The Institute of Archaeology in Belgrade and National Museum in Niš initiated in 1989 the joint project directed by Z. Kaluderović and N. Đurić-Slavković in order to investigate in detail possible Paleolithic sites in the Niš region. The text by A. Oršić-Slavetić, who was the first to indicate the location Kremenac near the village Rujnik in the journal Starinar in 1936 has been used as the starting point. At that time the attention of the academic public was drawn by just one sentence and the summary map to the site where finished and semi-finished flint flakes and huge quantity of unworked pebbles have been found on the surface. The first activity within this project was the site surveying in the immediate vicinity of Kremenac in 1991 and the test trench excavations had been conducted at the foot of Velika Humská Ćuka in 1994 when also the prospection of the site Kremenac had been carried out.

The site Kremenac is relatively bare slope about 1.6 km long and around 200 to 270 meters wide covered in places with sparse grass and low bushes and characterized by exceptionally large quantity of flint nodules of various dimensions protruding to the surface (Figs. 1, 2, 3). The northern sections of this slope are at around 390 meters above sea level, while its southern section descending towards the Niš valley is at around 330 meters above sea level. Writing about the genesis and evolution of the Niš valley Martinović states that the Hum–Rujnik extension is apparent to the north of the Nišava River, between the villages Rujnik and Hum exists. The site Kremenac is located at the western

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1 Oršić-Slavetić 1936.
2 Martinović 1976.
Josip ŠARIĆ, Lower Paleolithic Site Kremenac near the Village Rujnik (Serbia) (7–31)

Fig. 1. Geographical position of an open air site Kremenac, near village Rujnik, Serbia:
1) Place of finding of bifacial chopper (Pl. IV/I and Fig. 5);
2) Location of one of few stone piles containing Paleolithic artifacts collected by villagers (protobiface in Pl. IV/3); 3) Region of excavations in 1995. and 1996

Сл. 1. Крменац, налазиште на отвореном кох села Рујник, Србија: 1) Двоседиран чопер (Т. IV/I и Сл. 5); 2) Једна од хрпа камена коју су прикупили настанци и у којој се налазе палеолитски артефакти (протобифас на Т. IV/3); 3) Просектор ископавања 1995. и 1996. године

border of that extension. In the same text Martinović particularly emphasizes the conclusion of Sr. Milojević that the north Nišava fault together with the Nišava fault predisposed the Nišava valley and that one fault of lower order contacts Rujnik and the fresh opals had been found on that fault.3 Considering the altitude above sea level of the Kremenac area it could be said that this area corresponds to the terraces of 385–375 m, 362–348 m, 345–333 m and 320–308 m above sea level and their origin Martinović relates to the glacial periods Mindel (385–375 m), i.e. somewhat more precisely Mindel 2 (362–348 m) and interglacial Mindel 2 – Riss 1 as the time of entering of the Rujnička reka (river) into the Nišava terrace has been dated.4 According to the data provided by the author of the excavations Z. Kaluderović this area resembles an ancient lake terrace, which is at considerably higher altitude than the present-day lowest point of the Nišava valley (around 200 m above sea level) and also much older and where the flint pebbles had been deposited as a result of once very strong lake activity. The dimensions of flint and opal pebbles vary from few centimeters in diameter to huge pieces up to 80 cm long and weighing more than hundred kilograms. The local inhabitants used this material in everyday life for many previous decades so many wells in the village

3 Martinović 1976, 39.
5 Kaluderović 1996a. Unfortunately author does not quote relevant literature on which he based his statement.
Rujnik had been built with the flint pebbles from Kremenac.

Considering the concentration of the surface finds during 1995 the position of two trenches of 8 square meters in total had been selected. The first trench was laid on the fringes of the village while the second one was around 650 meters to the southeast from the first.\(^6\) Despite more than modest size of investigated area of 4.5 square meters, 15 artifacts have been found at the depth of 1 meter.\(^7\) The excavations continued in 1996 in trench 2, which was expanded to the total of 9 square meters. In the same year the excavations started also in trench 3 with removing of the humus layer. The level of virgin soil was reached in trench 2 and five geological strata have been distinguished, two of them being also the archaeological layers, which yielded almost two hundred artifacts.\(^8\) In 1996, upon the invitation by Z. Kaluderović I spent one day at the site and on that occasion I saw the assemblage of the artifacts, which came from the excavations but also from the prospection conducted at the site and also within a wider area of the Rujnik village. I visited the site once again that very same year after the excavations in order to see what is the state of it and whether any devastation happened after the archaeological team left the site. The entire area of Kremenac was intact as well as the area where the trenches had been excavated. In the immediate vicinity of the site Kremenac was a military installation, which was targeted in NATO bombing in 1999. As a preparation for starting a new project of the Archaeological Institute which would be a continuation of the previous one, I revisited the site in summer of 2008 and in spring of 2009 in order to see whether the site changed in the past 13 years and to what extent. Fortunately, the surface of the site looked intact as during my first visit in 1996. During these visits I found on the surface around hundred interesting pieces and among them 27 chipped stone artifacts, which represent for the time being the most significant indicators for the dating of this site considering that material from the excavations of Z. Kaluderović was not available for the analysis at the time this text is being written.

It is necessary to emphasize that the area of Kremenac had been used for many years as the army training ground for artillery trainings. In publicly available satellite pictures on the internet the traces of the artillery vehicles maneuvers are clearly visible and infantry trenches as well as large dug out areas where self-propelled artillery was located could be still discerned today at many locations at the site. The maneuvering of this self-propelled artillery of which many had caterpillars resulted in crushing of large quantity of the surface nodules and creation of the mass of flakes many of which have the characteristics which could confuse the

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\(^6\) This distance is based on a rough guess of the author of excavations Z. Kaluderović and actual distance is between 0.9 and 1.0 km.

\(^7\) Kaluderović 1996a, 1996b.

\(^8\) Kaluderović 1996b.
inexperienced investigator and lead him to the assumption that these are authentic artifacts. Because of that careful collecting of the surface material is necessary and even more careful analysis and attribution of discovered objects is essential.

