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AUTHOR'S SUMMARY

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by

Associate Professor Dr Maria Ranguelova Gurova

BALKAN FLINT AND NEOLITHIC CHIPPED-STONE ASSEMBLAGES FROM BULGARIA: A MULTIFACETED DIACHRONIC OVERVIEW

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The dissertation consists of 186 computer pages (313 pages BG standard) of text, including 22 pages of bibliography (a total of 323 titles). It contains 151 figures and 40 tables.

The thesis was discussed and approved for defence by the extended board of the Prehistory Department of the National Archaeological Institute with Museum of the Bulgarian Academy of Sciences, held on 11 November 2025.

I would like to express my gratitude to my colleagues in the Prehistory and Thracian archaeology Departments for the valuable discussions we had during the review of my work. I would also like to thank Dr Elitsa Stefanova and Dr Polina Andreeva from the Geological Institute at BAS for our long-standing and productive collaboration, as well as Professor Clive Bonsall for proofreading the first draft of the thesis and the reviewers for their competent and constructive feedback.

PREFACE

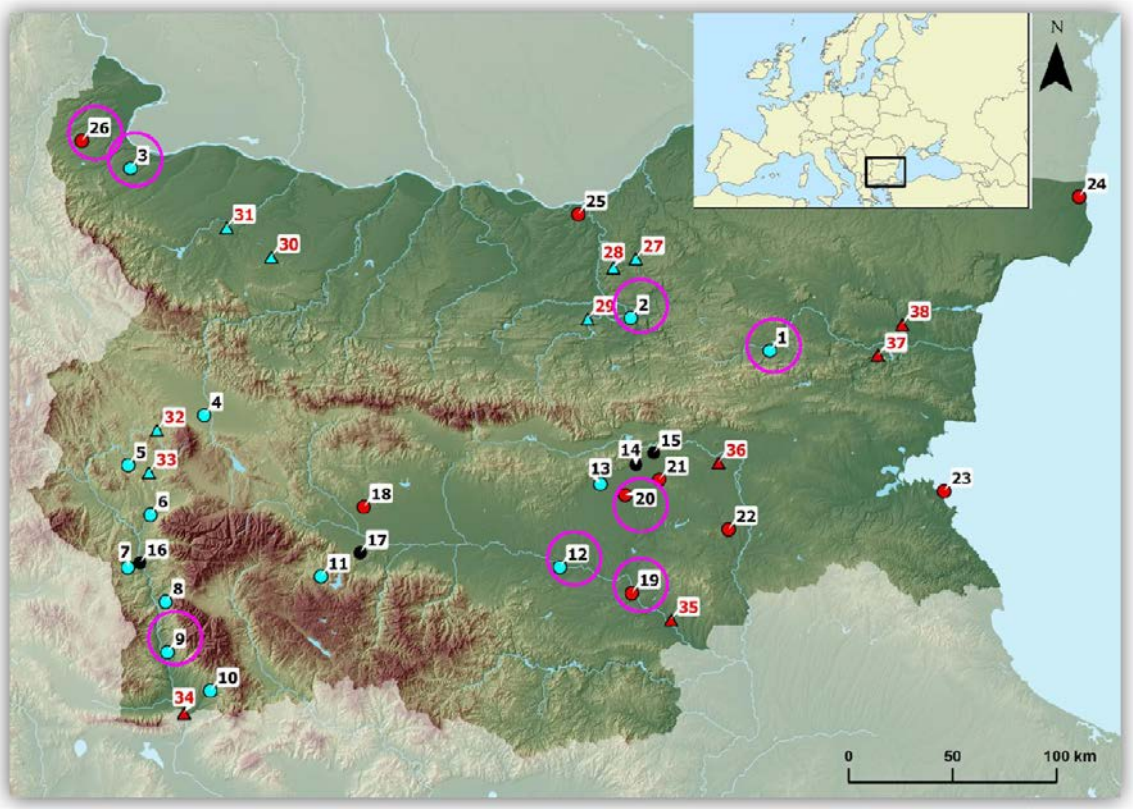
The Bulgarian prehistoric 'archaeological archive' contains a vast amount of information on various aspects of the Neolithic lifestyle. Recent extensive and intensive rescue investigations of many sites offer more and more evidence of known and new aspects of our ancestry during the 6th millennium cal BC. Our role as scholars is to assimilate the new gnoseological challenges based on a solid empirical and theoretical corpus of knowledge, accepting, rejecting, or revising them reasonably and intelligently, if possible.

My objective in compiling analytical results from almost three decades of research, focusing on Holocene chipped-stone assemblages, stems from an appreciation that there is sufficient new knowledge that deserves to be shared. For many decades, in the Bulgarian specialized literature, flint assemblages have been treated as less informative than pottery styles and as less significant compared to other 'social proxies' in the mainstream literature on Neolithization.

During my research, I had the opportunity to study more than forty Neolithic assemblages from settlements identified through field prospections, regular and rescue excavations. Most of the assemblages are considered in the text below, and they are presented in the map below. Apart from those assemblages studied by me, there are some that are mentioned in my comments and in a comparative perspective with the sites presented in more detail. A general overview of the Neolithic chipped-stone assemblages from Bulgaria is presented in Part I of this work, where the assemblages are assessed and interpreted in a conceptual and contextual perspective. In Part II, eight sites are presented as case studies in greater detail, following a conventional structure. The arguments for the selection of these sites are presented in the introduction to Part II. The final Part III of the dissertation provides a diachronic overview of the assemblages, focusing on key questions in their multifaceted interpretation. It also includes a discussion, conclusions and perspectives for future research.

The research methods are sufficiently clear and well presented in my previous publications (including collaborative works). They will be briefly mentioned in the relevant parts of the text. My understanding of the necessary quality of a recent scientific publication on lithics/flints–encompasses several key requirements: high-quality coloured images, high-quality artefact-drawings, multidisciplinary analyses and results, interpretations consistent with the archaeological evidence, and a sufficiently comprehensive reference corpus. This manuscript is far from optimal, but at least it represents a challenging attempt to produce scientifically sound research.

This abstract contains important references, which correspond to the reference list in the dissertation.



Map of Bulgaria with locations of the Neolithic sites mentioned in the text: 1. Varbitsa; 2. Dzhulyunitsa; 3. Yarlovitsa; 4. Slatina-Sofia; 5. Negovantsi; 6. Dzherman; 7. Drenkovo; 8. Brezhani; 9. Ilindentsi; 10. Kovachevo; 11. Rakitovo; 12. Yabalkovo; 13. Azmak; 14. Karanovo; 15. Musovitsa; 16. Balgarchevo; 17. Kapitan Dimitrievo; 18. Apriltsi; 19. Harmanli; 20. Sarnevo; 21. Ezero (Dryanova mog.) 22. Drama–Gerena; 23. Sozopol; 24. Durankulak; 25. Tash Bair; 26. Brankovtsi; 27. Koprivets; 28. Orlovets; 29. Plochite-Samovodene; 30. Ohoden; 31. Gradeshnitsa; 32. Pernik; 33. Galabnik; 34. Topolnitsa; 35. Lyubimets–Dana bunar 2; 36. Hadzhidimitrovo; 37. Ussoe; 38. Provadia-Solnitsata. ***Legend****: cyan circle – Early Neolithic site; black circle – Early & Late Neolithic site; red circle – Late Neolithic site; circles – site assemblages studied by the author; triangles – site assemblages used by publications. The sites presented as Case studies are marked by pink circles.*

PART I – GENERAL OVERVIEW

1. CHRONO-CULTURAL FRAMEWORK OF THE NEOLITHIC AND PROXIES FOR 'REGIONAL' NEOLITHIZATION

Absolute chronology as determined by radiocarbon dating (preferably in convincing series) is crucial for placing prehistoric events and processes in a reliable temporal framework as well as for reconstructing their development, dynamics and evolution *versus* retardations. The chronological framework of the Neolithic in Bulgaria, as presented in published data, is outlined below, based on various sources. Despite the apparent discrepancies between date ranges in different publications, I believe the chrono-cultural framework presented is necessary as a general temporal frame for all cultural processes and events discussed in my study, as dating and references to the chronology are mentioned.

The first is the conventional chronology, published long ago. Although it has not been updated, there is still no alternative general chronological scheme. It should be stressed that I did not make any calibration updates or additional Bayesian interpretative

modelling. All dates are taken from the published works of the cited authors and do not always contain a radiocarbon BP age range. They are provided here to facilitate the temporal contextualisation of the main events:

NEOLITHIC: Phase	**Date ranges (cal BC)**
Early Pottery	6300/6200–6000/5900
Early	6000/5900–5500/5450 (classical)
Middle	5500/5450–5200/5150
Late	5200/5150–4900/4850 (Boyadziev 1995)

The traditional chrono-cultural division of the Neolithic period is based on the sequence at Tell Karanovo, and ^{14}C dates for part of the sequence suggest the following chart.

- Karanovo I – 6000–5750 cal BC;
- Karanovo II – 5750–5500 cal BC;
- Karanovo III – 5500–5280 cal BC (Görsdorf 1997).
- Karanovo IV – 5220–5060/4910–4780 cal BC (Thissen, Reingruber 2017).

Until now, there are four dated sites with an earlier beginning of the Neolithic sequence than those at Tell Karanovo – Kovachevo, Galabnik and Azmak in south Bulgaria and Dzhulyunitsa – in north Bulgaria.

NEOLITHIC DIFFUSION: SELECTED MODELS AND TIMESPAN

My concern with the problem of Neolithization is not to delve into the details of the viral Neolithization debate, but to find a satisfactory explanatory model for the Neolithic expansion into the Balkans, and particularly Bulgaria, which does not contradict the radiocarbon dates and the established corpus of analyses and interpretations of the relevant sites, and which harmonizes with the issues raised by the chipped stone assemblages, and especially with the questions raised by the Balkan flint investigations.

Such a model is represented by R. Krauss (and team) as a rapid spread of early farming from the Aegean into the Balkans via the Sub-Mediterranean-Aegean (SMA) vegetation zone following the climatic fluctuations during the 8.2 ka event (Krauss 2023; Krauss et al. 2017). Surprisingly, although Thrace is the nearest part of the Balkans to Anatolia, it does not contain any sites of the earliest phase of the Neolithic beyond the narrow zone of northern Marmara. The easily anticipated route out of NW Anatolia is conceived of as compromised because of the late establishment of a Neolithic population in Thrace. It is noteworthy that this statement, based on objective evidence, is not inconsistent with a northward movement along the Black Sea coast, establishing settlements that are now submerged. The discourse on Neolithization inevitably refers to the issue of the pre-Neolithic and pre-Karanovo periods, which are still ambiguously addressed in the specialized literature. My vision on the further research that would shed light on the problemat is formulated at the end of this section.

2. LITHIC TRAJECTORIES TO NEOLITHIZATION

EARLY NEOLITHIC FLINT ASSEMBLAGES: BACKGROUND AND EMERGENCE

The emergence of the Neolithic flint assemblages in Bulgaria corresponds with the earliest occurrence of other lines of evidence of the Neolithic lifestyle and other elements of the variable and flexible Neolithic “package”. Many previous publications on the earliest chipped stone assemblages highlight their first manifestation within the already developed

Neolithic features and without any captive relation with a presumed/preconditioned pre-Neolithic substratum. Despite the extensive search for Mesolithic sites in Bulgaria carried out by the Group for Palaeolithic Research in the 1970s and 1980s, the practical issue remains negative. However, I. Gatsov addressed the problem of the non-existent Mesolithic in several publications. There is one cluster of sites near the Black Sea coast in the Varna district, namely Pobitite Kamani (Dikilitash) that displays numerous assemblages of surface artefacts from various periods. Despite the temptation to attribute some of these assemblages to a Mesolithic technocomplex, there are no convincing arguments for this interpretation. Furthermore, recent research on Late Neolithic assemblages suggests that small bladelet cores and geometric microliths cannot be securely attributed to pre-Neolithic periods. Ergo, part of the Dikilitash collection can be affiliated with the Late Neolithic industry/technocomplex.

MESOLITHIC: VIRTUALLY PRESENT OR ABSENT … AND NEOLITHIZATION

The problem of the missing Mesolithic in the Bulgarian prehistoric sequence was addressed by the present author and C. Bonsall in a publication that has had a strong echo within the Mesolithic scholarly community (Gurova & Bonsall, 2014b). The leading argument behind this paper lies in the belief that "absence of evidence is not evidence of absence". It was stated that theoretically e.g. "beyond the boundaries of empirically-based hypothesis", fishing villages or hamlets like those in the Iron Gates likely existed along the Bulgarian section of the Lower Danube, as well as in protected embayments, lagoons and river estuaries along the Black Sea (in the concrete case). And if we want to seriously search for the remains of pre-Neolithic (Late Mesolithic) and very early newcomers/farmers, we should explore the submerged Black Sea coastal plain and sloping southern banks of the Danube.

Of the neighbouring regions with Mesolithic remains, the Iron Gates is the most notable and enlightening phenomenon, highlighting the opportunity to use various lines of archaeological evidence (burials, architecture, pottery, lithics, artistic depictions) and to conceive the evolution of the material culture and social organization diachronically (based on sites with Mesolithic and Neolithic sequences) offered possibilities for multidisciplinary analytical research and conceptual interpretive publications. I focus on the early studies of chipped stone assemblages from Lepenski Vir and Vlasac in the Iron Gates, because there are clues for many postulates (some of which are already anachronistic) which have dominated the prehistoric Balkan lithic agenda (Kozłowski, Kozłowski 1982; 1984). A critical issue in the Lepenski Vir research is the presence of high-quality exotic or allochthonous flint from the beginning of the sequence. This flint is referred to as Balkan flint (BF) and shows a drastic increase after the contact of the local foragers with the incoming Early Neolithic communities of Starčevo culture. Within the traditionally rooted Early Neolithic chipped stone industries, BF was subsequently interpreted as a new raw material, with significant implications for the Neolithic *chaîne opératoire*. In this role, BF presents an important potential "filter" for the recognition of interactions between traditional foragers and incomers into the region of the Iron Gates (Bogosavljević-Petrović, Starović 2016).

As for the Bulgarian lands, which by definition were treated as deprived of a Pre-Neolithic substratum, the main and still conventional Neolithization scenarios are mentioned suggesting an inland spread from the northern Aegean following the Struma and Vardar River Valleys with subsequent multidirectional dispersal (Николов 1987; Nikolov 2003; Lichardus-Itten 1993; Todorova, Vajsov 1993; Lichardus-Itten et al. 2002, 2006 etc.). Only a few researchers (e.g., Bailey 2007; Özdoğan 2011b) seem to have considered the possibility

of a maritime spread along the (now submerged) Black Sea coast. In fact a presumed expansion along the Black Sea littoral with subsequent inland penetration via rivers – simultaneous with the Struma and Vardar River Valleys movement starting from the north Aegean – would fit better with the available radiocarbon dataset (cf. Gurova, Bonsall 2014b). The direct route of Neolithic spread from northwestern Anatolia was proposed by J. Roodenberg, who viewed the Marmara region as no longer "a cul de sac, but as a passageway employed by migrating agriculturalists" (Roodenberg 2016). Speculative, but not *a priori* rejectable, is the possibility that, still mysterious and unearthed, there existed a Mesolithic substratum that inherited and continued to operate with the BF network, acquiring (and why not?) distributing nodules and artefacts upstream along the Danube to Lepenski Vir.

