

History and current studies of petroarcheological data from the Neolithic and Eneolithic in Serbia

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Neolithic and Eneolithic sites in Serbia generally occupy extensive areas on old terraces of the rivers Danube, Velika, Zapadna and Južna Morava or in the lowlands of the central part of the country. Systematic excavations of these settlements have made possible the study of many assemblages of stone artefacts. In the middle of the 20th century the methodological approach to the study of such finds was based exclusively on typological analysis of the main tool types. In the next phase investigations expanded to technological questions until the 1980s when studies of stone artefacts started to include the raw material aspect of the problem. Many hypotheses have been suggested about the provenance of stone raw materials and the method of their procurement. These were well-presented stories without firm indications concerning the facts in the field. In order to demonstrate the necessity of the petroarchaeological approach we present the past development of these investigations and the studies and projects that are now in progress (fig. 1).

The beginning of petroarchaeological investigations in Serbia

Petroarchaeological investigations in Serbia started in the first half of the 20th century and are related to excavations of Belo Brdo-Vinča and the work of Miloje M. Vasić (the first professionally educated archaeologist in Serbia). By submitting quartz crystals from Vinča to Jovan Tomić, professor of mineralogy at Belgrade University, in order to investigate engravings on the crystal surface and identify certain 'hidden' meanings, as well as asking geologist V.K. Petković for his professional opinion about the origin of silicified wood at Vinča, and also by determination of source of quartz crystal in the area of the Rudnik mountain, cinnabar and copper ores 'in the Vinča hinterland', M. Vasić opened the field of cooperation between archaeologists and geologists in Serbia (Bacih 1932,104; Bacih 1936, 99-101). Unfortunately, this trend did not continue and investigations of stone resources used in prehistory were neglected until two decades ago, the only exceptions being isolated cases of the large settlements of Belo Brdo-Vinča, Gomolava, Divostin and Selevac. The investigations of stone artefacts were the results of international scientific projects (Radovanović et al. 1984; Tringham et al. 1988; Voytek 1990) and sometime later they were included in master's and doctoral theses (Bogosavljević 1990; Антоновић 1992; Šarić 1999; Antonović 2003).

At the sites Gomolava and Belo Brdo-Vinča Polish petrologist M. Pawlikowski in-

structively defined the main groups of stone raw material and classified them by letters of the alphabet with short descriptions including information about colour, structure, lustre and composition (Kaczanowska, Kozłowski et al. 1984, 8-13; Pawlikowski 1989, 9-15). Descriptions were accompanied by microphotographs of petrographic samples of basic raw materials. At the same time he attempted to determine potential deposits of identified raw materials from the geological literature (Kaczanowska, Kozłowski et al. 1984, 8-9). Unfortunately, the symbols of groups of materials are not identical for all assemblages as investigations were primarily directed toward identification and grouping of types and varieties of raw materials from every given site. Thus group **K** at Gomolava denotes raw materials of diverse variants originating from secondary deposits, while group **O₁-O₃** is flint of whitish colour with dark gray cortex. On the other hand group **O** at Vinča is quartz and group **K** is light, milky-brown flint of homogeneous structure consisting of chalcedony with scattered grains of quartz (Kaczanowska, Kozłowski 1986, 9-19; Kaczanowska, Kozłowski et al. 1984, 8, 9). Very soon afterwards a conference about the origin of flint raw materials in the Upper Paleolithic of northern and central Europe was organized resulting in a general conclusion about the necessity for standardization of methods and techniques of identification of stone raw materials and focusing on this problem in the broader territorial and chronological context (*„Northern“ (Erratic and Jurassic) flint of South Polish origin in the Upper Paleolithic of Central Europe* 1989). On that occasion M. Pawlikowski suggested a preliminary list of raw materials with four basic groups of material: sedimentary, raw materials of magmatic origin, metamorphic rocks and silica minerals. He marked distinct types within the groups using abbreviations: F - flint, Ch - chert, Li - limnoquartzite, R - radiolarite, H - hornstone, S - spongioliths, D - diatomites, G - geize (sedimentary rocks); Ob - obsidian (igneous rocks); J - jasper, Qw - quartzite (metamorphic rocks); O - opal, Ch - chalcedony, Q - quartz, and A - agate (siliceous minerals) (Pawlikowski 1989, 7-15).