Considering the traces of the military activity in this area worth mentioning is the existence of a dugout encountered in one trench that was briefly mentioned by Z. Kaluderović.9 He mentions in his report well-preserved slanting circular pit of funnel-like cross section that penetrates through all the layers with flint raw material and into the virgin soil. Considering that the raw material was probably easy reachable on the surface the question of justification for digging such pit could be raised. If we assume that someone searching for high quality pieces of raw material started to dig out of mere curiosity the question is why he made narrow vertical pit through all the layers with flint instead of horizontally following the first layer with higher concentration as it had been common practice in the genuine prehistoric mines? If we remember the information about the army activities at this site the question reasonably arises whether this pit resulted from the army activity in some earlier times? Even if this pit is not the result of the military activities it is still possible that this is a recent excavation of an indefinable purpose. The most reliable answer will be obtained in the course of new excavations in the future.

Raw material used for making the artifacts of KreMenac was analyzed at the University of Belgrade – Faculty of Mining and Geology, Laboratory of SEM-EDS by Dr Suzana Erić. Scanning electron microscope (type JSM–6610 LV) coupled with energy dispersive spectrometer (type X-Max Large Area Analytical Silicon Drift, Oxford) and LaB6 filament as the electron source was used for morphological and chemical analyses. Samples were coated by gold using a BALTEC-SCD-005 sputter-coating device with an 18 mm thick gold layer and investigated on natural broken surfaces and under high vacuum. Images were produced using the detector for secondary electrons.

Three most abundant rock varieties of variable color represent samples which were analyzed: 1 – pale brownish sample, 2 – pale ochre sample and 3 – grayish sample. Macroscopically, all the rock samples show amorphous texture and massive fabric often showing tiny cracks. The rock material shows hardness of around 7 according to Moss’s scale and shows no reaction with diluted HCl. Broken surfaces have characteristic shell like shapes, while strike edges are sharp. Sporadically, the rock surfaces are covered by whitish amorphous cortex (cortex in archaeological terminology).

Semiquantitative SEM-EDS analyses are given in Table 1. All the rock samples are compositionally and texturally opals. They show amorphous texture and massive fabric often showing tiny cracks. The rock material shows hardness of around 7 according to Moss’s scale and shows no reaction with diluted HCl. Broken surfaces have characteristic shell like shapes, while strike edges are sharp. Sporadically, the rock surfaces are covered by whitish amorphous cortex (cortex in archaeological terminology).

Table 1. Chemical analyses of raw material (wt %) normalized at 100 %

<table>
<thead>
<tr>
<th>Sample number</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis number</td>
<td>1–1</td>
<td>1–2</td>
<td>1–3</td>
</tr>
<tr>
<td>Place of analyses</td>
<td>rock mass</td>
<td>hole</td>
<td>cortex</td>
</tr>
<tr>
<td>Mineral</td>
<td>opal</td>
<td>quartz</td>
<td>opal</td>
</tr>
<tr>
<td>Al</td>
<td>2.89</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Si</td>
<td>46.74</td>
<td>44.19</td>
<td>41.68</td>
</tr>
<tr>
<td>Ti</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fe</td>
<td>0</td>
<td>0</td>
<td>7.58</td>
</tr>
<tr>
<td>O</td>
<td>53.26</td>
<td>52.92</td>
<td>50.74</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

are marked by crystals of quartz (Figs. 4b, d, analyses 1–2 and 2–2). Sample 1 has well developed cortex surfaces (Fig. 4a). The cortex itself is amorphous and its composition does not differ from the rest of the rock mass. Spongy parts developed on the surface of the cortex are represented by limonite impregnations (analyses 1–4 to 1–6).

Most of the objects discussed in this text and which are undoubtedly the artifacts could be distinguished from the others not only on the basis of their characteristics resulting from the technological procedures in the knapping process but also because of the prominent milky white patina, which in some instances covers also the retouched surface. In other words, all flint
(in this case opal), which contains unstable impurities is prone to patination, which varies depending on the variety of factors most important of which are:

- texture and microstructure of the rock
- its permeability
- kind, proportion and distribution of impurities
- environmental factors including temperature and chemical composition of the soil

The thickness of the patina could be uneven. It should be emphasized that patina formation is also influenced by the length of flint exposure to the mentioned conditions. Two distinctive patina types could develop – the milky white and reddish-brown. Both types of patina mainly differ in the changes of color and their study makes easier better understanding of the causes of flint coloration. The artifacts from Kremenac have been made of many variegated opals with just one specimen made of coarse-grained white quartzite, and as we already emphasized the milky white patina covered many of them. This detail is exceptionally important for two reasons: first, it makes possible distinguishing genuine artifacts from the flakes resulting from the crushing of pebbles overrun by artillery vehicles and second, also very important, it makes possible distinguishing the earliest Paleolithic artifacts from those dating from the later periods (Neolithic, Eneolithic) mentioned by Kaluderovic. Still, it should be taken into account that the unworked pieces of raw material also lied on the surface for rather long time so they were covered with patina even before the artifacts had been made. If after that the artifacts also lied on the surface for a rather long time there is considerable chance for the patina to cover also the retouched surfaces. But, if the artifact was more or less covered with earth also those specimens, which are dated according to their morphology to the Early Paleolithic could be covered with patina only on the original surface but not on the retouched surface.

To recapitulate – the patina is not the basic criterion for identification of the oldest artifacts at the site Kremenac but it is one of the most crucial and that should always be borne in mind.

When we analyze the artifacts of indubitably Paleolithic provenance, two groups could be discerned: in the first group are specimens with morphological context perhaps even more indicative than the typological context and it dates them without doubt in the period before the Middle Paleolithic, while in the second group are specimens, which have slightly more conspicuous typological characteristics according to which they could be ascribed to the Middle Paleolithic – the Mousterian period. If this dating were correct and even if from the site Kremenac originate only the Middle Paleolithic Site Kremenac near the Village Rujnik (Serbia) (7–31)

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10 Hurst and Kelly 1961; Rottländer 1975.
11 Kaluderovic 1996a. In the moment of writing this article I have no insight into complete finds of Z. Kaluderovic. One should believe the experienced scholar when he mentions the finds from the later periods including Neolithic and Eneolithic even more so because Velika Humska Čuka with the Eneolithic site is in the immediate vicinity but during my surveying of the site I did not find chipped stone artifacts from the later periods of prehistory.
Paleolithic artifacts even that would be enough to provide for this site the distinct place among the prehistoric sites in the Balkans. Nevertheless, the indisputable fact that we have group of artifacts with the evident characteristics of the Lower Paleolithic industry provides special significance to this site.