This section ends with two recent discoveries related to the topic of the 'missing' Mesolithic and the potential of submerged sea coast exploration. R. Krauss published three radiocarbon dates from a peculiar find of three red deer antlers deposited in a pit at Ohoden. Dates calibration indicates the 67th century BCE (Krauss 2023, 45). Being for the moment a Late Mesolithic feature unrelated to the explored Early Neolithic on the site, as further priority research by the excavators will be to look for the contextual background of the red deer antler structure and eventually – for some evidence of the relation between the Mesolithic structure and the Early Neolithic occupation of the site, the former being more than 1000 years younger than the structure context (Ганецовски 2009).

The second discovery remains unpublished. ^{14}C dates falling in the 59th century cal BC came from the underwater settlement of Ropotamo[1]. The existing publication (Dimitrov et al. 2024) gives information on the intriguing features of the site. Impatiently awaited is the forthcoming publication, which will contain a series of AMS dates and a more secure contextual interpretation. This site, and many others that remain submerged, could (hopefully) offer even more convincing and challenging evidence of very early Neolithic habitations on the now inundated portion of the Black Sea coastal plain.

Last but not least, there is particularly intriguing evidence of hunter-gatherer-related ancestry in the individuals from Malak Preslavets (Mathieson et al. 2018, 199), a site considered as belonging to the Early Neolithic (Панайотов и др. 1992) with only a brief and confusing rather than clear information on the 'heterogeneous' flint collection of the site.

BALKAN FLINT: SCIENTIFIC CHALLENGE AND TRAJECTORY TO NEOLITHIZATION

CONSOLIDATION OF BALKAN FLINT RESEARCH

More than a decade ago, I published the paper, "'*Balkan Flint*' – *fiction and/or trajectory to Neolithization: Evidence from Bulgaria*" (Gurova 2012a). The paper focuses on the current state of research and knowledge about 'Balkan flint' and the trajectories stemming from the BF problem to the broader and increasingly complex issue of the Neolithization of the eastern Balkans. Upon re-reading this work, I cannot help but acknowledge that most of the complex BF enquiry is well presented, serving as a solid starting point for further long-term, serious research, whose analytical and conceptual results were summarized in the recently published paper "Balkan Flint in Perspective: Ten Years of Interdisciplinary Research".

The BF paper (Gurova 2012a) was important because it consolidated thoughts, ideas and trends that fuelled further research on BF. Its enquiry included not only certain

[1] Personal communication by the Director of the excavation Dr Kalin Dimitrov.

identifications of the sources, but also the incorporation of the results into the viable Neolithization debate based on the fact that BF with certainty appeared and played a role in the establishment and operation of the Early Neolithic Balkan *oikumene* and its networks. And now, with many crucial results available, I cannot deny that my anticipation about BF provenance in general and its distribution among the known Early Neolithic sites containing its artefacts was correct. From the start, it was clear that the BF outcrops were located in north Bulgaria, but, on the contrary, the Thracian plain, which is devoid of flint that competes with BF, represents the largest arena of Early Neolithic manifestation of BF formal toolkits and other Early Neolithic material culture paraphernalia. At the end of the paper, the main Neolithization scenarios are summarized and commented upon: i) diffusion of farming from the north Aegean via the Struma River Valley (the scenario with most proponents); ii) via the Vardar and Morava to the Iron Gates and then along the Danube downstream movement to north Bulgaria, before Thracian colonization by the same enclaves, and iii) northward spread from northwestern Anatolia, penetrating the Ludogorie region and turning west up the river, bypassing the interior of Bulgaria (see details in Gurova 2012, 49-41). Apart from the Struma pathway, in both other scenarios in my view (at the time of paper writing, more intuitively than seriously argued), I presumed a special mediating role for the site of Dzhulyunitsa in the acquisition and subsequent distribution of BF to many site consumers – a working hypothesis that remains vital. However, the question I addressed at the end of the paper in 2012 remains challenging and unresolved. Who **were** the new flint knappers, and **from where** did they come, bringing the know-how of quite large Early Neolithic BF blade production? With further research, this question has been explored through several proxies, some of which will, hopefully, be answered in the exposé below.

BALKAN FLINT PROVENANCE STUDIES: AN INNOVATIVE INTERDISCIPLINARY APPROACH

Between 2011 and 2023, five field surveys were carried out, accompanied by consecutive Laboratory analytical procedures. This innovative and promising approach was initiated and carried out with the fruitful collaboration of colleagues from the Geological Institute, BAS (P. Andreeva and E. Stefanova). An external member of the team was Professor Clive Bonsall from the University of Edinburgh. Together, over more than a decade, we practised a pioneering approach leading to notable advances in Bulgarian raw material studies. This approach combined fieldwork sampling, macro- and micropetrography, with geochemical (LA-ICP-MS) analysis of raw material samples and flint artefacts. Based on five systematic field surveys to identify and record raw material outcrops, we selected 64 geological samples for comparison with 166 artefacts from archaeological sites. All stages of our analytical procedure – from fieldwork to the combined analytical results and database creation were meticulously documented. The results of this research have been presented in open-access publications and constitute a coherent corpus of analytical data that can be integrated into future collaborative research projects (Andreeva et al. 2014; Gurova et al. 2016; 2021b; 2022a–b; 2024; 2025). Only two field surveys will be mentioned here:

- Our first survey in central-north Bulgaria was the most productive and resulted in detailed documentation and identification of clusters of BF outcrops in the Pleven–Nikopol region (Гюрова и др. 2012a–c; Gurova et al. 2016). The Upper Cretaceous flint-rich rocks formed large areas of outcrops in north Bulgaria (the Moesian Platform and adjacent parts of the Balkan Alpine Orogen, but only in the Pleven–Nikopol region is Moesian flint (*sensu* Nachev 2009) hosted in non-deformed rocks. The most securely identified outcrops occur in chalky limestones of the Upper Cretaceous Mezdra (siliceous-carbonate) Formation. Secondary eluvial, diluvial and alluvial flint deposits in the area were formed due to

destruction and disintegration of the same limestones, which contained flint concretions. Despite the recognition of at least one outcrop with unmistakable evidence of exploitation during the Holocene (Zhernov outcrop, near the eponymous village), no workshop site with characteristic debitage of BF procurement and artefact production has been identified so far.

- Apart from the Pleven–Nikopol outcrops cluster, another part of what Nachev called Moesian flint remained insufficiently studied in NE Bulgaria – Shumen district, which was listed years ago by B. Voytek as a region to be the likely provenance area of this type of flint. Two new types of flint (Shumen I and II) were distinguished and described. Visually, Shumen I closely resembles BF, but geological and LA-ICP-MS analyses suggest that they have different petrographic and geochemical profiles.

Meantime, thanks to a grant-aided project of the Archaeological Institute in Sofia we enlarged our sample corpus with several additional raw materials to be compared with the BF database and with 77 artefacts from 10 Early Neolithic sites. The analytical procedure involved comparing the new series of artefacts with the BF raw materials recovered from all survey seasons. Our last results are very informative and, in some respects, unforeseen. They demonstrate a relevant way and opportunity to relate and distinguish between artefacts and raw material outcrops as well as between artefacts themselves and their sources, which is a condition for reliable reconstruction of raw material distribution. GIS modelling helps identify possible pathways for flint distribution between sources and sites of consumption, showing that the distances between them range from 23 to 314 km – assuming direct distribution from the outcrops to the sites (Gurova et al. 2022b).

The BF issues mentioned above, extrapolated to the Neolithization discourse – arguments and causality, suggest that none of the conventional scenarios and paradigms of the Neolithization of Bulgaria is workable without taking into consideration the BF outcrops and their accessibility to the first Neolithic settlers. The repetition of the BF formal toolkit over a large territory and its co-occurrence with other distinctive socio-cultural traits in the first half of the 6th millennium cal BC implies the existence of a sophisticated exchange network with a high degree of interaction, elements of which are still invisible, but which requires detailed systematic research. The first hypothetical issue lies in the fact that there is no archaeological record of the pre-Karanovo distribution of BF from north Bulgarian outcrops to the sites of Karanovo I milieu in south Bulgaria. On the other hand, it is possible to envisage some BF exchange between pre-Karanovo communities around the Dzhulyunitsa site and with the eventual pre-Karanovo substratum in Thrace, for which no archaeological evidence is expected.

BALKAN FLINT NETWORK DISTRIBUTION: A COUNTERWEIGHT TO MELIAN OBSIDIAN EXCHANGE?

BF formal tools (mainly retouched blades often with variably fashioned ends and sickle elements) appear in representative series among Early Neolithic assemblages with white-on-red painted decoration, which is the hallmark of the Karanovo I culture in Thrace together with its south/southwestern variant (including the Sofia plain) and sites in the upper and middle Struma Valley. In this sense, the formal tools made of BF are and should be treated as a cultural marker of the Karanovo I complex as well. They continue to be abundant during the Karanovo II culture and persist in the chrono-cultural Neolithic sequence during Karanovo III and IV as a retarded/reminiscent form. In the latter part of the sequence, they lose their diagnostic character but, based on their quality, continue to be reshaped and reused in both utilitarian and possibly symbolic aspects. It should be emphasized that formal toolkits *sensu stricto* are attributable to the Karanovo I–II cultural

alliance. Still, BF as raw material and debitage products has a much broader distribution. They are abundant among the assemblages from north Bulgaria, which is logical and expected due to the location of the outcrops in the Pleven–Nikopol area and in a small cluster around Shumen, where the Shumen I type of flint originated, which, as mentioned above, is (only!) the macroscopic equivalent of typical BF.

Early Neolithic sites with BF artefacts among their chipped stone assemblages are widely distributed in Southeastern Europe: Serbia (including Vojvodina), North Macedonia, southern Romania, the Carpathian Basin, Turkish Thrace sites, and one site on the island of Gökçeada (Imbros).

The BF distribution system was one of two major lithic exchange networks operating in Southeast Europe (together with the Melian obsidian distribution) during the Early Neolithic, which were symptomatic of interaction spheres that probably played a crucial role in the Neolithization of their respective regions. One of the crucial questions is which Bulgarian sites were involved in the network and what was their role in the intra- and intercommunity exchange? This question inevitably raises the next – about the BF procurement and artefact production workshops. Of the BF outcrops identified, the most promising workshops are Zhernov, Mouselievo and Ali Koch Baba Teke – all of them in Pleven-Nikopol cluster of BF outcrops, exploiting deposits belonging to the Upper Cretaceous Mezdra Formation. Regarding workshops in some of the Early Neolithic sites, the only site with a production zone/atelier is Slatina, but only three cores were recorded. Unfortunately, most of the artefacts were heavily affected by heat during the burning of the ”big house”. Other onsite Bf production opportunities are discussed in Case studies 1–3 and the Discussion section of the dissertation.

In such a relatively simple situation, with two Neolithic sites, both established at the very end of the 7th millennium cal BC – Dzhulyunitsa in central-north Bulgaria and Kovachevo in the Middle Struma Valley in the southwestern corner of the country, indisputable priority in the process of first adoption and (eventually) developing BF supply and distribution is more than obviously Dzhulyunitsa with its pre-Karanovo substratum and material culture patterns. Kovachevo, which is (one of) the first ‘colonies’ of the earliest farmers-migrants from Anatolia (directly or via north Aegean waves of Neolithic dispersal), does not reveal any BF presence before phases Ic & 1d when the site was integrated into the Karanovo I cultural *koiné.* I have already expressed my hypothesis about Dzhulyunitsa's key role in BF networking with full consciousness of the anticipatory character of my suggestions. The earliest securely dated occurrence of BF in an Early Neolithic context is at Dzhulyunitsa in northern Bulgaria, where artefacts of BF occur from the beginning of the occupation sequence before 6000 cal BC.

Finally, it should be noted that the previous section is based on long-term interdisciplinary research on BF (with outcrops in central-northern Bulgaria), emphasizing its emergence and repetition across a large territory, as well as its co-occurrence with other distinctive socio-cultural traits during the first half of the 6th millennium BC. This implies the existence of a sophisticated exchange network with a high degree of interaction, suggesting that none of the conventional scenarios and paradigms of the Neolithization of Bulgaria is viable without taking into consideration the BF outcrops and their discovery by the first Neolithic settlers or negotiating access to pre-existing BF exchange networks.

3. REGIONALITY *VS* UNIFORMITY IN EARLY NEOLITHIC FLINT INDUSTRIES

THE EARLY NEOLITHIC ASSEMBLAGES OF THE KARANOVO I CULTURAL ALLIANCE

This section includes data derived from 17 Early Neolithic assemblages that have been studied (including four which show Late Neolithic strata) (see the map above). I have studied them over a long period of time and using different approaches, conceptual premises, and publication strategies. The following site assemblages studied by me have been published: Karanovo (Gurova 1997, 2002a); Azmak (partially – Gatsov, Gurova 2001); Yabalkovo (Gurova 2014a, Case study no. 5); Slatina, Kovachevo, and Rakitovo (Gurova 2011b; 2012b). A representative sample of the sites was used to distinguish the formal tools of BF and to support the suggestion that flints play a role in the Neolithization debate (Gurova 2008a, 2009, 2018b; Gurova Bonsall 2014a). Many of the studies are included in a short article in the series *Archaeological Discoveries and Excavations*. Some of the more recent research and from the most important sites is first published here as Case studies in Part II – Varbitsa, Dzhulyunitsa, Yarlovitsa and Ilindentsi. My observations on all the assemblages studied have helped me in my attempt to provide an overview of the main characteristics of the flint industry and to define some regularity *vs* singularity/specificity. All the studied sites from southern Bulgaria eventually became a peripheral part of the broader Karanovo I culture area. For their affiliation to this cultural complex, the dynamic model of cultural processes in Thrace is used (Nikolov 2004). A peculiar cluster of the southwest variant of the Karanovo I culture is the set of sites in the Struma Valley (mainly the middle and, to a lesser extent, the upper reaches of the valley) – Kovachevo, Ilindentsi, Brezhani, Drenkovo, Balgarchevo, Dzherman and Negovantsi. Some comments will be offered on the last-mentioned site, compensating for the lack of flints at Galabnik. The other sites in south Bulgaria are geographically closer to the core area of the classical Karanovo I culture – Rakitovo and Kapitan Dimitrievo, as well as Yabalkovo. Tell Karanovo and Azmak were studied long ago, and my research on them did not have the later crystallized focus and cannot be compared with the more recently studied assemblages. However, they offer perhaps the most representative (at least, the most consistently used as labels for the "macroblade" industry) assemblages of formal tools made of BF.