At the same time, the American school (a colloquial name for projects carried out in central Serbia at the end of the 1970s) demonstrated a system of data generalization using already established tables of raw materials, which did not include photographs of the samples. This made possible the analysis of a large amount of archaeological material. The raw materials from Divostin are petrologically identified (D. Weide) and classified into distinct groups of material. Statistical correlations for basic groups of chipped artefacts - tan chert, pebble flints, quartz, porcelanite, obsidian (Tringham et al. 1988, 204-205; table 8.2, 8.3) and groups for large and ground tools - porcelanite, quartzite, jadeite and serpentinite (Prinz 1988, 266, table 9.2) have been established. Nevertheless, the representatives of each group were not separated for comparative assemblages and thus the possibility of macroscopic comparison of raw materials from neighboring geographical regions has been lost for a rather long time. The raw materials for chipped and ground stone tools at Selevac are presented as previously defined stone types. Also 15 petrographic samples of chipped stone material were photographed and as they revealed heterogeneous structures and provenances it was concluded that it is pointless to define the assemblage of over 7000 specimens in this way (Voytek 1990, 440). The microscopic photos of samples were not published but their results were incorporated in the established groups of material. The raw materials were assigned to the list of 25 types including 'yellow chert (10YR6/6)', 'gold opaque chert', 'general silex', 'milky quartz', 'black chert', 'calcified chert', 'chalcedonic quartz', 'white tabular chert'... (Voytek 1990, 440, table 12.5, 458-489). The list of ground and large tools is longer and divided according to basic rock types into plutonic, volcanic, sedimentary and metamorphic rocks with their subtypes including 85 rocks in total that could have been

used for production of large and ground stone tools (Voytek 1990, 487-488).

In all the previously mentioned instances we have at our disposal the identification and establishment of a basic system of classification of stone materials according to affinity into larger groups. But, identification of deposits as well as circulation of raw materials has not been included in the mentioned international projects. This method remained in use for many years and the result is that the source of raw materials is still based on hypotheses from the geological literature. Thus, for the settlement at Selevac the valleys of the rivers Ralja and Jasenica were major sources of flint raw materials in the form of pebbles and the Gledić Mts are possible sources of nodules of white flint and white opal because of their limestone sediments (fig. 1). The statements of this type for the sites of Selevac, Divostin, Gomolava, Belo Brdo-Vinča as well as for a series of Starčevo settlements have not been confirmed by field investigations of potential deposits or by comparing raw materials from deposits with artefacts from the sites. Because of this methodological inconsistency hypotheses about trade, import or use of local stone in the Starčevo and Vinča culture have been suggested exclusively on the basis of similarity of tool types and used materials from different settlements. The foreign scholars also made mistakes because of insufficient knowledge of the geographical characteristics of the central Balkans. This was another obstacle for further identification of deposits and their exploitation.

Serbian authors – individual efforts in petroarchaeology

The appearance of the earliest texts written by Serbian authors incorporating petrological analyses of stone artefacts coincided with the end of large international projects (see: International symposium *Vinča and its World* [1990]). These were individual attempts and depended exclusively on personal affinity and knowledge of the archaeologists. The scientific and cultural institutions of the former Yugoslavia and later of Serbia did not have until the end of the 20th century any interest in financing projects and investigations concerned with the problem of stone resources. The mentioned efforts have not been recognized on time, hence there is marked discord between 'factography' in the works of Serbian authors and European models of archaeology.

An exception of special significance in the history of petroarchaeological investigations is the catalogue of artefacts from the Department of Prehistory in the Belgrade City Museum – *Predmeti od kosti, roga i kamena* (Perišić 1984). Two facts are important where this book is concerned. First, every object was macroscopically examined by the petrologist M. Babović, groups of raw materials were distinguished and a certain number of specimens were subjected to chemical analyses or microscopically analyzed as petrographic samples. Second, it is a museum collection, which is heterogeneous regarding the finding place, method of acquisition and type of object and this limits the archaeological context of the book to a considerable extent. Each artefact is accompanied by a drawing and petrological identification in addition to a catalogue description. For its time, in the context of the Serbian archaeological literature, it was a distinct innovation and a step forward from standard museum publications of that type. Nowadays, when we consider the data in this Catalogue from a distance, we might conclude that the 628 published objects are the first organized collection of petroarchaeological interpretations in Serbia.