The indubitably Early Paleolithic artifacts from Kremenac are 12 specimens including the tools identified as unifacial and bifacial choppers, protobifaces, sidescrapers, sidescrapers/endscrapers and endscrapers. These are massive tools mostly made on pebbles (Pl. I/1, 2; Pl. II/1, 2; Pl. III/1, 2; Pl. IV/1–3; Pl. V/1), while only two of them were made on pebble flakes (Pl. V/2, 3). The weight of artifacts made on pebbles varies from 221 g to 954 g while the artifacts made on flakes weight 127 g and 371 g.

Of the most simple shape is the massive pebble of triangular section with one end removed and thus was created a tool of the unifacial chopper type with one edge being used as rough cutting edge (Pl. I/1). The complete pebble including the fracture is covered with milky white patina. The original gray color of the opal could be noticed at just one spot.

The unifacial chopper in Pl. I/2 is the more advanced shape made on the massive pebble of unchanged original shape although the original surface along one longitudinal side was removed by striking off series of rather large flakes thus obtaining the rough cutting edge. This is the largest tool in the assemblage. The irregular and full of holes surface of this artifact is completely covered with white patina including even the retouched section. The original color of the opal could not be discerned at any spot.

The unifacial chopper in Pl. II/1 was also made on the pebble whose original shape had not been changed because the irregular cutting edge had been obtained by removing only three rather large flakes and this is the smallest tool of this type from Kremenac. The complete artifact is covered with Milky white patina including the retouched edge as it is the case with previously described specimen. The original greenish-ochre color of the opal could be discerned at few spots.

The tool in Pl. II/2 is also the unifacial chopper of somewhat more elaborate type and it was made on asymmetrical pentagonal pebble by removing a series of rather small flakes along one edge and thus the shouldered cutting edge was obtained. This tool as well as the following two is characterized by the partial retouch executed in order to remove the protrusions, which impeded holding these tools in the hand. Somewhat more prominent natural pebble edge has been removed at the basal section of this tool thus making possible to use this end as handle. The surface of the pebble and retouched shouldered working edge are covered with milky white patina. The original ochre-greenish color of the opal could be discerned in the basal section.

The unifacial chopper in Pl. III/1 has been created in a similar way as the previous tool. The arched cutting edge was obtained by removing rather large flakes at one side of the pebble while the concave basal end was adapted for holding in the hand by removing two small protuberances on the ends. The original pebble surface is covered with milky white patina but the retouched surface is without patina and there is visible light gray color of the opal.

The tool in Pl. III/2 could probably have the combined function. It has been prepared as unifacial chopper by removing a series of large irregular flakes along one longitudinal edge while this massive pebble of asymmetrical pentagonal shape was partially narrowed by removing few rather large and also irregular flakes in order to make holding in the hand easier. As well as chopper this tool was probably used also as sidescraper that was actually the possible function of all choppers. The pebble surface was covered with white-yellowish patina except for the retouched sections where original light gray color of the opal is visible.

The most beautiful and the most typical artifact among the specimens made on pebbles is the bifacial chopper represented in Pl. IV/1 and Fig. 5 (N 43°23' 26.6", E 21°52’60.8”). This is the flattened pebble of circular shape with the sinusoid cutting edge obtained by alternate removing of two flakes from one side and one flake from the other. In addition to the retouch used to obtain the cutting edge, the pebble edge was tapered by removing few flakes from one side in order to adapt the tool for easier handling. The pebble cortex is covered with white-yellowish patina while the retouched surfaces reveal the original brown-reddish color of the opal.

The tools on pebbles have been recorded in layers 11a, 11b and 11d of the Kozarnika cave and that could be of particular importance for the explanation of the finds from Kremenac. Still, it is also necessary to specify the differences, not only in size but also in typology because the artifacts on pebbles from Kozarnika are identified as sidescrapers. The tools on pebbles are

12 Guadelli et al. 2005.
mentioned also in the Mousterian culture in the Balkans by D. Mihailović when he describes very rich industry at the site Crvena Stijena.13 But, the tools on pebbles appear at that site in completely different context and their occurrence is a logical consequence of the rational use of the available raw materials. At Kremenac abounding in high quality raw material and where the size of available nodules of raw material does not dictate the reduced dimensions of the artifacts, the choppers could be explained only as the inventory of a culture earlier than the classic Mousterian particularly when we have in mind the dimensions and weight of the pebble used for production of the bifacial chopper illustrated in Pl. IV/1. This type of tools from Kremenac is of larger size than the artifacts on pebbles from Kozarnika cave where their dimensions as well as in much later layers of Crvena Stijena had been the result of the size of available pebbles used for their production.

Still another type of artifacts from Kremenac is of exceptional importance for its dating in the Early Paleolithic. These are so-called protobifaces, which are represented in this assemblage by three specimens (Pl. IV/2, 3; Pl. V/1). Two specimens were made of opal (Pl. IV/2, 3) while one was made of quartzite (Pl. V/1). The protobifaces made of opal were made on pebbles in such a way that one section of original surface under cortex had been removed by the partial retouch while other section was preserved thus creating irregular handaxes perfectly adapted for holding in the hand.

The tip of the specimen in Pl. IV/2 is insignificantly damaged. The pebble cortex is covered with white patina, which covers in places also the retouched surface where could be noticed the original grayish-brown color of the opal.

The handaxe in Pl. IV/3 resembles to a certain extent the Cantalouette type because of its slightly curved longitudinal profile.14 The milky white patina partially covers the original cortex surface as well as the section of retouched left edge. Just on that edge could be noticed the surface covered with patina damaged by retouching and this indicates that the craftsman making this artifact took into account the original pebble shape and made use of its natural shape to achieve intended result with as little effort as possible.