The Early Neolithic sites from north Bulgaria – Varbitsa, Dzhulyunitsa and Yarlovitsa – are presented in Part II as Case studies (nos 1–3). To further elucidate flint industries as a factor in the socio-cultural processes of the first half of the 6th millennium cal BC, those flint assemblages studied by me are presented here more coherently (with an accent on still unpublished/new assemblages) but tend to be interpreted and commented on in comparison to other Early Neolithic sites studied and published by other scholars.

It is noteworthy to recall that based on numerous personally studied flint assemblages, coming from the most important Early Neolithic sites south of the Balkan mountains, such as Tells Karanovo, Azmak and Kapitan Dimitrievo, and the 'flat' sites of Kovačevo, Yabalkovo, Rakitovo and Slatina, I have argued for the recognition of a category of formal tools/toolkits (Gurova 2008a). The term 'formal tools/toolkits' is commonly used in the specialized literature. A definition is provided by Andrefsky, referring to tools that possess or embody one or more of the following attributes: standardized form, additional effort in manufacturing, potential for resharpening, use of special raw materials, advanced preparation, anticipated use and transportability (cf. Andrefsky 1994, 22).

Since then, in my study of other (Early) Neolithic assemblages from different regions, the concept of formal tools has been used as a discriminatory feature within all parameters of analysis and interpretation of the flint assemblages. Thus, this diagnostic feature of the

assemblages serves as a reliable criterion for comparative analysis in both synchronic and diachronic aspects.

The formal tools comprise blades of visually similar yellow-brownish-greyish white-spotted BF, with continuous (sometimes partial) semi-abrupt to abrupt high retouch along one or both lateral edges, sometimes with pointed or rounded retouched ends, as well as sickle inserts related to the well-known Karanovo type of sickle. From a technological perspective, this industry indicates the application of indirect percussion (punch technique). Pressure flaking with an organic stick was used for the characteristic high and steep retouching. It must be emphasized that neither cores nor common debitage linked to their preparation are attested among the assemblages; the *chaîne opératoire* remains fragmented with no possibility for diacritical reconstruction.

It is noteworthy that characteristic Early Neolithic Karanovo I and II flint toolkits from Bulgaria are recognized among different sites (cultural groups) of the supra-regional Karanovo I–Starčevo–Criş–Körös cultural technocomplex, as finished tools or simply as artefacts made of BF.

The formal tools represent a diagnostic feature of the Early Neolithic flint assemblages and are a sign of an affiliation to the Karanovo I–II cultural *koiné.* They are usually most numerous and representative among the assemblages from Tel Karanovo and Azmak (where the formal tools are dominant), followed by the sites of Yabalkovo, Rakitovo, Slatina, Kovachevo, Ilindentsi and others (Gurova 2008, 2011a, 2012b, 2014b). It should be emphasized that the formal toolkits appear within Early Neolithic flint assemblages in varying proportions and at different stages of their evolution (well recorded within the sites from the Middle Struma Valley). At Tells Azmak and Karanovo, they prevail and are evolved techno-typologically from the beginning of the respective cultural sequences.

Apart from the formal tools, the Early Neolithic assemblages of all the above mentioned south Bulgarian sites provide, of course, examples of expedient production of blanks (flakes and blades) and tools made of local, easily accessible raw materials. And while the presence of BF and the formal tools introduces elements of the uniformity/homogeneity of the assemblages, the features of the expedient assemblages introduce specificity and regionality into the Early Neolithic flint industry. The local raw materials in different parts of the country vary.

The regional distribution of Early Neolithic flint assemblages with an affinity to the Karanovo I cultural alliance is presented in the following order: sites in the Struma Valley, sites in the Sofia Plain, and sites in the Thracian Plain. The first cluster comprises sites starting with Kovachevo and including the following settlements further north: Ilindentsi, Brezhani, Drenkovo and Balgarchevo. The systematic research of M. Grębska-Kulow has involved the Middle Struma Valley sites, and her publications provide a conceptual and diachronic overview of the Middle Struma Valley occupation during the Early and Middle Neolithic (Grębska-Kulow, 2017; 2024). The Upper Struma Valley is represented by the sites of Dzherman, Galabnik (based on Gatsov's study) and Negovantsi.

To sum up the Struma Valley assemblages, they demonstrate common features from Kovachevo to Negovantsi – namely the presence of BF artefacts and formal toolkits (typically retouched blades and sickle inserts). Chronologically, at Kovachevo this process starts in phase Ic (ca 5900 cal BC, according to Grębska-Kulow 2024), while in the northern part (Galabnik and Negovantsi) approximately a century earlier, which corresponds to the presumption (and seemingly the unique practical possibility) that the BF 'package' was introduced from the north (via or bypassing the Slatina workshop).

Sofia and Thracian Plains sites that are commented on in the text include Slatina, Rakitovo, Yabalkovo, Tells Karanovo and Azmak. Ultimately, the typical characteristics of the assemblages are the presence of representative series of BF formal tools (most abundant at Azmak, followed by Karanovo and Yabalkovo) as well as their excessive use and transformation. All sites are characterized by opportunistic production, based on other locally and regionally available raw materials used in debitage production (mainly flakes and fragments). Unsurprisingly, these sites reveal a fully evolved sickle of Karanovo type with remarkably intensively used, resharpened, reversed and reused sickle inserts based mainly on retouched blades, but with a strong element of unretouched blade fragments used for this purpose.

EARLY NEOLITHIC SITES IN NORTHERN BULGARIA

The Neolithic flint assemblages from sites in northern Bulgaria differ substantially from those in the Karanovo I–II cultural milieu, which contain typical BF formal tools. The Early Neolithic flint industry in northern Bulgaria is characterized by an abundance of BF artefacts, including debitage products, typological tools and cores. However, it lacks a series of BF formal tools and a complete BF *chaîne opératoire*. The most interesting and important sites are Varbitsa (NE Bulgaria), Dzhulyunitsa (central north Bulgaria) and Yarlovitsa (NW Bulgaria), which I studied and presented as case studies 1–3 in Part II of this dissertation. Other sites studied by different scholars and commented on in this section include: Koprivets, Ohoden, Gradeshnitsa, Ovcharovo–Gorata and Orlovets.

Following the scenarios presented by Krauss et al. (2017) regarding Neolithization via the Sub-Mediterranean-Aegean biogeographic zone during the 8.2 ka event, Krauss places the site of Dzhulyunitsa at the centre of this pre-Karanovo enclave/cluster, affirming that "the Early Neolithic settlement of Dzhulyunitsa is currently proving to be a key site in determining the characteristics of the earliest Neolithic within the Balkans" (Krauss 2023, 141). This site is of great importance in my quasi-intuitive (in the past) and better argued (now) thoughts and hypotheses about the supply and distribution of BF as a developed and efficiently functioning raw material network in the Balkans (at least!). Dzhulyunitsa, with sufficient background information, a detailed study, results, comments, and discussion, is presented in Part II as Case study no. 2.

To sum up the evidence from the sites in northern Bulgaria: i) apart from the scarce numbers from Varbitsa and even fewer from Dzhulyunitsa, Yarlovitsa and (ultimately) Ohoden, the occurrence of BF formal tools is less well attested among these assemblages in comparison with the assemblages from the Karanovo I–II cultural milieu; ii) there are sites with evidence of a *chaîne oprératoire* based on local raw material supply and flake production (Koprivets, Ohoden) and an incomplete *chaîne oprératoire* of BF at Dzhulyunitsa and Yarlovitsa (in the former – accompanied by dark-grey white-spotted flint production; iii) BF products in general are primarily attested in the Yarlovitsa, Dzhulyunitsa, Varbitsa and, potentially, Ohoden (?) assemblages with the proviso that for Varbitsa BF and BF-like artefacts (those made of Shumen I flint) coexist; iv) BF outcrops *sensu stricto* (Pleven–Nikopol cluster) and *sensu lato* (Shumen I type of flint from Shumen) were nearer to Ohoden and Varbitsa, but Dzhulyunitsa and particularly Yarlovitsa demonstrate an abundance of BF as result of regional and superregional distribution (as measured from the Nikopol cluster – see Gurova et al. 2022b, Table 2, fig. 15); iv) as for the subsistence activities, studies at Dzhulyunitsa, Varbitsa and Yarlovitsa have revealed (contrary to my observations in 2018, based on pilot studies of Varbitsa and Dzhulyunitsa) sickle inserts of BF (i.e. formal tools) which are contextually presented in each of the case studies. Dzhulyunitsa shows a prevalence of implements used in animal product

processing; at Varbitsa, the ratio of animal products to cereals is more-or-less equal, whereas at Yarlovitsa, agricultural activity prevails noticeably.

4. LATE NEOLITHIC ASSEMBLAGES

GENERAL BACKGROUND NOTES

The Early Neolithic lifeways, including the important role of BF in subsistence and household activities, as well as in the resource distribution networks and exchange of social messages and symbols, changed gradually in the second half of the 6th millennium BC with the onset of the Late Neolithic. This was part of a general, significant shift in material culture and social organization. There are changes in site location (topography), settlement patterns, building strategy and architecture, as well as in the characteristics of pottery assemblages (Николов 1998; Nikolov 2004; Тодорова, Вайсов 2003). The significance of the different features and multifaceted progressive changes between the Early and Late Neolithic cultures has led some scholars to distinguish so-called 'Early' and 'Late Neolithic' cultural blocks with additional subdivisions. In Thrace, a discontinuity between these two blocks is affirmed; the relocation of the population from tells to the plateaus is explained by climatic change with increasing humidity (Тодорова, Вайсов 1993, 125).

There are few examples of diachronic research on Neolithic material culture and social structure, and the reasons for, and nature of, the large-scale transformation processes that took place around 5500 cal BC remain enigmatic. What is their relationship with the flint industry?

TRANSITION AND TRANSFORMATION IN NEOLITHIC FLINT INDUSTRIES

Ivan Gatsov (1993) presented the evolutionary changes in the Neolithic flint industries from western Bulgaria, highlighting technological degradation in flint industries during the Late Neolithic. What is important too is the fact that endscrapers became the dominant typological group in Late Neolithic assemblages. Further consideration of the transformation of flint assemblages in post-Early Neolithic times was provided by me with additional data, new ideas and overviews based on a diachronic comparative analysis of flint assemblages from many different types of Neolithic settlements In general, the argument for an important transformation is supported by: i) the increasing role of local raw materials (expedient industry) and limited demand for BF, ergo – a decline of the BF distribution system; ii) a decrease in ordinary blade production (in number and dimensions of the blades) and consistent prevalence of flake debitage with subsequent transformation into tools on flakes (mainly endscrapers, followed by retouched flakes); iii) an increased diversity of endscrapers both in typological and morphometric parameters, but with obvious reduction in length and increasing shape variation; iv) evident microlithization, represented by small and micro-cores for blades (bladelets) and two categories of retouched artefact: very small (micro)endscrapers on flakes (typically semicircular in shape) and geometric microliths *sensu stricto* (trapezes, crescents/segments and rare atypical shapes); and v) persistence of rare but recognizable BF formal tools, representing a retardation/reminiscent element of the flint industry.

Changes occurring in the flint industry during the Late Neolithic period are evident in all Late Neolithic flint assemblages, albeit to varying degrees, due to the different settlement patterns and social structures that existed at that time. The changes are smooth with clear evidence for continuity in the characteristic traits between the Early and Late Neolithic assemblages of tell sites, where the continuity of life is inherent and coherent *per se.* In contrast, among strictly Late Neolithic assemblages from flat or 'thin layer' newly-

established settlements, the industry can be mixed. Still, it is dominated by Late Neolithic diagnostic features as described above. In the second category are the flint assemblages from sites that I studied, such as Balgarchevo, Apriltsi, Ezero (Dryanova mogila), Sarnevo, Harmanli, Sozopol, Tash Bair, and Brankovtsi, with the most important examples presented briefly in the dissertation. Apart from these, other intriguing assemblages, studied and published by other scholars are also commented on: Usoe I, Acladi Cheiri and Tell Provadia.

Particular attention is paid to the geometric microliths that appear in the Late Neolithic sequences of various settlements. The Late Neolithic microliths are the most numerous and typologically variable among all Holocene geometric microliths from Bulgaria; however, trapezes prevail. Late Neolithic assemblages with microliths are intrinsic to the radical changes in material culture that took place after 5500 BC. The microlithization of the flint industry is just one aspect of this transition. Thus, they could be considered one of the peculiar and even diagnostic features of the transformation of the Late Neolithic flint industry. Microlithization is a phenomenon provoked either by an adaptive strategy to altered environmental circumstances, or by the establishment of new communities with different ancestral traditions and latent technological and craft apprenticeship, or resulting from a combination of factors. Thus, they could be considered one of the peculiar and even diagnostic features of the transformation of the Late Neolithic flint industry.

CHANGES IN RAW MATERIAL SUPPLY AND USE

Apart from the techno-typological split of the flint industry, another question that requires further investigation concerns the shift in raw material (notably BF) procurement and network distribution, which occurred at the beginning of the second half of the 6th millennium BC. After playing a fundamentally important role in the Neolithization process and having a wide distribution in the Early Neolithic of Southeast Europe, BF use and significance declined after the Early Neolithic, most likely during the Karanovo III or III–IV period (Gurova 2011b).

There should be no natural constraint on access to BF sources in the Late Neolithic. Still, it seems that the profound transformation in settlement patterns and social structures led to a new decision-making strategy and degradation/abandonment of the traditional networks – first the BF one, but also the long-distance import (random, but existing in the Early Neolithic) of obsidian artefacts.

Most Late Neolithic flint assemblages show variability in the raw materials used for debitage and tool production. The raw materials are mainly local, coming from secondary placer deposits of siliceous rocks. The needs of the numerous Neolithic sites in Thrace were met by easily accessible raw materials within the Maritsa River catchment (containing alluvial-colluvial sediments), rich in re-deposited materials from Palaeogenic flint rock masses that are widely distributed in the Plovdiv district and the Eastern Rhodopes. More information on the Early *vs* Late Neolithic raw materials will be presented in the following sections.