The next step was individual attempts of scholars who realized, while working on stone finds from prehistory that in addition to determination of composition and type of stone the suggestion from local petrologists concerning possible stone deposits can make

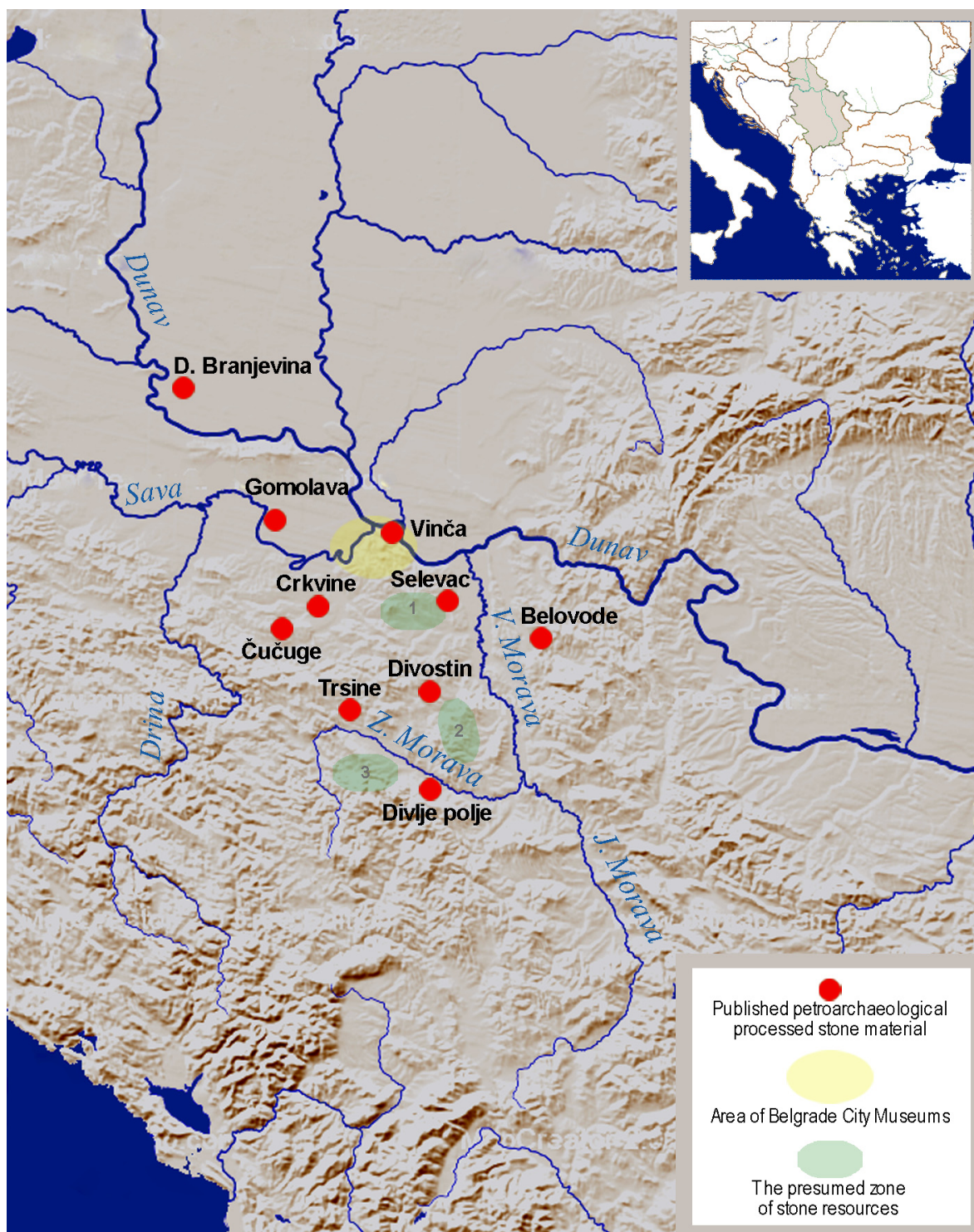


Fig. 1. Neolithic and Eneolithic sites with published petroarchaeological data. Suggested zones of stone resources for Selevac (1, 2) and hammer-axes from National Museum in Kraljevo (3)
 Обр. 1. Неолитни и халколитни селища с публикувани петроархеологически данни. Предполагаеми зони на суровинни местонаходища за Селевац (1, 2) и за брадви от Националният музей в Краево (3)

an important contribution. Eleven stone hammer-axes from the Archaeological Collection in the National Museum in Kraljevo were analyzed (Богосављевић 1987), and the petrologist D. Stojanović according to structure (X-ray diffraction, macroscopic and microscopic analyses) identified two main groups of rocks and the area where the raw material could have originated. He suggested the area to the north and west of the source of the Lopatnička river but with the warning (fig. 1): 'This assumption should be confirmed in the field' (Стојановић 1987, 29).