The handaxe in Pl. V/1 underwent the least modifications as for its production was used the quartzite pebble already naturally shaped as wedge and it was tapered with few flakes and adapted for holding in the hand. This is also apparent in the decolorized surface on one side of the artifact. Namely, the entire surface of the artifact except the section where mentioned flakes had been removed is covered with the reddish-brown patina. On the retouched section is visible glossy, milky white surface of the quartzite.

The conspicuous feature of all these artifacts is that they are excellently adapted for holding in the hand. Regardless of the size and weight of these artifacts they have perfect ergonomy and this is one of the essential characteristics of this industry.

Still another category of artifacts with two basic types also dates from the Early Paleolithic horizon. These are sidescrapers and endscrapers represented by one specimen each. In Pl. V/2 is illustrated the sidescraper on massive triangular flake with one edge retouched in order to obtain the working surface. Considering its weight and very shape of the tool this artifact could have also been used as a cleaver.

The specimen in Pl. V/3 is a convergent endscraper on massive flake. Only the section of preserved cortex of original pebble is covered with white-yellowish patina, while on the retouched surfaces and the ventral side is discernible the original brown-gray color of the opal.

Next group of artifacts has the characteristics, which allow also the dating in the Mousterian period and these are the specimens without distinct and clear-cut characteristics of the Levallois complex except for to a certain degree three implements (Pl. VIII/2, 4, 5). This segment of the assemblage generally leaves strong archaic impression indicating either the early phases of the Mousterian with still strong influences of the Acheulian traditions or even the segment of the Acheulian industry, which has been often neglected in the past on the expense of studying the bifaces as its most characteristic element. It is necessary to remember here the important work of H. Kelley who has drawn the attention of academic public already in 1937 to the fact the Acheulian industry recognizable mainly for the large artifacts of the biface type15 abound in fact in artifacts made on flakes.16 Among these artifacts are many rather small hand points but also numerous and char-

13 Михаилович 1993.
14 Debénath and Dibble 1994.
15 They were sometimes identified as the products of the core technique of knapping although these artifacts were also made of massive flakes.
16 Kelley 1937.
acteristic sidescrapers of various types and variants many of which according to their morphology resemble the Mousterian specimens to such extent that taken out of the stratigraphic context they would certainly be dated as such and not as the Acheulian types. So, when talking about the material from Kremenac we should not exclude the possibility that this was in fact the solely Lower Paleolithic site with the portion of material, which only resembles the Middle Paleolithic artifacts although these are in fact the artifacts of earlier date. For the time being and for lack of more precise indicators and accurate stratigraphic context we will treat this segment of the assemblage as the Middle Paleolithic artifacts but with already emphasized statement that in that case it is the atypical Mousterian with distinct and conspicuous archaic traits of the Lower Paleolithic.

The specimen in Pl. VI/1 is the convergent endscraper. This is crude and asymmetrical flake, which certainly is not of the type of triangular/leaf-like Levallois flakes. In addition the difference in the retouch type is also apparent as the retouch on this specimen is abrupt what is very infrequent on the Levallois flakes. The milky white patina covers the surface of the flake but not the retouch, so it could be concluded that the existing, asymmetrical flake already covered with patina had been used for making this endscraper. The original light brown to gray color of the opal could be discerned on the retouched surface.

The fragmented circular endscraper with stepped retouch on distal end is illustrated in Pl. VI/2. The left half of the artifact is missing and the fracture is covered with milky white patina indicating the tool age. The substantial milky white patina covers the entire surface of the artifact including the fracture as it is already stated. The patina of same intensity covers also the segment of the retouched surface at proximal end while the much less intense patina is also present on the section of the retouched surface of the distal half of the artifact. This leads to assumption that this is an older artifact, which had been found while looking for the raw material and as suitable piece it was reutilized by the stepped Mousterian (?) retouch in the Middle Paleolithic. Of course, it is just one possible indication because similar reutilization scenario could have also happened in the Lower Paleolithic.

The asymmetrical circular endscraper in Pl. VI/3 was made on massive flake removed from some larger pebble. Very crude semi-abrupt retouch has been employed to obtain the tool. The milky white patina completely covers only flat basal side, which is the remaining segment of the original pebble cortex. The traces of milky white patina are only sporadic on the retouched surface. The massive endscraper on the trapezoidal pebble was retouched also by the stepped retouch, which has been recently damaged in the left half (Pl. VI/4). The milky white patina covers the surface of original pebble while the beige color of the opal could be discerned on the retouched surface.

The asymmetrical endscraper in Pl. VII/1 was made on massive flake struck from larger pebble. The lateral left working edge and working edge on distal end are obtained by crude and irregular retouch so the tool could be assumed to be a combination of sidescraper and endscraper. The milky white patina covers the entire surface of the artifact including also the retouch. The original grayish color of the opal could be only discerned in a very small section.

The endscraper on flake represented in Pl. VII/2 is one of the smallest artifacts from this site that could be ascribed to the Mousterian cultural circle. Slightly convex working edge has been obtained on distal end by crude and irregular retouch. The milky white patina covers only the cortex of original pebble while it is lacking on ventral side and the retouched edge. The massive sidescraper with straight and crude abruptly retouched edge is represented in Pl. VII/3. The original grayish color of the opal is clearly visible as the tool was made on the pebble whose original cortex was not covered with milky white patina.

The sidescraper in Pl. VII/4 was made on massive and asymmetrical flake. The working edge on right edge and distal end was obtained by irregular stepped retouch so in this case it could be considered as the sidescraper/endscraper combination. The milky white patina is only partially preserved on the basal side, which is partially under the cortex of original pebble. The original grayish-beige color of the opal is visible on other surfaces.

The convex sidescraper on asymmetrical flake with the working surface on lateral edge obtained by stepped retouch is represented in Pl. VII/5. The entire surface of the artifact except for the retouched edge is covered with intense milky white patina. The original color of the opal is light gray.

One of the most recognizable shapes of the Mousterian chipped stone industry is the type of sinusoidal sidescraper, which corresponds to the artifact illustrated in Pl. VII/6. The problem with unambiguous determination of this artifact is in the fact that such types also
appear during the Acheulian period.\textsuperscript{17} This is the massive elongated flake. Its dorsal side is under carbonate cortex of white-yellowish color while milky white patina covers one half of the ventral side. The original brown color of the opal is visible on other surfaces.

