. Gurova)

Обр. 16. Карта на разпространението на суровини през неолита: А – мелоски обсидиан в Егейския басейн (по Reingruber 2013, fig. 15); В – установени находища на 'Балкански флинт' и направления на неговото разпространение; 1 – Aşağı Pinar, 2 – Hoca Çeşme, 3 – Uğurlu (М. Гурова)

Did the Balkan flint network share these same characteristics? Material was certainly moved over very large distances, comparable to (or even greater than) those of the Melian obsidian network; the straight-line distance from Nikopol to the Aegean island of Gökçeada, for example, is *ca* 400 km. Were itinerant flint knappers involved in the production and distribution of Balkan flint artefacts, or was the movement of raw material and artefacts part and parcel of normal social relationships between households and communities?

Water transport likely played a lesser role in the Balkan flint network, nevertheless larger rivers (especially within the Danube catchment) and the Black Sea coast may have been important distribution routes (Начев 2009; Gurova, Bonsall 2014). Equally important for our understanding of Neolithization, did the first farmers in the Lower Danube catchment discover the north Bulgarian outcrops for themselves, or was there an existing Balkan flint exchange network operating among Late Mesolithic fishing communities along the Bulgarian section of the Lower Danube and the Black Sea coast (Gurova, Bonsall 2014)? As the authors have observed (Gurova, Bonsall 2014), the answer to this and other questions of the Mesolithic-Neolithic transition in Southeast Europe must await systematic archaeological surveys of the Lower Danube Valley and the submerged Black Sea coastal plain.

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Проучването на кремъчни ансамбли – алтернативен подход към неолитизацията

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(резюме)

Неолитизацията на Югоизточна Европа, и по-специално на Балканите, е проблем с непреходна актуалност и повод за оживени научни дискусии. Територията на България е от ключово значение за проследяване движението на неолитните явления и процеси от Анатолия към Европа. Българската книжнина по праистория предлага редица хипотези, аргументи и теории за неолитизацията на нашите земи. В основната си част, проучванията се базират на детайлен анализ на керамичните комплекси от ранния неолит; някои въвеждат хронологически контекст в проследяване миграцията на алохтонното неолитно население; трети разглеждат процеса многопластово и в широк пространствено-времеви аспект.

Тази статия третира проблема за кремъчните ансамбли от пред-неолитния и раннонеолитния период, с амбицията да впише техните специфични характеристики в неолитизационния дебат. Предложен е критичен прочит на съществуващите в специализираната литература интерпретации на кремъчните ансамбли от началото на холоцена. Аргументирано е обособяването на диагностични кремъчни ансамбли, съпътстващи разпространението на културата Караново I и е отредено заслужено внимание на интердисциплинарния анализ на висококачествения кремък, от който са изготвени диагностичните раннонеолитни оръдия, наричани симплистично ‘карановски пластини’. Този кремък/флинт, добил популярност като ‘балкански флинт’, е регистриран в широк надрегионален мащаб (от Унгария до остров Имброс), което предполага добре изградена и функционираща от самото начало на културата Караново I система за добив, преработка и разпространение на тази суровина и производните ѝ изделия. Балканският флинт е разгледан в контекста на система за обмен и търговия, алтернативна на Егейската мрежа за разпространение на обсидиан от остров Мелос.

Като интегрална част от процеса на поетапна неолитизация на Балканите, 'балканският флинт' е осмислен в широк спектър от нерешени, но провокиращи въпроси като: i) времето (пред- или неолитно?) и причината за добиването и масовата му употреба в началото на VI хил. ВС; ii) моделите на доставка от доказаните местонаходища в Никополско до селищата, в които е регистриран (разположени основно в южна България); iii) освен утилитарния аспект – на какво се дължи особения/специален статут на 'балканския флинт' в рамките на обширната раннеолитна ойкумена?; iv) как и дали задълбочените ни познания за тази престижна суровина ще променят съществуващите парадигми в неолитизационния дебат?

Път за решаването на тези, и други съществени въпроси, авторите виждат в системни археологически проучвания по течението на Дунав и на потъналия черноморски шелф, криещи загадката на пред-неолитните (мезолитни) енклави на нашите земи. Тяхното откриване ще хвърли светлина върху прехода от присвояваща към уседнало-произвеждаща обществена организация.