The basic identification of raw materials at the Neolithic settlements from the Zapadna Morava valley (Divlje Polje and Trsine) was carried out for 2500 specimens as a collaboration of an archaeologist and a petrologist (Bogosavljević 1990, 15-40). The macroscopic identification of a large number of described types and varieties is supported by a series of X-ray and microscopic analyses of group representatives with illustrations. In that way basic groups of raw materials (white opals, the so-called 'soft white stone' and flint) have been identified, while their use had changed through time and space. The results of quantitative analysis of basic groups of raw materials and their varieties had a direct impact on the final interpretation of the raw material structure in the settlements during final phases of the Vinča culture (Богосављевић-Петровић 1992).

Soon after, an assemblage of 1226 tools and fragments of ground stone tools, tools with abrasive characteristics, pounders, querns, weights, decorative objects and other categories from the site of Belo Brdo-Vinča discovered during the excavations of Miloje Vasić were analyzed (Антоновић 1992). The petrologists N. Kreminac, N. Vasković, D. Pešić and A. Antonović identified general groups of rocks on the basis of microscopic specimens, differential-thermal and chemical analyses. The results of analyses associated certain rock characteristics with distinct types of tools: adzes, axes and grinding stones are related to varieties of hornfels, silicified limestone and siltstone meta-sandstone while abrasive instruments were mostly made of rocks with grained structure – varieties of sandstones. In the opinion of petrologists the territories where investigations of the origin of raw materials from the eponymous site should start have been preliminarily identified. Investigations by the same author have been expanded with a few new assemblages of the Vinča culture – Čučuge, Belovode, and Donja Branjevina. In addition, six samples of river pebbles from possible raw material sources were gathered as a contribution to the hypothesis that raw materials for large tools in the Neolithic were obtained primarily from fluvial deposits (Antonović 2003).

In the meantime the chipped stone assemblages from around twenty Starčevo culture sites containing 5831 artefact in total were studied (Šarić 1999). Petrologists N. Vasić, V. Jović, Lj. Cvetković, V. Cvetković and K. Resimić conducted macroscopic and microscopic investigations in order to identify raw materials but the methodological procedures and photographs of specimens have not been published. The author decided on a simplified classification, which includes large group of flints, quartz-rock crystal, quartzite, volcanic glass and so-called 'white rocks of different origin'. This approach is valid from a petrological point of view but essential data for interpretation of archaeological contexts are lost by leaving out nuances, e.g. the varieties of flint. This relates to the preference of flint of distinct quality or colour for distinct types of tools.¹ On the other hand, the author is aware of

1 In the discussion on raw materials author distinguishes the variety 'Balkan Flint' with proportional incidence in comparison to other types of flint at the sites and thus affirms the idea about necessity to identify varieties although he does not advocate that opinion in the main text (Šarić 1999, 233; ca. 2)



Fig. 2. Examples of so- called 'soft /light white stone': layers in situ (upper left), blades, point, cores and debitage from Crkvine site (right and down left)

Обр. 2. Примери за т. нар. „беловат мек камък“: пластове in situ (горе ляво); пластини, връх, ядра и дебитаж от селището Crkvine (дясно и долу ляво)

the real risk of introducing too many varieties as it is well-known that flint from the same deposit can be of different colour and quality.² It is worth mentioning that potential deposits of the mentioned raw materials in the whole of Serbia have been listed on the basis of geological literature, but field investigations of the deposits and identification of distinct sources of raw material have not been carried out.