PART II – CASE STUDIES

INTRODUCTION

After the overview in Part I, based on a synthesis of more than forty Neolithic sites, my intention was to combine examples of the various 'types' of sites to compare their particularities and common features. The manuscript (Part II) contains eight Case studies, comprising five from the Early Neolithic and three from the Late Neolithic. An additional, but

important argument in case study selection lies in the fact that some emblematic sites were studied and published long ago, when the conceptual, interpretative and technical meanings of the research were different. Last, but not least, from the point of view of the raw material/BF perspective are the sites in north Bulgaria and those belonging to the beginning of the Neolithic sequence – thus the preferential position of Varbitsa, Dzhulyunitsa and Yarlovitsa was quite reasonable, plus the fact that they are located in the northeastern, central and northwestern parts of the regional Neolithic *oikumene*, offering a good trajectory for comparative trends and observations. The Struma River Valley, as the most likely corridor for the first Neolithic migration groups, is represented by the site of Ilindentsi, which postdates Kovachevo but is sufficiently closer to it and with convincingly strong regional characteristics. The Thracian Early Neolithic (Karanovo I) period is shown by the representative selective assemblage from the Yabalkovo site. Late Neolithic sites are presented by three examples: a typical site of Karanovo IV period in Thrace – the site of Harmanli; one example from the fully published pit-field/site of Sarnevo, belonging to Karanovo III–IV period, closer to Karanovo Tell; and finally, the recently discovered site of Brankovtsi in northwestern Bulgaria, closer to the Early Neolithic site of Yarlovitsa and offering a good opportunity to compare both sites in raw material and typological perspectives.

All case studies are analysed and described using a common methodological and structural approach, comprising the following sections:

- Introduction
- Raw materials: characteristics and procurement strategies
- Techno-typological analysis
- Functional connotations
- General observations and discussion

The techno-typological descriptions and analyses are based on the following classification/differentiation:

- typological tools;
- debitage products consisting of:
    a) blades (fragments included);
    b) flakes (only entire pieces));
    c) fragments – distinguished as flake fragments (pieces with morphological parameters suggesting fragmented flakes, but without butts or proximal parts), and indeterminate fragments/chunks (in some studies, such fragments are termed debris).
- cores.

The case studies will be presented shortly, along with their introductory and concluding sections.

CASE STUDY NO. 1: FLINT ASSEMBLAGE FROM VARBITSA (EARLY NEOLITHIC)

Excavations at the Varbitsa site, conducted in two small surface trenches over two seasons (2015 and 2017), revealed an impressive array of finds. These allowed the archaeologists to conduct comparative analyses with contemporaneous sites in central-north and northeastern Bulgaria and Thrace, focusing exclusively on ceramic production and pottery assemblage (Венелинова, Григоров 2017, 2019). The site is intriguing and important with its representative Neolithic sequence including Karanovo I to Karanovo III cultures,

according to V. Nikolov's periodization (Николов 1998; Nikolov 2004, 14-17; 2017). The ^{14}C dates referring to the entire sequence corroborate the periodization of the cultural and stratigraphic strata presented by the excavators[2]. Therefore, Varbitsa cannot be overlooked as an important point in the debate on Neolithization, both regionally and supraregionally. A significant contribution to the general representation of the site is offered here by the analysis of its flint assemblage, and as mentioned in specialized archaeometric studies on the flint raw material in north Bulgaria (Gurova et al. 2022 a–b).

The flint assemblage comprises 108 artefacts, the general structure of the assemblage in terms of the techno-typological differentiation is presented in Table 1.

Table 1

Context	Tools	Blades	Flakes	Fragments	Cores	Total
Surface	9	6	1	3	1	20
Trench 2	1	1	6	1		9
Trench 1	22	19	24	14		79
Layers I–III/ *K III*	12	10	15	8		45
Layers IV–VI/ *K II-III*	4	3	3	1		11
Layers VII–X/ *K II*	4	4	2	2		12
Layers XI–XV/ *K I*	2	2	4	3		11
Total	32	26	31	18	1	108

General observations and discussion

The Verbitsa assemblage allows some observations and raises questions that will be discussed below.

- In general, two heterogeneous assemblages/components (in raw material and techno-typological aspects) are present. One came mainly from the surface and corresponds to the characteristics of a typical Chalcolithic flint industry. Several artefacts in this small assemblage belong to the distinct Neolithic strata, and an explanation of this contextual 'discrepancy' may relate to the pit-dwelling (with reworked material) dug during Late Antiquity. The second assemblage/component comprises artefacts from layers XV to IIA and can be defined as Early Neolithic, revealing typical formal tools/toolkit characteristic of the Early Neolithic cultural *koiné* of Karanovo I–II. The characteristics of this cultural unit are durable and dominate till the end of the Varbitsa sequence, which theoretically should belong to the transition to, and the first phases of, the Late Neolithic. As mentioned in the dissertation, among the artefacts from Varbitsa no trend to microlithization is evident: no small and microcores, series of bladelets, micro-endscrapers or geometric microliths are present. In this sense, the Varbitsa' assemblage noticeably differs from the studied assemblages from northeast Bulgaria and particularly that from Usoe (Скакун 1994; Gatsov 1990);

- The assemblage from Varbitsa raises thoughts on the question of the emergence of Ludogorie flints in a clear Neolithic context. For decades, the so-called "Dobrudzha flint" has been a kind of mythology, based on the incorrect reading of the term, used by E. Comşa (Comşa 1976). In various publications, the term is differently interpreted with the most frequent meaning being flint originating in Bulgarian Dobrudzha (Ludogorie region) and

[2] Until now, only one date (5799 cal BC) from the earliest layer has been published by R. Krauss and is mentioned here in Part I, Section 1 (Krauss, 2023, p. 238, Table 5).

ergo referred to the Ludogorie flints (described by Ch. Nachev) (Начев (2009). The sporadic appearance of Ludogorie (Dobrudzha) flint in the Early Neolithic flint assemblages from western Bulgaria was mentioned by N. Skakun who, however, emphasized that this flint exploitation and distribution started in the Chalcolithic (Skakun 1993). The macroscopic similarity of Kriva reka type flint with typical BF also led me to an earlier hypothesis on BF provenance, presented in early research (Gurova 2008a). Later meticulous multidisciplinary analyses of the raw material varieties convincingly disproved this hypothesis, but the visual resemblance between BF and the Kriva reka type continues to fuel speculation. Nevertheless, the question of the earliest recorded (pre-Chalcolithic) appearance of Ludogorie flint in the prehistoric assemblages remains open and demands relevant analyses to be conducted on artefacts with secure Neolithic contexts and compared to the Ludogorie flint samples;

- Varbitsa and the Neolithization debate is a topic to be addressed with the expectation of providing new insights into the first farmers' emergence in northeastern Bulgaria. Even as a preliminary observation, it can be affirmed that the site occupies a strategic location vis-à-vis the provenance and distribution of raw materials involved in the full Early Neolithic 'package'. There is no evidence of workshops for the initial production of either Balkan or Shumen type flints. On the other hand, there are formal tools of BF(-like) material, similar to those from the Karanovo I–II cultural milieu, suggesting interactions between these areas in the Early Neolithic. Based on the GIS pathways of raw material distribution, it can be assumed that the site of Varbitsa was suitable as a redistribution point for Shumen I and II flints to the Thracian plain in the Early Neolithic. On the other hand, Dzhulyunitsa and Varbitsa are well situated for the mutual exchange of BF and Shumen I–II flints when the sites were inhabited simultaneously (Gurova et al 2022b; 2025). It should be stressed that the results from micropetrography and trace element analysis have shown similarities between artefacts from Varbitsa, Dzhulyunitsa and Karanovo, particularly in grey white-spotted flints with no precisely identified provenance (Gurova et al. 2022б). Varbitsa is undoubtedly one of the important sites in northern Bulgaria. Its role in establishing the Early Neolithic lifestyle both regionally and supra-regionally should be seriously reconsidered, which I hope will happen once the site has been fully published, with all finds meticulously analysed and ^{14}C dates included.

CASE STUDY NO. 2: FLINT ASSEMBLAGE FROM DZHULYUNITSA (EARLY NEOLITHIC)

The significance of flint assemblages for our understanding of the process of Neolithization hardly needs to be discussed. On the other hand, there is still a lack of serious interpretative research based on a reliable, empirical dataset that could offer relevant conceptual insights into the Neolithization debate.

At the same time there has been some innovative multidisciplinary research on the raw materials used by Early Neolithic settlers in Bulgaria, which has shed light on one raw material of crucial importance for Neolithization – Balkan Flint, including its provenance and subsequent distribution among the first sedentary farming communities (Bonsall et al. 2010; Gurova et al. 2016, 2021, 2022a–b). As a further contribution to the topic, this Case study provides new data from one of the most important Neolithic sites in Bulgaria – Dzhulyunitsa–Smardesh (hereinafter, Dzhulyunitsa). The importance of this site has been emphasized in my previous publications, based on the results of a pilot study of 178 artefacts from the earliest phases, which highlighted the potential role of Dzhulyunitsa in the procurement of BF and its subsequent distribution to pre-Karanovo enclaves in south

Bulgaria (Gurova 2012; Gurova 2018b, Gurova, Bonsall 2014). In this detailed study, I present additional evidence to test this hypothesis.

The general structure of the assemblages is presented in Table 1.

Table 1

Phase	Tools	Blades	Flakes	Fragments	Cores	Varia	Total	Used
DZH I	24	87	253	181	4	9	558	31
DZH II	49	147	362	181	11	10	760	49
TOTAL	73	234	615	362	15	19	1318	80

General observations and discussion

In both phases two types of raw material predominate: BF with its varieties (easily distinguishable macroscopically) and the (dark-)grey, white-spotted flint. They occur in similar proportions in Dzhulyuinitsa I and II. No typical formal tools are registered although the retouched blades prevail in the tool repertoire. Noticeable is the presence of endscrapers, spintered pieces and three geometric microliths. The functional connotations of the artefacts in terms of subsistence activity suggest that livestock and animal products and sub-products were more important (or as important) compared to crop husbandry.

In the context of the ongoing debate on Neolithization, Dzhulyunitsa plays an important role and the following points should be noted:

- Dzhulyunitsa has the earliest dates of establishment of any Bulgarian Early Neolithic site which … "is currently proving to be a key site in determining the characteristics of the earliest Neolithic within the Balkans"(Krauss 2023, 141). The site is one of the pre-Karanovo I complex in northern Bulgaria;

- The Dzhulyunitsa I and II pottery assemblages show closer parallels with sites in Anatolia, with the strongest affiliations to sites from western Anatolia and the Marmara region. This affiliation is confirmed by the results of archaeobotanical and archaeozoological analyses;

- The working hypothesis on the role of the site in the Neolithization process can be summarized as follows: i) the Dzhulyunitsa inhabitants and the pre-Karanovo substratum in general founded settlements in northeast Bulgaria after their expansion from northwest Anatolia via the Bosporus and along the Black Sea coastline ca 6400 BC (Özdoğan 2006; 2011a–b); ii) The movement west from the sea coast inland may have been prompted by a search for the best land for farming and acquisition of suitable raw material for flint knapping. Most likely, the migrants reached the sources of high-quality BF(-like) raw material in the Shumen cluster, and they would have known of the dark-grey flint with numerous secondary deposits in the catchment of the Rusenski Lom River. Dzhulyunitsa lies 60 km from the Shumen outcrops cluster, and 80 to 100 km respectively from the Pleven–Nikopol cluster of BF outcrops and could serve (as hypothesized) as a mediating site in the distribution of BF and grey white-spotted flint nodules and products from flint outcrops and workshops in northern Bulgaria and consumption sites of the Karanovo I–II cultures in Thrace. This network has certainly been known and used by the putative Mesolithic/pre-Neolithic communities living most likely near the Danube and its tributaries (as suggested by Gurova, Bonsall 2014b); iii) bearing the technological know-how of blade manufacture from the Marmara region (an observation based on the Ilıpınar and Menteşe inventories) they could advance successfully in blade production in some still unknown workshops near the outcrops or the settlement. Assuming there was pre-Neolithic procurement and distribution of BF (the best sources of which are located in the Pleven–Nikopol cluster/region) the settlers of Dzhulyunitsa could decide to incorporate

blade production in the network of regional and supra-regional exchange of goods; iv) being not particularly interested in the fashioning and use of formal tools, the flint workers from Dzhulyunitsa may have decided to focus their efforts on knapping for subsequent circulation of BF artefacts (most likely series of blades) to the (pre-?)Karanovo I enclaves in Thrace, which seemingly became the primary consumers of the flint production from north Bulgaria.

This hypothesis, and the many additional arguments presented in the previously cited publications (including the new insight brought by genetic studies – see Gurova 2018, 136–137), seems even more relevant to me now, after studying the representative flint assemblages of the Dzhulyunitsa I and II inhabitants. Further research on flint assemblages from Early Neolithic sites in north Bulgaria and interdisciplinary analyses of raw material provenance and distribution will undoubtedly contribute to more robust and detailed scenarios and conceptualization of Neolithization.

CASE STUDY NO. 3: FLINT ASSEMBLAGE FROM YARLOVITSA (EARLY NEOLITHIC)

The archaeological investigations at Yarlovitsa revealed a single-layer site which lies on a high overflow terrace on the left bank of the Mechkobor River, a tributary of the Skomlya River, which flows into the Danube. The northern part of the site lies in arable land on nearly level terrain, while the southern part is situated on a steep slope leading down to the river. The northern section was initially investigated through 31 trenches. The main excavations were carried out on the cleared slope, which was divided into sectors (Todorov et al. 2020).

The site is characterized by sloping terrain and poorly preserved pottery, which makes interpretation difficult. The pottery is highly fragmented, with a destroyed surface and smoothed edges. The rare decoration is represented by an embossed edge with small pits and an embossed rosette. The pottery assemblage is considered to resemble that from Ohoden, which is assigned to the Starčevo IIв phase (Todorov et al. 2020, 220). Probably during this period, a settlement existed on the habitable overflow terrace, the remains of which were destroyed in antiquity and buried under later deposits. Most likely, the few structures that were uncovered belong to the periphery of the settlement. The flint assemblage is rich and representative but, unfortunately, it is re-deposited on the slope and thus deprived of its primary context, occurring in a layer of brown-black soil (Todorov et al. 2020, fig. 2). Despite this gnoseological disadvantage, the assemblage deserves to be presented because of its significance in at least two important aspects: raw material and typological repertoire.

The flint assemblage from Yarlovitsa comprises 974 artefacts, coming from trenches and sectors unattributed to specific features.

The general structure of the assemblage according to the techno-typological differentiation is presented in Table 1, convincingly showing the solid prevalence of the debitage products and the noticeably numerous cores, which is, in general, unusual for Early Neolithic assemblages.