Another recognizable artifact from the repertoire of the Mousterian culture is the sidescraper on elongated flake with concave retouched edge that corresponds to the artifact illustrated in Pl. VIII/1. There is identical problem with this artifact concerning the distinct chronological and cultural identification as with the previous specimen.\textsuperscript{18} The left half of dorsal side is under the carbonate cortex while the original brown-gray color of the opal is visible on the remaining surface.

The massive retouched flake with certain elements of the Levallois technique is represented in Pl. VIII/2. The partial retouch on the proximal half of the right edge makes rather large encoche thus distinguishing this artifact as the notched flake. The artifact is not covered with patina so the original milky white to grayish color of the opal is clearly visible.

The trapezoidal cleaver in Pl. VIII/3 was made on massive flake struck from rather large pebble. The top of the tapered end is the rounded part of the pebble and tapering from the cutting edge to the top was obtained by retouching the lateral edges. In order to achieve the straight cutting edge of this cleaver it has also been retouched (which is unusual for this tool type). That was probably caused by the asymmetrical shape of the flake. This tool also has the characteristics, which resemble the Mousterian retouch and it could fit also typologically into the scheme of the Mousterian cleavers (hacherau sur éclat in French). The pebble of which it was made had been covered with milky white to yellowish patina, which is now preserved only on the dorsal side. The original brown color of the opal is discernible on the ventral side and the retouched surfaces. It should be mentioned that among the Mousterian tools with characteristics identical to this artifact Bordes distinguishes one specimen as the rare type, which has the working edge obtained by inversely retouched distal end and he identifies such tool as hachoir.\textsuperscript{19} We should not disregard the possibility that this artifact had been perhaps used as denticulated endscraper.

Another two artifacts on which rudimental elements of the Levallois technology could be noticed are the nosed sidescraper on irregular flake (Pl. VIII/4) and the pentagonal unretouched flake (Pl. VIII/5). The patina was not encountered on either of these two artifacts and original color of the opal is light gray. The nosed side-scraper (Pl. VIII/4) has been also recorded at the Lower Paleolithic site Bilzingsleben (Germany) where the author identified it as a piece with nose between two notches.\textsuperscript{20} It is interesting that we encountered at the same site also the sinusoid sidescrapers on massive flakes that completely corresponds to the specimen from Kremenac (Pl. VII/6). And just the sinusoid sidescraper and nosed sidescraper on the flake with the Levallois characteristics (Pl. VII/6; Pl. VIII/4) because of so conspicuous analogies from the site Bilzingsleben are additional indicators suggesting that group of the Kremenac artifacts of potentially Mousterian provenance should in fact be connected to the Lower Paleolithic habitus.

After the analysis of this assemblage of chipped stone artifacts from the site Kremenac it is necessary to point to a dilemma to which at one moment succumbed Z. Kaluderović as the first scholar conducting archaeological excavations in this area. In his three summary presentations of the excavation results he puts forward the assumption that massive and crudely worked tools probably date from the Early Paleolithic period even though they do not having direct analogies in the neighborhood.\textsuperscript{21} In his next presentation of the same investigation results, somewhat more comprehensive but still rather summary, he proposes the assumption that these tools date perhaps from some later Paleolithic phase or even the post-Paleolithic period and ‘…their unusual characteristics could be the result of direct exploitation of this rich flint deposit, i.e. they date from the very beginning of long and complex process of the flint use that later continued at other locations.’\textsuperscript{22} Such radically different interpretation could be the result of two facts of which perhaps the decisive one was the fact that rather great attention was paid to archaemetallurgy in our archaeology at that time, so the accent was often laid on discoveries of the earliest traces of mining. Because of that Z. Kaluderović insists more or less on such traces in all three of his reports on the results of investigations at Kremenac although the evidence leading to such conclusions is not convincing. Considering that genuine mining understands certain technological procedures some of which could be very

\textsuperscript{17} Kelley 1937; Laurat 2006.
\textsuperscript{18} Kelley 1937.
\textsuperscript{19} Bordes 1961. Pl. 48, fig. 8.
\textsuperscript{20} Laurat 2006.
\textsuperscript{21} Kaluderović 1996a, 1996b.
\textsuperscript{22} Kaluderović and Đurić-Slavković 1998, 217.
complex even in the early days of mining and which have not been encountered so far at this site, Kremenac certainly could not be treated at this moment as mine but that in any case does not diminish its importance. On the contrary, we have the traces of ancient mining in Serbia but there is not confirmed so far the site earlier than Kremenac.

Another reason for the dilemma of Z. Kaluderović considering the dating of finds from the site Kremenac lies in the fact that in the time of his excavations there had not been known the finds of similar date from the immediate vicinity, so it seems that he got afraid of his initial assumption. Although the project in Kozarnika cave have started in 1980s the results of investigations of the Early Paleolithic sites in the region of the Rhodopes and Stara Planina (Balkan) in Bulgaria have not been published at the time when Z. Kaluderović wrote his reports. At that time neither the results of investigations of the Early Paleolithic sites in Turkey, more precisely in the Turkish part of Thrace, where some very important sites were discovered (Yarimburgaz cave, Kustepe, Yatak, Balitepe) have been known. Considering such lack of data to compare directly his finds from Kremenac it looks as for Z. Kaluderović the possibility that he faces the artifacts of the Early Paleolithic date seemed quite incredible.

Even in the moment when this text is being written there is at least one dilemma, which is difficult to solve considering the quantity of material and the ambiguous stratigraphy of the site. It regards the group of artifacts, which resemble the Middle Paleolithic specimens but because of their archaic characteristics view they are strongly related from morphological point of to the Lower Paleolithic artifacts. What is essential and what must be emphasized once again is the fact that artifacts of the Middle Paleolithic provenance from the site Kremenac clearly identifiable from technological and morphological point of view and there is no doubt that these are neither mining tools nor semi-finished objects.

At the present level of investigation of the earliest hominization of the European continent the theories about four directions of advancement of those migrations are still existing. One direction is connected with the Gibraltar straits and this theory is corroborated by the material from the site Atapuerca in Spain dating from the transition period from the Pliocene to the Pleistocene.