Over the same period few texts focusing on investigations of stone raw materials in the Serbian Neolithic have been published. Many authors were preoccupied with the use of the so-called 'soft white stone' (fig. 2) and the problem of imprecise terms and interpretations expressing the view that a source of confusion is the absence of a relevant number of identified samples particularly from deposits and settlements as comparative elements for valid analysis (Bogosavljević 1990; Antonović 1997; Antonović, Antonović 1998; Šarić 1999). Few articles concerning the problems of identification of workshop camp sites in the vicinity of ore bearing regions, mining and gathering stone raw materials, systematization of archaeological and geological information about distinct geographic-geological region as prolegomena for future study of the Vinča culture have also appeared (Јовановић, Милић 1988; Јовановић, Богдановић 1990; Богосављевић 1999; Богосављевић-Петровић 2001; Šarić 2002; Богосављевић-Петровић 2005; Antonović, Resimić-Šarić et al. 2005). The impression is that these works had impact on intensification of studies and on initiating quali-

² See example from Lojanik, mine of stone raw materials (Богосављевић-Петровић 2005, 99-100, сл.10)



Fig. 3. Photo-lithoteque, (Crkvine, Kolubara region)
Обр. 3. Фото-литотека (Crkvine, област Kolubara)

tatively new research projects.

Involvement of petroarchaeological teams in the project

Greater progress in the petroarchaeological approach was made when the third campaign of archaeological excavations at Belo Brdo-Vinča began in 1988. At first the participation of petrologists was limited to the separation of the most problematic and most frequent raw materials and to performing microscopic analyses with identification. The petrologists D. Jovanović and R. Gajić distinguished 13 samples of chipped stone and concluded on the basis of the analysis of mineralogical-petrological structure and geological map that it coincided with the structure of rocks in the area of the Avala and Kosmaj mountains.³ In the ensuing years the petrologists K. Šarić and V. Cvetković performed the analyses of prevailing raw materials. Finally, within the *Projekt Vinča/Project Vinča* with the realization in 2008 of the subproject *Petrološka analiza kamenog materijala sa lokaliteta Belo Brdo-Vinča/Petrological analysis of stone material from the site Belo Brdo-Vinča* (authors D. Antonović and V. Bogosavljević-Petrović) with analysis performed by the same scholars a very significant methodological step forward was achieved. The macroscopic analysis of every artefact was performed, general groups of raw materials were established and the first large statistical sample was obtained. By the end of 2010 in the first petroarchaeological database from a single site, 4570 chipped stone specimens and around 1000 specimens of ground stone artefacts were analyzed. The preliminary system of identification included only 1% of the total number of chipped stone artefacts.

The same team of scholars worked together at the site of Crkvine in the village Mali

3 Petrological-mineralogical analysis of flint material from the site of Vinča-Belo Brdo and identification of the origin of the investigated samples. Report by R. Gajić and D. Jovanović, Geozavod, Belgrade, 2003. Locations of raw materials are precisely determined in the Report. Project documentation.

NUMBER 1067

ARCHAEOLOGICAL DATABASE
NUMBER: 1513

SECTOR	2
BLOCK	C III
SQUARE	4
LOCUS	24
LAYER	0
LAYER DESCRIPTION	UNIT 1
EDM	100
EAST	2901
NORTH	2878
HEIGHT	8464
GENERAL CLASS OF ARTEFACT	61
CORE TYPE	2
TOOL TYPE	0
REJUVENATION TYPE	0
SUPPORT	7
COMPLETENESS DEGREE	51
SECTION	0
DIMENSIONS	0
RELATIVE THICKNESS	0
LONGITUDE	28
WIDTH	16
THICKNESS	15
ORIENTATION OF SCARS ON DORSAL SIDE	36
PREPARATION	0
CORTEX	1
PLATFORM TYPE	6
PLATFORM ANGLE	89
RAW MATERIAL	18
PHYSICO - CHEMICAL AND THERMAL DAMAGES	0

PETROLOGICAL DATABASE

COLOUR	OCHER
STRUCTURE	AMORPHOUS
TEXTURE	MASSIVE
ROCK COMPOSITION	FLINT WITH RADIOLARIA REMAINS
IDENTIFICATION	AMORPHOUS FLINT

SITE BELO BRDO - VINČA

TYPE OF SAMPLE CHIPPED STONE TOOL

ORIGINE ARCHAEOLOGICAL EXCAVATION

RELATIVE CHRONOLOGY VINČA - PLOČNIK PHASE OF VINČA CULTURE

ABSOLUTE DATING

STORAGE BELGRADE CITY MUSEUM

TYPE OF PETROLOGICAL ANALYSES MACROSCOPIC AND MICROSCOPIC

PETROGRAPHIC LABORATORY FACULTY OF MINING AND GEOLOGY IN BELGRADE

PETROLOGIST K. ŠARIĆ AND V. CVETKOVIĆ

DATE OF ANALYSES 2008.