Table 1

Entire assemblage	Tools	Blades	Flakes	Fragments	Cores	Varia	Total
Total	84	177	310	355	25	23	974

General observations and discussion

The assemblage from Yarlovitsa is intriguing in the lens of the following points: i) abundance of BF giving an aspect of relative homogeneity of raw material presented; ii) the affiliation of pottery features to Starčevo IIb and Ohoden requires a comparison between the Yarlovitsa and Ohoden assemblages from one side, and Yarlovitsa and assemblages belonging to the Starčevo cultural group in Serbia – from the other side; iii) a comparison with Dzhulyunitsa is very challenging because the Dzhulyunitsa I and II pottery assemblages show closer parallels not with the Starčevo cultural complex (as for other Early Neolithic sites in central-north and northwest Bulgaria) but with sites in Anatolia, with the strongest affiliations to sites from western Anatolia and the Marmara region. Thus, the assemblage of Yarlovitsa is intriguing as potentially possessing dualistic features between two profoundly different Early Neolithic cultural milieux – the Starčevo cultural complex and northwestern Anatolia.

In a comparative perspective with Starčevo assemblages, it can be stated that the role of the BF is convincingly and seriously recognized as an unavoidable factor in the Neolithization of the Central Balkans (precisely northeastern Serbia with the unique Iron Gates cluster). Taking into account the fact that the only securely identified BF provenance area is in central northern Bulgaria, the role of Bulgarian Early Neolithic sites, including those near outcrops such as Dzhulyunitsa and those in the north-western corner such as Yarlovitsa, became potentially important as redistribution centres of BF raw materials and byproducts. Other scenarios are, of course, admissible as well, such as the hypothesis that the BF was distributed by itinerant specialists. Unfortunately, none of the possibilities can be rejected and none can be verified.

Seemingly, the most convincing and empirically proven similarity is between the assemblages of Yarlovitsa and Dzhulyunitsa. Concerning the raw material, the closeness lies in the BF frequency among all techno-typological categories of artefacts and especially among tools. There is, however, a difference consisting in the fact that at Yarlovitsa the dark-grey white spotted flint (visual grey version of BF, with still unknown provenance) is virtually absent, contrary to other light greyish-beige coloristic variants of the BF. As for the typological spectra, the similarity consists in the prevalence of retouched blades, followed by endscrapers (mainly on blades), retouched flakes, and splintered pieces. Burins and notched items are minimally represented. At Yarlovitsa, more perforators/borers and truncations are recorded than in Dzhulyunitsa; in the latter three trapezes are present, while Yarlovitsa is entirely devoid of geometric microliths. Another difference lies in the functional connotations of the toolkits. Unexpectedly, at Dzhulyunitsa, few sickle inserts are recorded in contrast to artefacts involved in animal products processing – butchering, hide and bone working. At Yarlovitsa, sickle inserts drastically dominated, whilst the animal byproducts treatment was minimal. This fact raises questions, but it should be kept in mind that the use-wear analysis involved selected representative samples from both assemblages.

In summary, despite the lack of absolute dating and some prominent specialized research (in palaeobotany and archaeozoology), the Yarlovitsa site is critical in terms of its flint assemblages and their potential role in reconstructing the distribution network of the BF in the Balkans.

CASE STUDY NO. 4: CHIPPED-STONE ASSEMBLAGE FROM ILINDENTSI (EARLY NEOLITHIC)

Ilindentsi is part of a cluster of Neolithic sites in the Middle Struma Valley that provides opportunities for both regional and supra-regional diachronic analysis, highlighting the dynamic cultural and social interactions and networking between sites (Grębska-Kulow, Zidarov 2020; 2021). The relative chronology of the findings was supported by radiocarbon dating.

The Early Neolithic at Ilindentsi is represented by its later (upper) phase, which is contemporaneous with Kovachevo Ic and Id, and is associated with the cultural *koinè* of the Karanovo I culture (Lichardus-Itten et al. 2006; Grębska-Kulow 2017). The research conducted at Ilindentsi is crucial for understanding the transition from the Early to Middle Neolithic on a regional scale, as well as the interactions with neighbouring Early Neolithic cultures such as Galabnik and Anzabegovo–Vršnik. How does the chipped-stone assemblage respond to this cognitive challenge? Does the assemblage provide significant insights from a diachronic perspective? Furthermore, how does it fit within the broader context of Early Neolithic regional and supra-regional events in the Balkans, particularly as evidenced by the distribution of BF in various forms, including the signature 'package' of a formal toolkit? The analysis presented in the dissertation seeks answers to these research questions.

The overall structure of the assemblage, along with the differentiation of raw materials, is summarized in Table 1.

Table 1

Raw material	Tools	Blades	Flakes	Fragments	Chips	Cores	Varia	Total
Balkan flint	14							14
Others	58	18	60	63	59	6	4	268
Quartzite	3	3	25	7		1		39
Total	75	21	85	70	59	7	4	321

General observations and discussion

The first observation to make is that the detailed chronological and cultural division of the sequence, derived from the statistical analysis of pottery, is not reflected in the chipped-stone assemblage. It is challenging to identify diachronic changes or transformations in the chipped-stone assemblage. Micropiercers made from local materials, such as chalcedony and quartz, appear simultaneously with formal tools made from BF. This indicates a rather evolved phase of the Early Neolithic when the Karanovo I culture reached its southwestern variant. Compared to the Kovachevo sequence, this Early Neolithic level should correspond to Kovachevo Ic and Id, as confirmed by pottery analysis (Grębska-Kulow, Zidarov 2020).

The assemblage from Ilindentsi is informative and significant for several reasons: i) the presence of a formal toolkit of BF; ii) the presence of 33 micropiercers/borers; and iii) the notable presence of quartzite artefacts, including three typological tools. The BF diagnostic toolkit, which includes characteristic tool types and widely used sickle blades, is represented in the assemblage from Ilindentsi. It is important to note the similarities between the BF formal toolkit found at Ilindentsi and that at Kovachevo, which suggest a synchronization of Early Neolithic cultural events. Both sites showcase these toolkits during the developed phases of the Early Neolithic: phases Ic and Id at Kovachevo and phases I and II at Ilindentsi. During this time, the region became part of the southwestern variant of the Karanovo I culture (Николов 1996). A pertinent question arises regarding

whether the pottery assemblage from Ilindentsi exhibits features that precede the phases Ic and Id found at Kovachevo, thereby indicating the influence of Karanovo I on the regional Early Neolithic. To address this question, a deeper understanding of the Neolithization stages in the Middle Struma River Valley, as well as cultural interactions with the Ovche Polje and Anzabegovo–Vršnik cultures, is necessary. However, a genuine comparison of the BF formal toolkits with those from these neighbouring regions is not feasible without thorough geological investigation and laboratory analyses. V. Dimitrovska has published a limited number of BF artefacts from six prehistoric sites in the Republic of North Macedonia, including Anzabegovo. These artefacts are macroscopically identical to the diagnostic Early Neolithic formal tools found in Bulgaria (Димитровска 2012; 2013). The provenance of these North Macedonian artefacts remains unclear, as their origin is hypothetically considered local rather than imported from northern Bulgaria. However, no convincing arguments have yet been presented to support this hypothesis.

The collection of micropiercers and borers (also functioning as drills) can be interpreted on two levels: first, as a functional toolkit incorporated into specialized craft production on-site, and second, as part of bead manufacture within the broader context of Neolithic cultural diffusion from Southeastern to Central and Northern Europe (*vide infra*, Rigaud et al. 2015). A close parallel to the microdrills from Ilindentsi is found in the significantly more extensive collection of micropiercers and borers from Kovachevo (Gurova 2006; Gurova et al. 2013; Gurova, Bonsall 2017). Both collections exhibit similarities in morphology and technology. However, there are notable differences in the characteristics of the raw materials used. The microtools from Kovachevo are crafted from dark grey to black flint sourced from the western Rhodopes, whereas the tools from Ilindentsi are primarily made of chalcedony and quartzite/quartz, with one item made of yellow jasper. Another significant difference lies in their contextual appearance within the cultural sequence. At Kovachevo, these tools are part of the earliest habitation phase, while at Ilindentsi, they emerge within a heterogeneous context that belongs to the final phase of the Early Neolithic.

The emergence of micropiercers, borers, and drills as distinct components in the typological repertoire of Early Neolithic assemblages raises an intriguing question: do these tools serve specific functional needs, such as the manufacture of beads and other ornamental items? Or do they represent the natural and inevitable spread of Neolithic groups and artefacts – from south to north – bringing with them new knowledge, skills, beliefs, and symbolism? Alternatively, could it be a combination of both factors? Research based on a vast empirical collection of beads from across Europe supports these considerations. As noted by Rigaud et al. (2015), "Cultural items fulfilling exclusively symbolic functions are generally considered more useful than functional artefacts for detecting cultural affinities between populations and patterns of cultural change over time"(ibid., 1). In light of this quotation, bead types and personal ornaments trace the pathways of Neolithic lifestyles from Anatolia through the Balkans to Central, Western, and Northern Europe, similar to other elements of the material culture, often referred to as the Neolithic package. This presents a new challenge for scholars: to enhance our understanding of bead and personal ornament production in Bulgaria during the Early Neolithic, thereby integrating our territory more deeply into the complex process of Neolithization.

CASE STUDY NO. 5: FLINT ASSEMBLAGE FROM YABALKOVO (EARLY NEOLITHIC)

The large settlement of Yabalkovo is located on the south bank of the Maritsa River in Upper Thrace, thus affiliating geographically, palaeoenvironmentally and culturally with the broader and dynamic cultural milieu of the Early Neolithic Karanovo I culture. Its long-lasting investigations, conducted within the context of different infrastructure projects, culminated in an exhaustive volume on the Early Neolithic strata from the site, where the present author has a chapter (Gurova 2014; Roodenberg et al. 2014). The text presented in the dissertation is an updated version, in full awareness that Yabalkovo represents a 'pearl' from the point of view of the representative formal tool component as one of the most significant and distinctive features of the Karanovo I–II *koiné* in the Early Neolithic industry.

According to its investigators, the cultural assemblage from Yabalkovo suggests a cultural attribution to the Early Neolithic Karanovo I horizon with a clear Anatolian influence (Leshtakov 2006; Leshtakov et al. 2007). The absolute dates (published later) suggest the Early Neolithic occupation spanned the first three centuries of the 6th millennium cal BC (Roodenberg 2014). Thus, the site has proven to be one of the most important, intriguing and rich in material culture diversity Early Neolithic sites in Thrace. A key feature of the site is that it possesses one of the richest and best assemblages of BF formal tools (toolkits), which represent a hallmark of the Early Neolithic flint assemblages of the Karanovo I and II cultures in Bulgaria, as well as one of the characteristics of the supra-regional technocomplex of the Karanovo I–Starčevo–Criş–Körös cultural complex.

I had the opportunity to apply my conceptual approach to a small, yet representative, assemblage from the 2003 excavations in the Northeast sector, provided to me by the site's excavators. Due to the undoubtedly important aspects/nuances of this limited study, its results are presented here in more detail and with necessary updates, especially vis-à-vis the BF problem. On the other hand, the chipped-stone assemblage has been partially and later entirely published by R. Zlateva-Uzunova (Zlateva-Uzunova 2014; Златева-Узунова 2025), and some correlations/references to her descriptions and interpretation, unavoidably and hopefully very sporadically are made in the dissertation.

The general structure of the assemblage shows a quite disproportionate ratio between different flint categories, with a strong predominance of tools and a virtual absence of cores (Table 1).

Table 1

Entity	Tools	Blades	Flakes	Fragments	Varia	Total
Total	120	24	45	46	9	244

General observations and discussion

Despite the clear awareness of the limited empirical basis of this study for whatever conclusions, there are some issues that merit comment.

- The results suggest an expedient/opportunistic *chaîne opératoire* based on local and regional raw materials, which Zlateva-Uzunova described in her exposé but without a clear distinction in the scale of this 'regionality'.

- The topic of raw material supply and distribution should be separated into two lines/levels of analysis and interpretation – the BF and the local raw materials. The first concern is the BF and the sequence of advancing and increasing multidisciplinary

geoarchaeological research on it, which is regularly published with open access (Bonsall et al. 2010; Gurova 2012a; Gurova, Bonsall 2014; Gurova et al. 2016; 2022a–b). In most of these publications, Yabalkovo is identified by a series of artefacts/samples and is incorporated into the conceptual framework. Additionally, GIS application, based on analytically demonstrated similarity/discrimination between the raw materials and artefacts, suggests distances between the geologically identified sources and the sites consumers, and Yabalkovo, which is concretely 119 km approximate distance from the Nikopol cluster of the BF sources (Gurova et al. 2022b).

- The mass of typological/and functional tools are made of BF, and most of them could be assigned to the category of formal tools/toolkits. These toolkits from Yabalkovo are certainly an 'imported' phenomenon. As a site consumer, Yabalkovo imported BF blanks and finished formal tools.

- The functional analysis of flint artefacts demonstrates quite particular results with some affiliation/similarity with the functional data of the assemblages from the site of Kovachevo and divergence *vis-à-vis* some NW Anatolian studied sites (Gurova 2006). The field of functional connotations of the flint artefacts and functionality of the site as a whole requires further detailed examination and interpretation.

- Yabalkovo is the fourth Early Neolithic site where geometric microliths are recorded. Apart from this, Ohoden and Dzhulyunitsa (see case study no. 2 in this book) in north Bulgaria possess geometric microliths, as does Kovachevo in the Struma Valley (Gurova 2017). It will be essential to compare these finds with their reliable contextual data and chronology to shed light on one of the 'pre-Neolithic' (at least theoretically) components of the flint industry and to attempt to explain their erratic appearance in the Early Neolithic. On the other hand, it will be a challenge to compare them with the much more numerous series of geometric microliths coming from secure Late Neolithic contexts.

CASE STUDY NO. 6: FLINT ASSEMBLAGE FROM HARMANLI (LATE NEOLITHIC)

The chipped-stone assemblage from Harmanli was published in 2010 together with the general contextual presentation of the site (Bacvarov et al. 2010; Gurova 2010). The settlement is located between two right tributaries of the Maritsa River, on the first terrace. Apart from three pits, no archaeological features were revealed, suggesting to the excavators that the exploration was done in the peripheral part of the site (Bacvarov et al. 2010, 135). The three stratigraphic layers, as well as the backfills of the pits, contained pottery dating to the Karanovo IV period – the final phase of the Neolithic cultural sequence. The chipped stone assemblage is quite numerous (1445 artefacts) and has fundamental characteristics of the Late Neolithic industry, which is why it is presented here in a slightly restructured version (for easy comparison with the other case studies). In terms of horizontal stratigraphy, the material originating from the cultural deposit in 11 investigated squares prevails (94.5% of all finds), in contrast to the limited finds from the two pits: Pit 1 (n=23), Pit 2 (n=35), and from the surface (n=21). The surface material contains four typologically characteristic tools, typical of the Late Neolithic flint industry, that have not been excluded from the total number of tools in the general statistics.