The direction of migration that could have inhabited Europe from Africa via Sicily is less plausible but this idea also exists in the academic circles. One of the potentially possible directions has been assumed after the discovery of the site Dmanisi in Georgia. According to that theory the migration resulting in the inhabitation of Europe was running along the northern coasts of the Black Sea as it is suggested by the sites Korolevo I, Pogreby and Dubossary, Khrayashch and Mikhailovsky, Treugol’naya cave, Weasel cave, Kudaro I and III and Tsiona.

Still, the most probably direction of the early hominization of Europe is related to the route Africa – Near East – Balkan Peninsula and it is confirmed by many material evidence. In the Pliocene and during transition into the Pleistocene the Dardanelles and the Bosphorus were the straits between the Mediterranean and the Black Sea, which was at that time large freshwater lake. The migration of the megafauna better adapted to the colder climate could have been running uninterruptedly along that route, from the Near East, i.e. Asia Minor towards Europe. The logical consequence of these movements was moving of men after large prey as main source of highly valuable proteins.

The finds from the site Ubeidiya (Israel) have clear stratigraphy and they are dated around 1.4 million years while particularly important are the confirmed dates for the finds from Dmanisi (1.8 million years) and Kozarnika cave (1.5 million years) as this was indubitably the migration route of the first hominins towards Europe.

The artifacts from the Treugol’naya cave despite considerable distance from the site Kremenac reveal an exceptional degree of correspondence. It regards the chipped stone industry identified as the pre-Mousterian, i.e. as Tayacien with artifacts of smaller size including the pebble tools, without Acheulian bifaces and the Levallois technique but with crude protobifaces and atypical bifaces. The date of the earliest layer in Treugol’naya Cave (7A) is more than 560,000 years.

The age of the artifacts of the unifacial and bifacial chopper types from the sites Eskike Sirtu and Gümüşdere has been estimated at around 350,000 to 400,000 years. Also, all sites in the Bosphorus region date from the Middle Pleistocene period. Some of these sites like

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23 Ivanova 2006.
26 Dennell and Roebroeks 1996.
27 Doronichev 2008.
Yatak, Kustepe and Balkitepe are even typologically very similar to Kremenac. These are the plateaus on the slopes of the Ganos Mt. where large quantities of raw material consisting of rounded river pebbles have been found. The site near the village Rodia to the north of Larissa (Greece) is dated to the period around 300–400,000 years BP on the basis of the geological context, while the Early Paleolithic finds have also been recorded in the Petralona Cave, at an open air site Kokinopilos, at Alonaki, at Kopsis (in Corfu), at the sites in the vicinity of Preveza, in the Argolis as well as at some Thessalian sites. The earliest finds from the Gajtan I Cave located to the southeast of Skadar in Albania have also been identified as of Early Paleolithic provenance.

The sites in the territory of modern Bulgaria are of special importance for marking out the route of early hominization of Europe through the Balkan Peninsula and it is particularly important to emphasize the fact that site in the Kozarnika Cave in Bulgaria (on the slopes of the Balkan Mt. in the immediate vicinity of Belogradchik) is around 70 kilometers far as the crow flies from the site Kremenac in the village Rujnik. The finds from the Kozarnika Cave are assumed to be the earliest Early Paleolithic artifacts in Europe dated in the period between 1,500,000 and 600,000 years BP. The sites Siroka poljana and Kremenete are the open air sites in the in the western Rhodopes massifs only around 10 kilometers far from each other and according to the analogies from the Caucasus these two sites are also dated to the period around 500,000 years BP. Such dating suggests the assumption that this region in Bulgaria had been inhabited in the period between 800,000 and 500,000 BP.

The series of chipped pebbles with the Acheulian characteristics from the sites Valea Dirjovului, Farcașele, Valea Lupului i Mitoc – Malul Galben in Romania as well as the Lower Paleolithic artifacts from the site Verteszolos in Hungary made on smaller flint and quartzite pebbles and dated around 350,000 years BP are indubitable indications for the following of the route of the earliest hominization of the southeast Europe. Farther to the west on that route are the sites Donje Pazarićte, Golubovac and Punikve with artifacts of the Acheulian provenance and the Sandalja I near Pula with the tool of chopper type from its Villafranchian layers as the additional evidence for the assumed migration route.

In the center of this vast area abounding in the mentioned sites is located the site Kremenac near the village Rujnik as one of potentially crucial sites. Disregarding certain inconsistencies and the evident differences in the date of some sites, they all confirm the assumptions about early inhabitation of the Balkan Peninsula. It is significant for the site Kremenac that in immediate vicinity of the village Rujnik and around 2 km to the east from the site Kremenac there is a rocky massif of Velika Humski Ćuka with many smaller caves, which could have provided safe refuge for the early inhabitants of this area. From there they could embark on further investigations of the area and searching for the necessary food resources and raw materials. The finds from closer or farther Balkan neighborhood of the site Kremenac suggest the logical assumption that the zone of that site was unavoidable in progress of the Early Paleolithic populations throughout the southeast Europe, i.e. that this is the route along which had been carried out early hominization of the southeast Europe but even more important of the Europe in general.

The existence of more than one Early Paleolithic industry has been encountered in the Bosphorus region of the northwestern Turkey. The authors emphasize that it is impossible to draw the conclusion at this level of investigation whether such diversity is the result of chronological, functional, ecological or some other differences. The finds from Kremenac also fit into that conclusion. The artifacts are crudely executed with undoubted characteristics of the so-called pebble culture but some of them reveal the traits of the early bifaces making this industry closer to the Acheulian. Most of these artifacts, regardless of the morphological characteristics, were made on the unprepared pebbles many of which had been carefully selected so it was not necessary to adapt greatly their natural shape by the retouching. The retouch is in any case coarse.