NATIONAL MUSEUM IN BELGRADE
NARODNI MUZEJ U BEOGRADU
Trg Republike 1a, 11000 Beograd
www.narodnimuzej.org.rs

NOTE
Numbers assigned to each category accordingly to list of attributes for Vinča culture (Radovanović et al. 1984: 20, 22, 28; Bogosavljević 1990: 8-9, 42-43, 47-50, 60-61)

Fig. 4. An example from the petroarchaeological database. User interface in development

Обр. 4. Пример от петроархеологическата база-данни – потребителски екран в процес на развитие

Borak in western Serbia during 2007 and 2008. To date chipped and ground stone artefacts from closed contexts have been examined (Антоновић 2011, Богосављевић-Петровић 2011). The authors analyzed but did not publish 25 petrographic specimens⁴ and field investigations of potential deposits of raw materials for chipped stone industry are in progress. In order to define the raw material aspect of chipped stone artefacts the comparative collection of samples of raw materials (and varieties) used as reference lithotheque with photographs created at the site (fig. 3). It turned out that the creation of a comparative collection is a good method to speed up archaeological observations regarding identification of stone raw materials and that it makes collaboration of archaeologists and petrologists much easier.

Particularly important work in the field of petroarchaeological investigations in recent times is the analysis of 60 samples of obsidian from the site Belo-Brdo-Vinča from all stratigraphic layers and different phases of investigations by B. Tripković and M. Milić. It has been ascertained using ED XRF (energy-dispersive X-ray fluorescence) analysis that analyzed specimens originate from Carpathian 1 in Slovakia (Tripković, Milić 2008). Few important elements qualify this work as unavoidable in the development of petroarchaeological investigations in Serbia. First, the quality of raw material was determined, second, its geological context was established and third, the authors by paying attention to the ex-

⁴ Mineralogical-petrographic analysis of samples from the site of Crkvine (Mali Borak village). Report by V. Cvetković and K. Šarić, Faculty of Mining and Geology in Belgrade, Belgrade 2008. Project documentation.

clusive material, which was the subject of many speculations and theories for many years solved the enigma and marked the path for more detailed comprehension of importance and influence of the Neolithic communities in the Tisza basin in relation to the previous period of investigation. Thus, the first analyses of the Vinča material from Belo Brdo when Polish scholars gave priority to the connection of Vinča with its northern neighbors had been confirmed (Kaczanowska, Kozłowski 1990, 36, 42).

To conclude, the knowledge about use of stone in the Serbian Neolithic and Eneolithic has advanced considerably, first of all by defining groups of raw materials, which permanently appear at many sites. Something that is missing, in our opinion, for the complete picture is the creation of a library of stone raw materials (*lithoteque*) for the territory of Serbia as well as the determination of sources of raw materials. Currently, the problem rests on the slim evidence of geologists' interpretations and geological maps without directly connecting raw material sources and artefacts from the settlements.

The first systematization of petroarchaeological investigations

The foregoing survey of investigation history clearly reveals that petroarchaeological investigations in Serbia are in their infancy. For this reason the research project '*Tumačenje, poreklo i distribucija kamenih sirovina sa neolitskih i enelitskih lokaliteta centralnog Balkana*'/ '*Interpretation, origin and distribution of stone raw materials from Neolithic and Eneolithic sites in the central Balkans*' (project director V. Bogosavljević Petrović) was initiated by the National Museum in Belgrade in 2010. The main objectives of the project are the systematization of published petroarchaeological results and investigation of deposits of stone raw materials, which could have been exploited during the time-range of the known Neolithic and Eneolithic sites. The first step in these activities was the creation of a unified database (fig. 4).

A database containing 6000 artefacts and raw materials from archaeological investigations subjected to petrological analysis was established during 2010 and 2011. The data entry was carried out according to categories relevant for explanation of the problem of raw materials and in a way providing compatibility with databases that already exist worldwide (see: Pawlikowski 2008). The categories were arranged in two segments. In the first part, after basic information about the sample (thumbnail of sample and unique ordinal number) there is an archaeological segment of the base (type of sample, site, geographic longitude and latitude, provenance of find, relative chronology, absolute chronology, ordinal number from original base or publication, storage location, link to the archaeological base). The second part of the database is a petrological segment (colour, structure, texture, composition, identification – general, identification – detailed, type of analysis, ordinal number of sample, source of information, date of analysis, institution, analyzers, possible geological deposit), followed by the categories: link to illustration and note (Богосављевић-Петровић, Марковић 2012, in press).