The general structure of the assemblage by context is presented in Table 1, showing the clear domination of debitage products, among which, on the other hand, blades are surprisingly scarce.

Table 1

Artefact categories	From sectors	Pit 1	Pit 2	Surface	Total
Typological tools	89	2	1	4	96
Blades	86	1	1		88
Flakes	353	5	11	4	373
Fragments	647	6	15	8	676
Small flakes and retouch flakes	105	3	3	4	115
Cores	11	1			12
Varia	74	6	4	1	85
Total	1365	24	35	21	1445

General observations and discussion

Without drawing firm conclusions, some admissible characteristics of the assemblage may be formulated based on the observations made during the study.

- The structure of the assemblage gives the impression of a well-organized and operating expedient-type industry, testified by the use of a wide range of local raw materials of medium quality. At least partial knapping (debitage) was carried out *in situ* with testing of different raw materials and techniques;

- At least two directions of *chaîne opératoire* can be reconstructed: i) debitage performed by the technique of direct percussion with a hammerstone and aimed at production of flakes, some of which were shaped into tools (the fact that the cores for flakes are extremely few suggests that they should be sought in other parts of the site); ii) debitage of blades by the punch technique, and iii) a new *chaîne opératoire*, related to the microlithization – consisting of bladelet production from small single-platform cores by presumably pressure technique (modes 1–3 after Pelegrin, 2012). The blades were used directly, which is corroborated by the large number of unretouched blades with use-wear traces, or were reshaped into tools, only a few of which were used;

- The typological repertoire has well-defined characteristics of a Late Neolithic assemblage: prevalence of small size endscrapers (most on flakes), high percentage of retouched blades, presence of geometric microliths and individual reminiscent forms of Early Neolithic formal tools (in this case two perforators on blades with high bilateral retouch and one blade with high bilateral retouch of Karanovo I type). General parallels for the studied collection can be found in flint assemblages from all over the country: central-north Bulgaria – the Late Neolithic assemblages from Samovodene and Kachitsa (Цонев 2007); the assemblages from the Late Neolithic in west Bulgaria (Gatsov 1993), the Late Neolithic culture Usoe central-east Bulgaria (Скакун 1994) and indeed – the assemblages from Thrace – the sites of Karanovo and Drama–Gerena (Karanovo III–IV, especially Karanovo IV cultures) (Gurova 2002a; 2004a; 2019). The flint assemblage finds its closest parallels with the materials from the Neolithic pit sites, such as Sarnevo (Gurova 2017a; Case study no. 6 in the dissertation) and Lyubimets–Dana Bunar 2 (Анастасова 2012; Anastassova 2009).

- The results of the use-wear analysis are indicative of the range of used tools and for the possible reconstruction of the subsistence and household activity of the community. They undoubtedly reveal agricultural practices and operations related to the routine lifestyle of the population. These results would be even more convincing if archaeobotanical data were available.

In Bulgarian specialized literature concerned with flint industries, some novelties (both hypotheses and concepts) are not readily accepted and applied, while others remain marginalized. An example of the former type is the hypothesis for the differentiation and more serious interpretation of the two opposite kinds of industry: those directed towards production and consumption of "formal tools" and the opposite ones, called "expedient or opportunistic", based on production of simple (informal) tools. This topic has been developed and discussed in the Western literature for decades. Still, one of the most successful examples of its application is associated with the name of Andrefski (cf. Andrefski 1994). The French prehistorians, intensely focused on the concept of *chaîne opératoire* and all its possible trajectories in both practical and theoretical aspects, dedicate scientific forums to clarifying the nomenclature related to the two above-mentioned types of chipped stone (flint) industries (for ex., Astruc 2005).

In the Bulgarian archaeological literature, the problem was raised and successfully solved on a regional level by T. Tsonev, who studied the Neolithic and Chalcolithic assemblages from central Bulgaria (Цонев 2007). Collections like the one from Harmanli, originating from sites along the river terraces of Maritsa and its tributaries are potentially very interesting for interpretation in terms of: i) definition of the expedient industries that supply raw materials from the Rhodopes' volcanic rocks in the context of embedded/incidental procurement of flint nodules alongside other (subsistence) activities, and 2) their differentiation from industries based on imported raw materials, reduced and reproduced typological repertoire and intensive use of BF formal tools which persist as reminiscent forms from the Early Neolithic backgrounds.

In light of the reliable and already sufficiently accumulated dataset and knowledge of the BF provenancing, supply strategy and distribution, the provisioning of this raw material can be assumed as similar to the network distributions where Tell Karanovo and Yabalkovo were involved – direct procurement strategy from the outcrops in north Bulgaria or supplying BF via the mediating role of sites such as Dzhulyunitsa (or Karanovo?)(Gurova et al. 2022b; 2025).

CASE STUDY NO. 7: FLINT ASSEMBLAGE FROM SARNEVO (LATE NEOLITHIC)

Sarnevo is the first (and still the only) site of the "pit field" type to be fully published in the series of rescue excavations in the context of infrastructure projects of NAIM-BAS (Bacvarov et al. eds. 2017). These peculiar sites were introduced into the BG prehistorian agenda as agglomerations of pit features, interpreted as being related to the ritual rather than domestic sphere (Бъчваров 2017; Петрова и др. 2024; Nikolov 2011). The chrono-cultural affiliation of the site is specific – Late Neolithic (Karanovo III–IV periods in Thrace) – established via material culture (mainly pottery) correlations and confirmed by ^{14}C dates suggesting the time span between 5355/5320–5335/5290 cal BC (Cook et al. 2017, 509).

The relatively large flint assemblage (n=1091) was published by the author in Bulgarian, with an English summary (Gurova 2017a). The assemblage is fascinating and instructive in revealing the coexistence of heterogeneous (in their diagnostic attribution) characteristics and is presented here in a more general aspect. The assemblage comes mainly from negative features (pits); from layer 2, treated as stratigraphically reliable and containing materials identical to those from the pits; and from layer 1, with compromised stratigraphy combining finds from the surface, ploughing and redeposited levels. According to the explorers, "Layer 1 is formed from the soil accumulated throughout the millennia after the Late Neolithic and from the remains of human activities in the Early and Late Iron Age and

the Late Roman period. Layer 2 is formed from the Neolithic palaeosol and from the remains of human activities related to the Late Neolithic pit deposition" (Bacvarov, Tonkova 2017, 18). This assumption made the results of the flint assemblages from different contexts particularly challenging and interesting in a comparative perspective. As the results show, as demonstrated below, there is no significant difference in the flint assemblage composition between the two layers that can support the compromised character of layer 1.

The assemblage is presented according to this general contextual distinction, and visualized in Table 1.

Table 1

Artefact category	Structures	Layer 2	Layer 1	Total
Typological tools	92	60	76	228
Blades	115	58	59	232
Flakes	139	93	80	312
Fragments	82	63	87	232
Cores	28	9	8	45
Varia	19	13	10	42
Total	475	296	320	1091

General observations and discussion

I have no ambition to make any particular interpretation of the site, different from the excavators' concept (despite my deep scepticism about its 'ritual' character), not least because the fragmentary information we have (in spite its diverse aspects) and the lack of assemblages for relevant correlation would provide anticipative/speculative character of the interpretation.

Although no serious analytical research on the raw material spectrum of Sarnevo has been done, some general observations become apparent: the raw materials are sufficiently diverse. Among them there are 'exotica' such as the BF, the grey-black high-quality flint, and the rock crystal. The frequent variety of raw materials is similar to those found in most prehistoric archaeological sites in Thrace (including Upper Thrace as in the concrete case) and had presumably been accessible due to the secondary/placer deposits of the Eastern Rhodope volcanic rocks accumulated via big rivers' tributaries.

The flint assemblages studied and presented are just a part of the bigger and partially investigated complex, and all comparisons between the assemblages coming from different contexts are relative. However, some comparisons of components of the empirical dataset can be instructive and intriguing. Table 2 presents the artefact categories in per cent referring to the total number of specimens in the whole assemblage.

Table 2

Artefact category	Structures	Layer 2	Layer 1
Tools	19 %	20 %	23 %
Blades	24 %	19 %	18 %
Flakes	29 %	30%	25 %
Fragments	29 %	21 %	27 %
Used artefacts	7.5 %	8.4 %	7.8 %
Artefacts of Balkan flint	9. 4%	5.4 %	10 %
Cores	5.8 %	3 %	2.5 %

To some degree, surprisingly, the general proportion of and the balance between techno-typological categories in the three assemblages is quite close and comparable. There are two aspects in which the assemblage from the pits differs from the assemblages from the layers: i) the cores from pits are much more numerous; ii) the used pieces are, on the contrary, much less numerous. It is interesting to try to anticipate the principle of selectivity that the users of the ritual sites used for choosing which artefacts to include in the special and deliberately prepared ritual packages – the basic element in the semantic significance of pit backfills. What the primary reading of the table data suggests is the 'preferential' somehow position of the cores (which are the most volumetric artefacts, suitable to serve as backfill, and the BF artefacts, which are the most aesthetically attractive and possibly valuable. No reasonable arguments for any alternative selection can be imagined and approved because the flint artefacts are considered marginal in the component of the deposit package completion. Their role is seen as binary – as exotic raw material and, eventually, as artefacts made especially for pit deposition (Bacvarov 2017). The former, in the case of BF and rock crystal, is reasonable, but the latter I consider irrelevant and speculative.

The comparison of the typological repertoire creates the impression of a relative homogeneity of the three assemblages (Table 3). This is especially relevant for two typological categories which are among those diagnostic for the Late Neolithic flint industry: the small endscrapers and the geometric microliths. The latter, it is worth recalling, appear in Thrace in the Late Neolithic sequence (Karanovo III–IV period in the eponymous Tell) and belong to sites such as Drama–Gerena, Tell Karanovo and Dryanova mogila, but also to other 'ritual' pit-field complexes like Lyubimets–Dana bunar 2. Some differences, however, are noteworthy: the pit assemblage is the only one with predominance of the retouched blades and the only one where notched blades and a burin are recorded. The composition of the pit assemblage does not allow us to assume some "deliberate placing of specially selected diverse materials in pits in a certain mode, order and connection to each other", as the ritual package is understood and described by K. Bacvarov (Bacvarov 2017, 237).

Table 3

Typological category	Structures	Layer 2	Layer 1	Total
Endscrapers	26	22	28	76
Early Neolithic formal tools	6	3	10	19
Retouched blades	27	12	16	55
Truncated blades	7	6	1	14
Geometric microliths	4	5	6	15
Perforators/borers	5	1	1	7
Retouched flakes	6	5	7	18
Combined tools	3		1	4
Notched blades	2			2
Burin	1			1
Splintered pieces			1	1
Tool fragments	5	6	5	16
Total	92	60	76	228

An observation, which is not visualized in the text, but should be stressed, is that the technological parameters of the cores and the debitage products allow us to assume at least three removal techniques: i) direct percussion with hard hammerstones for flake removals

mainly; ii) punch technique for most of the blades with flat and large butts; and iii) pressure technique for small blades/bladelets with compact or linear butts and parallel ridges and edges. Which pressure modes from 1 to 3 (according to Pelegrin's scheme) were applied is difficult to say (Pelegrin 2012).

The conceptual and interpretative problem of the so-called 'pit-field' complexes is open and waiting for more empirical data (similar sites in other regions, for example) and more convincing arguments about their 'ritual' character. As for the flint industry in a site such as Sarnevo, it is evident that the community/communities that lived in such a site for maintaining routine everyday life (NO objections for such a purpose can be found in the flint assemblage), OR visited it for practising some particular rituals, filling the various pits with diverse materials (representing a "ritual package"); in any case the people left remains of their sustainable inhabitation that in the terms of flint industry means they produced, consumed and discarded their tools balancing between the preferential and *ad hoc* tool manufacture and use.

CASE STUDY NO. 8: FLINT ASSEMBLAGE FROM BRANKOVTSI (LATE NEOLITHIC)

Two campaigns of archaeological rescue excavations of the site were carried out in 2019 in the framework of the already named "Balkan Stream" gas pipeline route. The archaeological investigations revealed a single-layer site whose material indicated affiliation to the Late Neolithic with pottery characteristics of the Vinča and Gradeshnitsa cultures (Kecheva et al. 2020). Chronological attribution has been confirmed by a series of 5 charcoal ^{14}C dates, provided by the Poznań Laboratory and indicating a chronological context of 5500 to 5000 cal BC (Kecheva et al. 2023). General information on the site, its structures, and features is presented in the last cited publication (ibid.). The meticulous spatial records of all finds allowed a detailed spatial distribution to be done within the general plan of the site, where 6 main features are identified in the geophysical map (Kecheva et al. 2023).

The general structure of the assemblage, based on techno-typological differentiation and main features, is presented in Table 1. Structure 3 (not described in the Tables below) is defined as a light construction located to the northwest of the pit in the northern portion of the site (Kecheva et al. 2020).

Table 1

Context	Tools	Blades	Flakes	Fragments	Core	Varia	Total
House 1	4	3	6	11			24
House 2	1	4	1	5			11
House 3	2	4	5	2		1	14
Between house 2 and the oven	3	3	2	8			16
Oven area	5	1	1	7			14
Dug-in /negative feature		1	3	17			21
Pit	2		2	2	1		7
Structure 3	4		4	7			15
From the squares	13	16	14	144		2	189
Total	34	32	38	203	1	3	311

General observations and discussion

The pottery from Brankovtsi suggested affiliation to the Vinča and Gradeshnitsa cultures (Kecheva et al. 2023). Once again (as in the case of Yarlovitsa), some general comparison with flint assemblages from the Serbian Neolithic sequence will be taken into account, as well as the short overview on the north Bulgarian chipped-stone assemblages made by Gatsov decades ago. The Vinča world represented a very attractive topic for researchers for at least half a century. There was a particular focus on chipped-stone assemblages, combining the efforts of many (mainly foreign for Serbian scholars) (Radovanović et al. eds., 1984), etc. Without going into details of this research, some highlights will be presented, including from my study on the Drenovac (2004 season) assemblage, which belongs to the post-Starčevo – Vinča early phases culture (Gurova 2016). The later assemblage from Drenovac corresponds smoothly to the conventional model of the Vinča culture tool repertoire (endscrapers>truncations>retouched blades)(Kaczanowska, Kozłowski 1990). This conventional model was not entirely proven by later studies of some sites attributed to the Vinča–Pločnik I phase (Bogosavljević-Petrović 2001).