29 Dinçer and Slimak 2007.
31 Fistani 1993.
32 Иванова 2006.
33 Pătrășescu 1970, 11–13, Fig. 2. Still, the attention should be paid to the critical review of Doño concerning the former interpretations of the potential Lower Paleolithic finds in the territory of Romania and his conclusion that existence of such sites is dubious (Doño, 2008) although their contesting is based exclusively on the absence of the radiometric data that only partially diminish the importance of the finds, which by their morphology indicate the age of the site from which they originate.
34 Doño 1988.
35 Malez 1979.
36 Malez 1987; Karavanic i Jankovic 2006.
and executed by the hard retouch stone tools as it is confirmed by the negative facets with very prominent impressions on the spots where was the bulb of the removed flakes. Dinçer and Slimak\(^\text{38}\) state in their investigation the difficulties in estimating the date of finds in the Turkish Thrace emphasizing as the main problem small number of sites, relatively small number of artifacts and the fact that most of them are the surface finds. The finds from Kremenac also share the same problems. Kremenac is for the time being an isolated site and in the moment of writing this text we have at our disposal small number of artifacts, which are all the surface finds. The so-called industry of choppers from Kremenac fit into the picture established by the analysis of the material from the sites Eskice Sirtu and Gümüşdere\(^\text{39}\) and Yatağ, Kuştepe and Balıtepe\(^\text{40}\) in the Turkish Thrace but the situation is additionally complicated because of the fact that besides the industry of choppers we also have at our site the industry of protobifaces but also possibly the Middle Paleolithic artifacts. It should be emphasized that lower dating of the sites in the territory of the Turkish Thrace is only the consequence of still insufficient level of investigations and the environmental conditions where the sites of earlier date perhaps could have not been preserved.

If we bear in mind generally accepted explanation that typical Balkan Mousterian is characterized by the presence of relatively high proportion of the retouched Upper Paleolithic types of artifacts\(^\text{41}\) the assumed Mousterian material from the site Kremenac offers completely different picture. The differences in comparison with typical Mousterian inventory are conspicuous in total absence of the mentioned Upper Paleolithic types of artifacts, in the insignificant quantity of the Levallois flakes, i.e. in complete absence of the classic triangular Levallois points either retouched or unretouched. This industry is based almost entirely on the use of massive flakes from the unprepared pebbles so, conditionally speaking, the Mousterian horizon at Kremenac has so strong archaic features that it looks much closer to the Early than to the Middle Paleolithic. This also is the strongest argument, which probably directly links this group of artifacts with the Lower Paleolithic specimens making with them a single entity.

Despite the dilemmas, which these industries pose to the investigators I think that at this moment the more precise dating of our site is not so essential as is the indisputable fact that regardless whether these are its early, middle or late phases the Early Paleolithic industry has been encountered at the site Kremenac.

The conclusions reached after the analysis of this small assemblage of the surface finds could be summarized as follows:

- the Lower Paleolithic industry indubitably exists at the site Kremenac,
- the artifacts identified by Z. Kaluderović as mining tools are actually not that kind of implements,
- the tools assumed by Z. Kaluderović to be the semi-finished products possibly even from the post-Paleolithic period date from the Paleolithic period and are entirely defined artifacts,
- the artifacts with the characteristics of the Mousterian industry and very prominent archaic elements are probably of the pre-Mousterian date.

The future study of the material housed in the National Museum in Niš and originating from the excavations conducted by Z. Kaluderović will make possible more precise chronological determination of the artifacts and will also provide new evidence for the importance of this site in the study of the early hominization of the southeast Europe.

**CATALOGUE**

1. Unifacial chopper. Dimension: 8.6 cm x 7.4 cm x 6.0 cm. Weight: 529 g. Opal. (Pl. I/1)
2. Unifacial chopper. Dimension: 13.0 cm x 9.6 cm x 5.4 cm. Weight: 954 g. Opal. (Pl. I/2)
3. Unifacial chopper. Dimension: 9.4 cm x 7.1 cm x 2.7 cm. Weight: 220 g. Opal. (Pl. II/1)
4. Unifacial chopper. Dimension: 7.5 cm x 10.3 cm x 2.9 cm. Weight: 289 g. Opal. (Pl. II/2)
5. Unifacial chopper. Dimension: 8.2 cm x 10.8 cm x 4.2 cm. Weight: 393 g. Opal. (Pl. III/1)
6. Chopper-sidescraper. Dimension: 10.1 cm x 6.0 cm x 4.6 cm. Weight: 381 g. Opal. (Pl. III/2)
7. Bifacial chopper. Dimension: 11.5 cm x 9.1 cm x 5.1 cm. Weight: 581 g. Opal. (Pl. IV/1)
8. Protobiface. Dimension: 9.4 cm x 7.6 cm x 5.4 cm. Weight: 369 g. Opal. (Pl. IV/2)
9. Protobiface. Dimension: 10.2 cm x 6.8 cm x 4.7 cm. Weight: 305 g. Opal. (Pl. IV/3)