This method of data entry represents the borderline between investigations carried out so far and the way in they should be carried out in Serbia in the future. This particularly concerns the necessity to analyze artefacts according to categories suggested in the database that have hitherto been applied (as has already been explained) to a different extent from one site to the other. The creation of uniform base of petroarchaeological data has made possible the sorting of contents according to sites, type of analysis, type of material or other parameters and also cross examination of the data. Thus it is possible, for instance, to single out all artefacts made of white opal (fig. 5) discovered at Neolithic sites in Serbia



Fig. 5. Blades and retouched blades made of white opal (Divlje polje, central Serbia)

Обр. 5. Неретуширани и ретуширано пластини от бял опал
(Divlje polje, централна Сърбия)



Fig. 6. The retouched blades of so-called 'Balkan Flint' from Grivac, Tečić and Vršac-At (Starčevo culture, below) and Belovode (Vinča culture, above)
Обр. 6. Ретуширано пластини от т.нар. „Балкански флинт” от Grivac, Tečić and Vršac-At (култура Старчево – долу) и Belovode (култура Винча – горе)

and subjected to microscopic analysis, or to identify proportional incidence, quality and provenance of the artefacts made of so-called 'Balkan Flint' (fig. 6) within distinct regions or objects of magnesite subjected to X-ray diffraction. It is obvious to what extent the comparison of raw materials from Serbia and beyond is made easier by gathering the complete material in one place.

The following procedures in systematization of petroarchaeological investigations of the Neolithic and Eneolithic will be carried out in two parallel courses. One of them means making the database available to general academic audience, either archaeological or geological, using the Internet and corresponding software (fig. 4). Even more so, it will be possible for all interested scholars to take part in supplementing and changing data and sharing information in the unique petroarchaeological database. The second course concerns expansion of the scope of the database. It implies taking raw material samples from deposits, their analysis and entering the data into the base. By using this methodology it will finally be possible to compare artefacts from sites with samples from potential sources of raw materials. Thus, precision in interpretation of the process of circulation of raw materials from exploitation and distribution to reconstruction of the network of trade routes should be increased considerably. The creation of a collection of minerals and rocks

that is already under way⁵ will make possible direct comparison of finds from sites with raw materials from distinct deposits as it was achieved in practice using the lithoteque in Hungary (Biró 1987).

Conclusion

An important segment of information about 'the Neolithic package' in the territory of Serbia is the investigation of stone resources and the 'transfer' of stone from its geological source to the places of production in settlements. It is necessary, in order to carry out such investigations in a relevant way, to introduce a petroarchaeological approach. This process in Serbia has been going unusually slowly and was falling behind the European trend first of all because of a deeply rooted culture-historical approach and reliance on typology and interpretation of pottery assemblages. The first step forward, although small and for many years the only one, was made by archaeologist Miloje M. Vasić in the first decades of the 20th century who attempted to explain material from the Neolithic settlement Belo Brdo-Vinča in collaboration with petrologists.

The middle phase of development of petroarchaeological investigations was marked by systematic excavations at the sites of Divostin, Gomolava, Selevac, Grivac and Vinča in the 1980s and the study of artefacts from the Belgrade region thus achieving certain results in the identification of stone raw materials. The lists of materials turned out to be very heterogeneous and numerous. Unfortunately, nomenclatures for each site are different and represent in fact series of parallel systems without possibility of correlation. The problem of the location of raw materials remained only at the hypothesis level in this phase.

Over the past two decades some investigators in Serbia invested considerable effort in including petrological analyses as a systematic activity in the organization of archaeological excavations and study of discovered material (Divlje Polje-Ratina, Belo Brdo-Vinča, Crkvine-Mali Borak and at some Starčevo culture sites). At the same time they have emphasized that it is necessary to investigate geological deposits in order to identify the source of stone raw materials and thus assess many existing theories.