The assemblage from Brankovtsi matches perfectly with the axiomatic convention of endscraper prevalence. The high frequency of endscrapers on blades is the hallmark of the assemblages, as seen at Vinča Tordoš II and Vinča Pločnik (Radovanović 1984), as well as at Gomolava with the same cultural affiliation (Kaczanowska, Kozłowski 1984; 1990). A similar trend occurs in the assemblage from Gradeshnitsa in northwest Bulgaria. The entire sequence of Gradeshnitsa is dominated by endscrapers (in contrast to the other Early Neolithic sites in western Bulgaria, studied by Gatsov (1993). Gradeshnitsa level C is marked by a change in the typological repertoire and prevalence of endscrapers on flakes, thus resembling the assemblage from Vinča A (ibid., 33). The dominance of endscrapers on flakes is one of the secure indicators of Late Neolithic characters of the flint industry in Bulgaria.

Switching the focus to more general issues than typological comparisons, the character of the transformation between Early and Late Neolithic is crucial, and is detectable in various aspects of the material culture and social life. The complex transformation in the middle of the 6th millennium cal BC is a multifaceted problem with local and regional characteristics and an unresolved origin, although new explanatory hypotheses are forthcoming (Boyadzhiev 2020). Apart from the changes in raw material supply strategies – a decline in BF provisioning and an increasing role for local flint sources assuring sustainability of small-scale expedient production, a marked change in the typological repertoire appears based on microlithization of the industry, one aspect of which is the increasing number of small (ovoid and fan-shaped) endscrapers on flakes. The comparison between the assemblages from the Early Neolithic site of Yarlovitsa and the Late Neolithic inventory of Brankovtsi is a good example of this change in the chipped-stone industry.

As for Brankovtsi itself, the flint artefacts came mainly from the strata in general, but also from all specific archaeological features, with a more obvious presence of typological tools in house 1, the place between house 2, and the oven and the dug-in negative feature where only debitage products were found. There is no evidence in the flint artefact inventories to identify a location as related to a particular activity.

The remnants of developed agricultural practice in the region (attested at Yarlovitsa) persist during the Late Neolithic, as shown by the number of sickle inserts. As in the case of Yarlovitsa, the lack of palaeobotanical studies can be partially compensated for by data from the adjacent regions in Serbia, where enlargement of the crop range is recorded, with

an increased role for emmer (*Triticum dicoccum*) and einkorn (*Triticum monococcum*) (Filipović, 2014). The comparative diagram of the ubiquity of crop types from Early and Late Neolithic sites from Serbia (ibid.) is particularly instructive. A similar diachronic comparative study, based on Neolithic sites in Bulgaria, would be beneficial and would enable palaeoeconomic reconstructions with integration of the functional analysis of flint toolkits.

Brankovtsi represents a small but instructive Late Neolithic assemblage, allowing us to delve deeper into the social transformation between the Early and Late Neolithic sequences and shed light on the flint assemblages as one of the factors testifying to these changes.

PART III – DIACHRONIC PERSPECTIVE, DISCUSSION AND CONCLUSIONS

1. DIACHRONIC COMPARATIVE OBSERVATIONS

Approaches to the problem of raw material supply and distribution should be based on reliable geological and, where possible, analytical data, or at the very least, on adequate macrophotographs corresponding to visually distinct raw materials among artefacts. Our team's publications provide such a dataset on BF that responds to scientific standards, ensuring a solid analytical corpus that can be used in future national and international projects (see section 2.3 in Part I).

It should be recalled that the study of each flint assemblage should optimally be focused on reconstruction of the *chaîne opératoire*, "from the acquisition of the raw material to the discarding of the tools, and to address questions about the techno-economic organization of raw material acquisition and tool production" (Perlès, Papagiannaki 2022, 198). How can this statement be applied to the supply, distribution and use of BF?

It has already been stated that BF supply and distribution decreased during the Late Neolithic. It is difficult to trace the origin of this process, and any simplistic explanation would be speculative, as the origin of the radical change in social structure and material culture in the mid-6th millennium cal BC is not unequivocal. The ratio between the 'special' raw material (in the sense of preferred, frequent, and typically provisioned by long-distance distribution) and the readily available local raw materials used in opportunistic production is variable and significant. The reason is that in the evaluation of raw materials, it is not the number of pieces that is most important, but the investment of human effort and the complexity of decision-making in raw material procurement strategy.

We are aware of BF outcrops, but we do not know by whom and/or when they began to be exploited for direct consumption, trade, and exchange. We have evidence of a workshop in secondary deposits of BF, with remains of nodule extraction and primary core exploitation – the Zhernov workshop offers us this evidence. But we do not know if a settlement with local experts-knappers existed nearby, or itinerant specialists visited the workshop for procuring raw materials and preparing cores — or (most likely) – if both options/activities were carried out. Workshops at the outcrops could be specialized only for raw material nodule/concretion extraction and core preparation (and eventually exploitation), with a later stage of blank removal and tool fashioning at other workshops – usually near or on-sites. As has been explained, apart from Slatina, with three available blade cores and a significant quantity of heavily heat-altered artefacts, we have no other recorded workshop functioning on-site.

A crucial question is when did the BF distribution system began to operate and serve the first farming sites in north Bulgaria. It seems logical that it happened BEFORE the establishment of Neolithic sites, because they display incomplete but well-represented fragments of the BF *chaîne opératoire*. This network supplied BF products to all Early Neolithic sites (at least those under discussion). For consumers in northern Bulgaria, the supply included cores and debitage, whereas for sites in the Karanovo I–II cultural milieu, the supply probably focused on blades and finished tools. Using the classification based on raw material circulation in the LBK context, the sites in northern Bulgaria fall into the group of producer and intermediate sites, whilst those in southern Bulgaria are primarily consumer sites (apart from Slatina) (Kampf, Denis, 2024). What is, however, clear is that the formal tools of BF, represented by blades with semi-steep to steep/high retouch, were subjected to regular resharpening, thus becoming progressively narrower. It is difficult to determine when and why this network ceased operating, as most sites with BF formal tools do not contain later sequences. It was most probably not related to source accessibility (as hypothesised by Gatsov), but rather due to a new decision-making process oriented towards local, easily accessible resources, as a consequence of deeper changes in the social structure. Tell Karanovo, however, is an example of continuous habitation, and the fact that formal tools decreased in quantity but continued to be used suggests symptoms of a provisioning crisis.

The decline in the Early Neolithic *oikumene* (with many sites abandoned) and re-establishment in a new landscape (see Boyadzhiev 2020, Grębska-Kulow 2017, 2024) inevitably led to adaptations to new circumstances and changes in decision-making in many aspects of everyday life, including the raw material supply. At that time, people seemingly turned to opportunistic production, based on the easier acquisition of raw materials from available local sources (mainly secondary deposits). The local and meso-local distributions are based on the more readily accessible outcrops/deposits compared with the previous BF networks. I hypothesize that people from the Early Neolithic sites with BF formal tools and other products brought these artefacts with them when leaving the settlements/villages ca 5500 cal BC. It is not a great labour to bring several kg of precious objects. They continued to use them at the new places of residence (such as in Apriltsi, why not at Harmanli too) or at the new places for ritual performances (such as Sarnevo, as interpreted by the discoverers).

TECHNO-TYPOLOGICAL FEATURES IN COMPARATIVE PERSPECTIVE

The Neolithic flint industry is marked by two extremes – from macroblade production in the Early Neolithic to microlithization in the Late Neolithic. It is a very impressive transition with an impact on all aspects of techno-typological parameters of the assemblages. The macroblade *chaîne opératoire* is a problem occasionally mobilizing the brainstorming efforts of some specialists, but remains enigmatic. Here, I focus on a couple of points (touched on in previous publications (Gurova 2008a, 135; Gurova 2012b, 18, 21). It is cognitively stimulating, but not realistic, to expect evidence of a direct connection between the BF macroblades from Bulgaria and some desirable Anatolian 'homeland'... not least because, as stated by Özdoğan, any comparison between Anatolian and Balkan assemblages should be done "without overstating the presence or the absence of selected objects" (Özdoğan 2006, 23). As another theoretically framing concept about how and what was transferred during the Neolithization motility, the opposite approach (focused on elements that were not transferred) is noteworthy, as demonstrated by C. Perlès (Perlès 2005).

The origin of the Balkan macroblades is a topic that vividly engaged the attention of J.K. Kozłowski, who defined it as "one of the most puzzling questions of the Balkan pottery Neolithic" (Kozłowski 2007). The question is still unresolved, and it is better to focus on the macroblades displayed in the Bulgarian Early Neolithic that ensured the fashioning of the BF formal tools. Each macroblade debitage/removal depends on two main factors – suitable raw material/flint for core *mise en forme* and knappers with sufficient skills to maintain a successful core reduction system. BF definitely responds to knapping property requirements. However, on the question of who were the (itinerant) knappers, or people with 'new personal skills' (in the sense of Chapman and Gaydarska, 2011), there is no unequivocal answer.

Once removed by indirect percussion (punch technique), the (macro)blades of BF continued their biography as being used directly (mainly as sickle inserts) but with sequential resharpening or by retouching into various types of retouched blades. The retouching was accomplished through pressure flaking using an antler stick (retoucher). Apart from this optimal, method many incidental kinds of 'retouching' are plausible – scarring due to utilization or taphonomic alterations, or intentional retouch using an *ad hoc* stick or simply pressing the blade on a hard platform. My macro- and micro-observations of numerous series of BF formal tools (retouched blades) unequivocally suggested multiple instances of rejuvenation/resharpening of their lateral edges. The clearest examples of such a procedure are revealed by BF sickle inserts. Starting with their use as virgin blades, their edges systematically required reversing and resharpening. Thus, the edges became gradually abrupt, and the retouch on them progressively (and unavoidably) higher and steeper. In this respect, we can say that the formal tools reveal a technological dichotomy – apart from the initial, deliberately abrupt retouch performed by the knapper, a significant part of them can be attributed to a maintenance strategy consisting of systematic resharpening for utilitarian needs.

There is a crucial detail to be clarified – no evidence for lever pressure of relatively big blades is recorded among the Early Neolithic assemblages from Bulgaria. On the other hand, the pressure technique can be attributed to the small and microcores, which are common in Late Neolithic assemblages and represent one of the most notable traits of microlithization in the industry. Our assemblages provide rare examples of small, light blades with readable characteristics, facilitating the detection of reliable removal techniques. More instructive are the exhausted small cores from Late Neolithic assemblages. They are not of the conical/bullet types, which are very characteristic of the pressure debitage in the Near East and Anatolia. Our cores have various shapes, with usually plane striking platforms (with various inclinations) and flat (to slightly convex) removal surfaces and relatively parallel arises. The widths of the blade/bladelet negatives suggest that Modes 1 to 3 (as described by J. Pelegrin are applicable) (Pelegrin 2012). There is a conventional view that bladelet detachment and standardization are necessary for the production of geometric microliths from the Mesolithic and later periods of prehistory. In our series of geometric microliths, this concept seems more applicable to the Late Neolithic (with numerous microliths), rather than to the Early Neolithic.

The Early Neolithic microliths, despite their scarcity, could eventually compensate for the lack of pointed arrowheads, which are typical of the PPN and the Neolithic in the Near East and central Anatolia, but are missing in northwest Anatolia and the Balkans (Гюрова 2005). Typical projectile points are also absent from the Early Neolithic period in Greece, and C. Perlès mentions them among the non-transferred Neolithic elements (Perlès 2005). The geometric microliths reappeared in the Late Neolithic with the same anticipated

projectile point function, as they were, in fact, the only known weapon elements among the local Neolithic groups.

To summarize the topic: The geometric microliths from the Neolithic strata warrant further study, shedding light on many technical details in a diachronic perspective. The variability in morphometric parameters, retouched edges, and general shape (isosceles *vs* scalene) requires a detailed techno-typological study to reveal, eventually, a common know-how applied or at least a trend in microlith manufacture. A thorough study based on uniform criteria of description, terminology, and interpretation would be a significant contribution to the study of geometric microliths in both local and broader contexts.

I would resume the typological changes taking place during the Late Neolithic sequence emphasizing the following:

- Early Neolithic: i) domination of retouched blades within which the most representative are the formal tools (retouched blades and sickle inserts); variability in the proportions of other typological groups derived from the regional patterns and specificity in the household eventual specialization (example of micropiercers/drills in the Kovachevo and Ilindentsi assemblages); iii) marked preference of high quality flint (BF) for toolkit manufacture;

- Late Neolithic: i) increased role of local raw materials and limited demand for BF; ii) a decrease in large, ordinary blade production and the prevalence of flake debitage with subsequent transformation into tools on flakes (mainly endscrapers); iii) the great diversity of endscrapers both in typological and morphometric parameters, but with apparent shortening of proportions and increased shape variation; iv) microlithization is represented by micro cores for blades (bladelets) and two categories of retouched artefact: (very) small endscrapers on flakes with oval (semicircular) shape, and geometric microliths *sensu stricto* (trapezes, crescents/segments and rare atypical shapes).

FUNCTIONAL CONNOTATIONS OVER A LONG TIME-SPAN

My dataset on the functional features of artefacts from the studied assemblages is instructive for each concrete assemblage, as presented in Part II of the dissertation. On the other hand it does not allow for exhaustive and reliable diachronic comparison between them. That is the reason why I focus on selected categories of tools, whose functional analysis I consider the most trustworthy for interpretation and commentary here. These groups of artefacts are: i) the sickle inserts because they are easily recognizable on the macro level, and no piece is omitted from my use-wear analysis; ii) the geometric microliths, whose scarce number and erratic appearance allowed all items from the assemblages available to be observed. Both artefact categories relate to the subsistence activity of the Neolithic people and are treated as 'fossiles directeurs' in a broader perspective of agriculture and hunting.

We have two excellent examples of toolkits that directly refer to a specialized production type – the micropiercers/borers from Kovachevo and Ilindentsi, whose analysis here is limited to the second site (Case study no. 4) and is aided by experimental work on prehistoric drilling (Gurova et al. 2013). More meticulous analysis and further comparison between the two toolkits from both sites is needed until their role in the communities reaches the level of identified and revealed specialization.

Sickles appear in the Early Neolithic sites in Bulgaria, completely evolved, as part of the Neolithic package. They are present in the earliest strata of Kovachevo (before the adoption of Karanovo I cultural traits). They are also present at Dzhulyunitsa, but they undoubtedly

reach their apogee during the Karanovo I culture, becoming one of its emblematic features. The sickle inserts found in Early Neolithic sites are numerous and exhibit morpho-typological variability. There is no evidence of morphometric standardization of sickle inserts; they consist of virgin and variably retouched blades measuring 2–5 cm in length and 1–3 cm in width. The sickles on typological tools – mainly (bi) laterally retouched blades predominate. In absolute numbers, sickle inserts prevail among the Early Neolithic tools with utilization traces. Among the sickle inserts, a particular category are the sickle elements of BF, thus representing a prominent part of the formal toolkits. They usually exhibit durable use (obviously preferential) and shiny, angular polishes (from slightly oblique to diagonal) on the working edges, which were resharpened (sometimes continuously) until the working edges became abruptly retouched, as mentioned earlier (Gurova 2005). Sickle-blades with parallel lateral polish are extremely rare. The Karanovo type of sickle is widely recognized as one of the most efficient prehistoric agricultural tools, tracing its origins to the Fertile Crescent, with very close parallels at Neolithic Hacilar in the Lake District of Anatolia (Gurova 2008d). The Hacilar type of sickle was recorded among the extensive series of blades with cereal diagonal polish in the assemblages from Ilıpınar and Menteşe (Gurova 2001; 2006; 2008b).