\(^{38}\) Dinçer and Slimak 2007.
\(^{39}\) Runnels and Ozdogan 2001.
\(^{40}\) Dinçer and Slimak, 2007
\(^{41}\) Runnels and Ozdogan 2001.
10. Protobiface. Dimension: 13.7 cm x 10.2 cm x 5.8 cm. Weight: 829 g. Quartzite. (Pl. V/1)
11. Sidescraper. Dimension: 10.2 cm x 8.4 cm x 4.2 cm. Weight: 371 g. Opal. (Pl. V/2)
12. Convergent endscraper. Dimension: 7.1 cm x 5.6 cm x 2.9 cm. Weight: 127 g. Opal. (Pl. V/3)
13. Convergent endscraper. Dimension: 4.2 cm x 4.4 cm x 2.3 cm. Weight: 34 g. Opal. (Pl. VI/1)
14. Circular scraper. Dimension: 6.4 cm x 5.4 cm x 2.7 cm. Weight: 114 g. Opal. (Pl. VI/2)
15. Circular scraper. Dimension: 6.9 cm x 5.4 cm x 3.1 cm. Weight: 132 g. Opal. (Pl. VI/3)
16. Endscraper. Dimension: 7.3 cm x 5.8 cm x 3.0 cm. Weight: 164 g. Opal. (Pl. VI/4)
17. Endscraper. Dimension: 5.8 cm x 5.3 cm x 2.6 cm. Weight: 98 g. Opal. (Pl. VII/1)
18. Endscraper. Dimension: 4.6 cm x 4.5 cm x 1.9 cm. Weight: 48 g. Opal. (Pl. VII/2)
19. Sidescraper. Dimension: 7.1 cm x 6.2 cm x 2.7 cm. Weight: 160 g. Opal. (Pl. VII/3)
20. Sidescraper. Dimension: 7.2 cm x 5.7 cm x 3.3 cm. Weight: 162 g. Opal. (Pl. VII/4)
21. Sidescraper. Dimension: 8.2 cm x 6.8 cm x 2.4 cm. Weight: 134 g. Opal. (Pl. VII/5)
22. Sidescraper. Dimension: 7.0 cm x 3.9 cm x 2.2 cm. Weight: 67 g. Opal. (Pl. VII/6)
23. Sidescraper. Dimension: 5.2 cm x 2.8 cm x 1.6 cm. Weight: 24 g. Opal. (Pl. VIII/1)
24. Retouched flake. Dimension: 6.5 cm x 7.2 cm x 2.6 cm. Weight: 136 g. Opal. (Pl. VIII/2)
25. Trapezoidal cleaver. Dimension: 6.0 cm x 6.5 cm x 2.8 cm. Weight: 113 g. Opal. (Pl. VIII/3)
26. Nosed sidescraper. Dimension: 7.2 cm x 5.4 cm x 2.6 cm. Weight: 113 g. Opal. (Pl. VIII/4)
27. Unretouched flake. Dimension: 5.1 cm x 4.3 cm x 1.8 cm. Weight: 38 g. Opal. (Pl. VIII/5)

Translated by Mirjana Vukmanović
BIBLIOGRAPHY:

Dojopaleolitsko nalazištje Kremenac
Kod Sela Rujnika (Srbija)

Većina predmeta o kojima je rеч u ovom tekstu i kojima su ne-
sumnivo artefakti izdavački se u odnosu na ostale, osim po
svim karakteristikama koje su posledica tehnioloških po-
stupaka u okresavanju, i po izraženoj mlječibeloj patini
koja u nekim slučajevima je stvario određena imitacije.

Različite karakteristike artefakta sa Kremenca su na osnovu
izrađenog materijala, tehnoloških postupaka i strukturu,
koju obično karakterizuje neki tip artefakta.

Kad su podaci dovoljni za detaljisan pristup artefakto-
ju, oni se redovno iskorišćuju u temelju tehnoloških
postupaka, sa sekvencijom koje karakterizuje neke od
artefakata. Na ovom mestu je potrebno podsetiti se i
vrednog rada H. Kelija koji je davan 1937.

Ako imamo na umu opšteprihvaćeno tumačenje da je tip-
inčni balkanski musterijen karakterističan po prisustvu
relativno velikog procenta retučiranih goripoaleolitski-
skih tipova artefakata, onda je potrebno poštovati proble-
matske karakteristike artefakta i biti osebnim u upotrebi
masivnih odbitaka.

Ako imamo na umu opšteprihvaćeno tumačenje da je tip-
inčni balkanski musterijen karakterističan po prisustvu
relativno velikog procenta retučiranih goripoaleolitski-
skih tipova artefakata, na jesen svog pristupa
kneževima egzistira bez obziro da li su retu-


Vila 1994 – P. Vila, Lower and Middle Pleistocene
archaeology. In: S. J. de Laet (eds.) History of Humanity,
Prehistory and the Beginnings of Civilization, Routledge
љених облутика тако да, условно речено, мустеријенски хоризонт на Кременцу носи толико архаичне црте да изгледа много ближи старијем него средњем палеолиту. То је и најјачи аргумент који ову групу артефаката вероватно не-посредно везује са доњепалеолитским примерцима чивећи са њима једну целину.

И поред дилема које ове индустрије постављају пред истраживача мислим да у овом тренутку није толико битно прецизније датовање нашег налазишта колико неспорна чивењице да се на локалитету Кременцу налази индустрија старијег палеолита без обзира да ли говоримо о њеним раним, средњим или касним фазама.

Закључићи до којих се долази обрадом ове мале збирке површинских налаза могу да се сведе на следеће:
– на локалитету Кременц несумњиво постоји индустрија доњег палеолита,
– артефакти за које З. Калуђеровић наводи да су рударске алатке то заправо нису,
– алатке за које З. Калуђеровић претпоставља да су полуфабрикати могуће и из постпалеолитског периода су палеолитске и потпuno су дефинисани артефакти,
– артефакти са карактеристикама мустеријенске индустрије и јако израженим архаичним елементима вероватно су премустеријенски.
Plate I – Kremenac: 1–2) Unifacial choppers

Табла I – Кременац: 1–2) једносидрани чопери
Plate II – Kremenac: 1–2) Unifacial choppers

Табла II – Кременац: 1–2) једносијарани чопери
Plate III – Kremenac: 1) Unifacial chopper; 2) Chopper-sidescraper

Таблица III – Кременац: 1) једносијеран чопер; 2) чопер-идескриптер
Plate IV – Kremenac: 1) Bifacial chopper; 2–3) Protobifaces

Таблица IV – Кременац: 1) двосијран чопер; 2–3) Простобифаси
Plate V – Kremenac: 1) Protobiface; 2) Sidescraper; 3) Convergent endscraper
Табла V – Кременч: 1) иройбифас; 2) йосйярушка; 3) конвергентни сйруцач
Plate VI – Kremenac: 1) Convergent endscraper; 2–3) Circular scrapers; 4) Endscraper
Tabla VI – Кременач: 1) конвергентни стругачи; 2–3) кружни стругачи; 4) стругач
Plate VII – Kremenac: 1–2) Endscrapers; 3–6) Sidescrapers

Таблица VII – Кременач: 1–2) стругачи; 3–6) йосиришки
Plate VIII – Kremenac: 1) Sidescraper; 2) Retouched flake; 3) Trapezoidal cleaver; 4) Nosed sidescraper; 5) Unretouched flake

Табла VIII – Кременац: 1) Јострирука; 2) ретуширан орбитак; 3) трепезоидален кливер; 4) носед сидескрепер; 5) неретуширан орбитак