The project '*Tumačenje, poreklo i distribucija kamenih sirovina sa neolitskih i eneolitskih lokaliteta centralnog Balkana*'/'*Interpretation, origin and distribution of stone raw materials from Neolithic and Eneolithic sites in the central Balkans*' resulted in the first systematization of previous petroarchaeological investigations and in setting the framework and parameters for future investigations. By connecting the artefact, its petrological identification and territory of exploitation and distribution, the prerequisites are created for studying the process of circulation of stone raw materials. A good example is the uniform type of retouched blade with parallel edges that could be made of white opal or organogenic white-coloured flint or of silicified limestone depending on the territory – from Pločnik via Divlje Polje (fig. 5) and sites in central Serbia, Divostin and Grivac to Belovode and eastern Serbia. The goal is also to treat rock from natural sources like an archaeological item by giving it both a geological and archaeological context in the database.

Most of the Neolithic and Eneolithic sites should be subjected to this process and the concrete results from it would have an impact on the determination of levels of individual

5 In order to achieve this, objective surveying of the surroundings of the site of Belovode was conducted in 2011. On that occasion 95 groups of samples of raw material were obtained from 53 locations including primary and secondary deposits. Types of raw materials, which look similar to the raw materials from the Neolithic settlement at Belovode after macroscopic inspection, were submitted for petrographic identification.

and organized relations within the settlement network. Defining the locations where stone raw materials have been exploited makes it possible to define and visualize a population and its role in nature.

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Петро-археологически изследвания на неолита и халколита на Сърбия – история и състояние на проучванията

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Резюме

Неолитните и енеолитните обекти в Сърбия са широко разпространени и се намират главно върху стари речни тераси или в низините в централната част на страната (Обр. 1). Един от подходите в проучването на живота през неолита в тези земи е петрографското изследване на каменните артефакти. Развитието на този тип изследвания в Сърбия е бавно и изостава от европейските тенденции преди всичко поради дълбоко вкоренения културно-исторически подход. Първата крачка във въвеждането на петрологията, макар и изолирана, е предприета от М. Васич в първите десетилетия на XX век, когато е направен опит да се обясни материал от неолитното селище Винча-Бело Бърдо в сътрудничество с петролози.

Следващата фаза в развитието на петрографски изследвания е белязана със системните проучвания на обекти като Дивостин, Гомолава, Селевац, Гривац и Винча през 80-те години на миналия век и с анализа на артефакти от територията на Белград, които постигат определени резултати в идентификацията на каменните суровини. Списъкът от използвани материали се оказва многоброен и хетерогенен. За съжаление, номенклатурите на отделните обекти са различни и на практика представляват паралелни системи, които не могат да се корелират. На този етап, локализацията на източниците на суровини остава само на хипотетично ниво.

В последните две десетилетия някои проучватели в Сърбия полагат неимоверни усилия да включат петрографските изследвания като системна част от организацията на археологически разкопки и анализа на намерените материали (Дивле Поле-Ратина, Винча-Бело Бърдо, Църквине-Мали Борак и няколко обекта от културата Старчево). В същото време те подчертават необходимостта да се проучват геоложките депозити с цел идентификация на източниците на каменни суровини, като по този начин би станала възможна преоценката на много от съществуващите теории.

Проектът *‘Tumačenje, poreklo i distribucija kamenih sirovina sa neolitskih i eneolitskih lokaliteta centralnog Balkana’* / *‘Интерпретация, произход и разпространение на каменните суровини от неолитни и енеолитни обекти на Централните Балкани’* създаде първата систематизация на предишни архео-петрографски проучвания и очерта рамката и параметрите на бъдещите изследвания. Свързването на артефактите и тяхната петрографска идентификация със зоната на експлоатация и разпространение създава необходимите предпоставки за изучаването на циркулацията на каменни суровини. Показателен пример е устойчивият тип на ретуширана пластина с успоредни краища (retouched blade with parallel edges), която се среща направена от бял опал или органогеничен бял кремък или силициран варовик (white opal or organogenic white-colored flint or of silicified limestone) в зависимост от територията – от Плочник през Дивле Поле (Обр. 5) и обектите в Централна Сърбия - Дивостин и Гривац - до Беловоде и Източна Сърбия. Целта е също различните скали да бъдат третираны като архео-

логически материал с включването им в база от данни на геоложки и археологически контексти.

Повечето от неолитните и енеолитни обекти би трябвало да участвуват в един такъв процес на изучаване и като резултат биха могли да се определят нивата на индивидуални и на организирани отношения в селищната мрежа. Локализацията на местата, където се добиват каменни суровини би спомогнало да се дефинира ролята на населението в контакта му с природата.