During the Late Neolithic, the same type of sickle seems to have been used, despite the changes that occurred in the chipped-stone industry. The sickle inserts continue to be the most important category among the used tools. More of them (particularly in the tell sites with noticeable continuity with the previous Early Neolithic strata) are the same BF formal tools that persisted as a reminiscent form of the Early Neolithic formal toolkits. Another category of sickle inserts consists of unretouched blade fragments, but soon after their use, utilization retouch appears, and/or some resharpening is done. Therefore, the most common sickle elements remain the retouched blades. Neolithic sickles can be reliably identified not only by the typical micro-use wear of their flint inserts, but by some complete or fragmented hafts made from *Cervus elaphus* antler. Contrary to the observations on Mediterranean assemblages with sickle inserts, which reveal a transformation from diagonal polish (insertion) to parallel hafted inserts (Mazzucco et al. 2020), no change in the hafting of sickle elements, and therefore in harvesting technique, is observed among Bulgarian Neolithic assemblages.

The second group of artefacts I present in the dissertation consists of the geometric microliths, which appear in both Early and Late Neolithic assemblages and are anticipated to have functioned as a transverse arrowhead, given the lack of typical pointed projectile points in the tool repertoire. There is a dichotomy in the functional connotation of the geometric microlith: on the one hand, it is anticipated that they were used as projectile points (transversal arrowheads or barbs of composite projectiles), but on the other hand, they often reveal traces of other functions, such as sickle inserts and/or knife elements for cutting various materials.

As a brief synopsis, several general observations on artefact utilization can be formulated.

- typical BF formal tools (blades with bilateral steep retouch) suggest several steps in their functional transformation: i) starting with sickle inserts as virgin blades followed by reverse and resharpening for the same function (from there some relict cereal polish along the rejuvenated lateral edges) and finally (after accumulation of various microwear stigmata and dull edges) – discard; ii) another biography cycle recorded is the deliberate retouching and use for hide and/or wood as composite tool – the so-called ‘rukan’ with a arched handle and a blade, axially inserted in the centre. This instrument is very efficient for scraping hide and wood, and its use is recorded among the formal tools from Tells

Azmak and Karanovo (Gurova, Gatsov 2000). Many of the formal tools, which by resharpening became very narrow, reveal relict ambiguous traces with no detectable character;

- most multifunctional tools are the variously retouched blades (except the above-described). We have, however, kept in mind that part of the retouches have utilitarian origin which, after intentional rejuvenation, gains a dualistic feature and is typically treated as fashioning retouch – from here arise these 'discrepancies' between the conventional typological classification and the microscopic observation, correctly described by C. Perlès (Perlès, Papagiannaki, 2022, 213);

- even more apparent is the discrepancy between the endscrapers (anticipated to serve for hide scraping) and the fact that most (in the cases I studied) of the Late Neolithic small endscrapers remained unused;

- some operations, such as wood and bone/antler processing, are weakly represented, which is surprising because of the rich osseous industry and the wide application of wood in household life – some options as alternative toolkits, or some weakness in their traceological detection (my personal approach) should be considered;

The use-wear results unavoidably provoke questions about the correlation between the typological and functional features of the flint artefacts; how can we explain the variety of the typological repertoire *vs* the limited practical application of some of the types, and what could be the tool producers' priorities – intra-and inter-community exchanges, concrete functional needs, or formal representation of raw material supplying restrictions? These questions I formulated years ago are still awaiting satisfactory resolution (Gurova 2006).

2. DISCUSSION AND CONCLUSIONS

Each of the case studies presented in Part II contains a discussion and conclusions part, because each case study is peculiar in its shared and unique characteristics. To make a compilation of these discussions/conclusions and to present here a synopsis of them is not a great achievement. I would rather finish with some thoughts appearing in my mind alongside my research and my intention to assimilate the increasing amount of literature on Neolithization for ex. ...

Let us recall Özdoğan's concept that the … "neolithization process was a complex phenomenon, so multifarious that no single model would suffice on a supra-regional basis". In this movement, each settled zone may be considered as a 'core' to those further along the way. So there were many moving 'cores' (Özdoğan 2011a, 31). My question is which is the 'core' role of Bulgaria and in which process? I think I found my answer (within others) – it is at least in the domain of BF supply and distribution from the outcrop clusters in north Bulgaria into the surrounding Meso-Neolithic oikumene in the Balkans at the boundary between the 7th and 6th millennia BC.

What stories were the flint assemblages telling me during my study? I will try to make my narrative short and maximally instructive. There are two Early Neolithic sites in Bulgaria which, in the current state of knowledge and available chronological dataset, could be seen as earliest farming establishments – Kovachevo in the Middle Struma Valley and Dzhulyunitsa in central north Bulgaria, on the small tributary of the Yantra river. As clearly stated in the previous section, Kovachevo undoubtedly relates to one of the earliest migration waves reaching the actual territory of Bulgaria. Kovachevo demonstrates great cultural development before and after its incorporation into the Karanovo I cultural complex during Kovachevo periods Ic–Id, when BF appears at the site. *Ergo* – Kovachevo's

role in the emergence of the BF network is null. Its role as eventual 'core' can be envisaged in the complex interactions with the sites of Pelagonia in northern Greece, and those to the north along the Struma Valley (Grębska-Kulow 2024).

On the other hand, Dzhulyunitsa with its impressive BF blade production and fortunate location between the Pleven–Nikopol and Shumen clusters of BF (of BF-like) flint sources is easily envisaged as a 'core' area for distribution of BF blanks after the supply of the flint nodules from the outcrops by groups dealing with the primary acquisition of the flint and its subsequent trade/exchange. Flint knappers from Dzhulyunitsa obviously possessed the necessary know-how for successful blade removal. The question is where did these knappers come from? Not many options could be listed. The nearest location geographically is from the Iron Gates region, down the Danube, reaching the high-quality flint source areas, before establishing the Dzhulyunitsa site; another possibility, according to the theory of the sub-Mediterranean-Aegean vegetation zone, supposes a shift of migrant groups from their northward itinerary toward the north Bulgarian platform. However, in this scenario, the first site inhabitants supposedly immediately undertook expeditions for raw material provisioning. In my view the best match to the circumstances and the evidence of the pre-Karanovo enclave in north Bulgaria, comprising a cluster of sites (Dzhulyunitsa, Koprivets, Polyanitsa, Orlovets, Samovodene), is the hypothesis of a maritime spread of farming groups from northwest Anatolia (including the Marmara region) along the (now submerged) Black Sea coast eventually reaching the Ludogorie Plateau (Özdoğan 2006; 2011a–b). Here I can quote Roodenberg's statement: "The combined outcome of the radiocarbon dates and DNA analyses clearly illustrates that from as early as the middle 7th millennium, northwest Anatolia must no longer be perceived as a cul-de-sac but as a passageway employed by migrating agriculturalists" (Roodenberg 2016, 4).

Another possibility of course is that at Dzhulyunitsa mostly itinerant knappers arrived for ensuring flint productions. This option approaches the virtual scenario of pre-Neolithic/Mesolithic groups deeply involved in the BF procurement strategy and core reduction systems – i.e. practising the primary stage of the BF *chaîne opératoire*…

Another trajectory of my (more general) thoughts ....

During my long-lasting research on Neolithic assemblages I tried to apply a multifaceted approach *via* techno-typological and functional analyses. The former is the oldest, most traditional and conventional in flint industries research for revealing their characteristics and making them usable in comparative (synchronic and diachronic) perspective. For a formal glance at the assemblages such an approach is workable and even satisfactory/exhaustive. Technological and typological stigmata are relatively well defined, and allow flexible implementation. The vast literature on chipped-stone industries around the world was, is and will be carried out based on this methodological and interpretive level.

A key advantage is to approach assemblages using use-wear analysis revealing the functions of the artefacts and allowing us to identify particular toolkits and to 'lift the curtain' on the real everyday household and subsistence activities practised by the human groups. The functional connotations of the artefacts are not to create supplementary (often confusing) functional typology, which unavoidably will confront the conventional typology based on a series of common features resulting from repetitive retouching/fashioning of the blanks, and transforming them into typological tools. The function of the artefacts gives a new perception of the flint/stone implements, thus gradually improving our understanding of the tools.

My experience nowadays suggests to me that, in some cases, starting with a simple 'label' in the specialized literature – 'Balkan flint', for example – and trying to approach it scientifically by means of relevant analytical procedures can itself become a trajectory for real scientific advancement. In this sense, I think the most important part of my research consists of the analyses, results and relevant interpretations that I and our team have produced on BF, converting it from a confusing fiction to a real (and inescapable in passing) factor in the Neolithization debate, thus ending the era of scenarios and paradigms mainly based on pottery. All aspects of BF query provoke new questions and open rooms for more specialized study going far beyond description and outcrop identifications. Its network before and during Balkan Neolithization is crucial. The results of our research over the past decade have provided new evidence relating to the Neolithization of the eastern Balkans and the vital role played by lithic raw materials (particularly BF) in the spread of farming. If we focus on the Balkans, then all the BF issues mentioned above (section 2.3 in the dissertation) suggest that none of the conventional scenarios and paradigms of the Neolithization of Bulgaria is workable without taking into consideration the BF outcrops and their accessibility to the first Neolithic settlers. The repetition of the BF formal toolkit over a large territory and its co-occurrence with other distinctive socio-cultural traits in the first half of the 6th millennium cal BC, implies the existence of a sophisticated exchange network with a high degree of interaction, elements of which are still invisible, but which requires detailed systematic research.

However, there are important questions still unresolved …

- Did all BF used in the Early Neolithic of SE Europe originate from the known sources in northern BG? To resolve this question, more geological surveys and studies in neighbouring countries are needed.

- When and how did the BF exchange network originate?;

- Were there Final Mesolithic populations living along the Lower Danube who already exploited the BF sources in northern BG … and did they share that knowledge with the first farmers?;

- Or did the first farmers to reach northern BG (re)discover the BF outcrops themselves?;

- From which direction(s) did the first farmers come? Which of the various scenarios (based mainly on 20th c. pottery studies) is best supported by the available radiocarbon data?

- How does BF acquisition fit within the traditional concept of the Neolithic package (it exists from the beginning of the Karanovo I culture), but which pre-Karanovo population introduced it?

The questions listed above should be kept in mind by Balkan prehistorians, since resolving them will require a common effort and more rigorous analytical studies of BF by scholars in all Balkan countries. Bulgaria is very rich in high-quality raw materials that have been used in the prehistory, but the country is much richer in assemblages containing a variety of these raw materials in multiple configurations and telling us different stories about the people behind them. We should accurately read the stories before embodying them in our personal narratives.

MAIN CONTRIBUTIONS OF THE DISSERTATION

1. This dissertation represents the first comprehensive synthesis of long-term research on Neolithic flint assemblages, examined from multiple perspectives: the raw materials used for artefact production, and their techno-typological and functional characteristics. Of more than 40 assemblages investigated by the author, 26 – originating from systematically excavated sites – are presented. The assemblages are considered diachronically in their respective contexts. They are also compared with a further 12 sites studied and published by other scholars.

2. These Early Neolithic assemblages are presented within their cultural and chronological framework and the broader theoretical discourse on the Neolithization of the Balkans. A critical re-evaluation is offered of several paradigms and scenarios related to this complex process, highlighting the role of flint as a raw material, and Balkan flint in particular, as well as the diagnostic artefacts made from it, within the historical dynamics of the spread of the new economy across the Balkans.

3. This is the first study of flint assemblages based on a systematic interdisciplinary approach to flint raw materials, providing a solid empirical and scientific database derived from geological analyses, from field investigations to complex laboratory expertise. The research was conducted in collaboration with professional geologists, incorporating geological field surveys, the identification and documentation of geological outcrops, macropetrographic descriptions of raw materials and artefacts, micropetrographic examinations of thin sections taken from both geological and archaeological samples, and geochemical analyses performed using laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS). Our research group has pioneered the application of this innovative methodology to the study of prehistoric flint raw materials – not only in Bulgaria and the Balkans, but on a European scale. The extensive corpus of empirical data and results from the geochemical analyses is available online and can serve as a valuable resource for future international research projects.

4. The strong analytical foundation of the raw material study has made it possible to clarify an almost mythologized issue in Balkan prehistory – the meaning and character of 'Balkan flint'. Once an enigma and a label with an uncertain geological context in the specialist literature, it has now become a well-studied flint type with a clearly defined origin, geological characteristics, and reconstructed trajectories of prehistoric distribution – from its sources to the consumer settlements. The distribution network of Balkan flint, partially reconstructed with the aid of GIS (Geographic Information Systems), constitutes one of the key previously missing components in understanding the active circulation of raw materials, artefacts, and ideas among communities in the Balkan Neolithic *oicumene.*

5. The study of Neolithic assemblages made it possible to identify and define diagnostic artefacts characteristic of the Early and Late Neolithic, and to clarify their evolution, transformation, and regression through examples, general observations, and conclusions. The manuscript (Part II) contains eight Case studies (in which assemblages are described and interpreted in detail), comprising five from the Early Neolithic and three from the Late Neolithic, allowing for both correlative and diachronic analyses. Five of these sites (all located in northern Bulgaria and one in the Middle Struma Valley), are the first publications of highly significant Neolithic settlements in the context of Neolithization and the distribution (from local to supra-regional) of Balkan flint. Based on geological data, the interactions between settlements from different regions acquire new dimensions and trajectories of intra- and inter-settlement communication.

6. The manuscript incorporates data on the functional (use-wear) analysis of artefacts from the main assemblages, revealing the principal activities related to agriculture and other household practices, as well as aspects of specialized production of characteristic tools and ornaments. Particular attention is devoted to sickles, one of the primary markers of the productive economy and, consequently, of the spread of the Neolithic way of life and subsistence. Emphasis is also placed on the functional connotations of another interesting category of artefacts – geometric microliths – the origin of which remains a subject of ongoing debate. The author has a clearly articulated stance on this issue.

7. Finally, and by no means least, this dissertation establishes a benchmark for the comprehensive and relevant publication of flint assemblages – both as an epistemological framework and in terms of the documentation and visualization of artefacts. Its contribution will be of benefit not only to the prehistoric research community in Bulgaria but also to scholars interested in one of the key developments in the prehistory of the Balkans.

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