The question how, when and where bow and arrow had been used for the first time in history has drawn attention of scholars long time ago but despite many archaeological discoveries precise answers have not been attained so far.

HISTORY OF PROJECTILE EVOLUTION

There is no doubt that occurrence of bow and arrow was preceded by a long period characterized by use of their predecessor – a spear. The earliest known specimen is heavy, crudely worked wooden spear with pointed tip found at Clacton on sea and it is one of just a few proofs for use of organic materials for making weapons already in the Lower Paleolithic.\(^1\) With this type of weaponry, which due to its size and weight was not intended for throwing the penetration was achieved as an effect of considerable kinetic energy resulting from power and swiftness of stroke and the mass of the weapon.

However, usefulness of this type of weapon was brought into question in two instances – in a situation when it is necessary to come close enough to a big game and thus put the life of a hunter at stake and when it is necessary to come even closer to small game, which certainly do not sit and wait for the hunter. Such situations inevitably resulted in creating more efficient weapons – throwing spears. For the first time we can speak about projectile, which had smaller length and smaller mass than hand spear and special improvement was the use of a tip made of chipped stone or ground antler or bone.

Analyses of micro-damages on the edges of typologically clearly identified Levallois points indicated the method of attachment to the wooden body of the spear.\(^2\) The find of damaged Levallois point in the neck vertebra of wild ass from Umm el Tlal after detailed analyses revealed that this type of spear was certainly used for throwing at short distances. Small speed of about 8–10 m/s was compensated by still relatively great mass of the weapon providing sufficient kinetic energy for piercing of thick and strong skin and deep penetrating even into bone tissue of the game. According to the dating of the find from Umm el Tlal it all happened around 50.000 years ago.\(^3\)

Next stage in the evolution process is marked by appearance of specific throwing device, which extended the hand as lever so the thrust was stronger, speed of the projectile greater (around 25 m/s) and range much longer. In other words, some of so-called »commanding batons«, which occurred in the Late Paleolithic are in fact ancestors of the tool known as atlatl, i.e. ot-lotle in the Aztec culture.\(^4\) Spears being thrown by using this

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\(^1\) Adkins and Adkins 1988, 14.
\(^3\) Boëda et al. 1999, 394–402.
\(^4\) From Aztec term nahuatl originating from the word atla meaning to throw.
device are shorter and lighter (their weight is about 300 gr) and with smaller and more precisely shaped stone tips. On the basis of dating of the sites where these throwing rods were found this crucial transformation happened about twenty thousand years ago.

The efficiency of this device is confirmed also by more recent historical notes about unpleasant surprise and fear suffered by conquistadors who with Cortes invaded Mexico in 1520. Heavy armored Spaniards who brought with them armors and firearms had been stunned by efficiency of technology originating from the Stone Age. Well-trained Aztec warrior could throw the spear using atlatl at the distance of 90 meters and Spanish armors were easily pierced. The spears were around 180 cm long and with barbed tips so the only way to take it out of the body was to pull the tip through to the other side.

At the very beginning of use of the throwing rods first to appear among chipped artifacts were Solutrean points – artifacts of leaf shape exceptionally precisely and nicely bifacially retouched. Some of them were probably used as knives while the other were used as tips for the spears. Artifacts used exclusively as projectiles are somewhat later Gravettian shouldered points.

The exact moment of the beginning of use of bow and arrow also could not be identified. The bows used to break and then discarded as useless and as they had been made of organic material soil structure usually did not allow their preservation within archaeological layers. At this moment the earliest known find is the pine-made bow discovered in Ahrensbourg in the vicinity of Hamburg (Germany) and its age is estimated at around 10,000 years.

However, very precisely worked projectiles of Aterian type from north Africa suggest the possibility that bow and arrows in the warm regions of Africa perhaps had been used already in the Middle Paleolithic i.e. around 50,000 years ago. Finds of nicely defined projectiles with barbs and tang for hafting from the Solutrean layers in Parpallo cave in Spain are still another confirmation for much earlier use of bow and arrow than we assume on the basis of the find of bow itself.

In any case, climatic changes, receding of ice and tundra which happened in north Europe in the end of Pleistocene made possible formation of forest cover and hunters could easily find suitable trees for making bows and thus atlatl was completely abandoned as bow and arrow had greater range and were incomparably more precise and faster in use.

On the basis of archaeological data bow and arrows had most frequently been made of elm, ash, maple and yew. The bows were up to 1.5 m even up to 1.9 m long and arrows were usually from 0.5 to 1.0 m long.

Bow strings were made of flax, animal tendons, intestines and leather and arrowheads were made of stone, bone, antler, teeth, thorns or wood partially hardened by fire.

The skill mastered in production of bow and arrow is best explained in the ethnological notes recorded among the members of Ona tribe who still in the beginning of the 20th century inhabited vast areas of Tierra del Fuego.

They made bows of the small birch (Nothofagus pumilio) using exclusively white part of the tree. Only the core was of red color and not suitable for use. It was rather difficult to find the tree of required size, around 1.20 m and also without knots. The cross-section of the bow was not circular but polygonal, consisting of about 24 planes.

Bows had been made of yellow barberry tree but only of the kind growing in the northern areas of territory populated by the members of the Ona tribe. They used to cut the branch around 80 cm long that after removing of the bark they divided longitudinally in four pieces removing the core. These pieces had been heated on the fire and after that straightened and then their surface was finally trimmed by polishing using sand or fox leather. For the arrow stabilizers they used bird feathers attached by the tendons of guanacos but especially those taken under the skin of animal’s back. These tendons were soaked before use then dried and eventually used for attaching feathers. For the left-handed hunters they used as arrow stabilizers the feathers from the left wing of a bird and for the right-handed hunters the feathers from the left wing.

The arrowheads were made of silicate rocks but also of broken glass bottles left by white settlers. In the process of working the arrowhead was held by fox leather and it was retouched with dried bone of a fox or guanaco that was from time to time sharpened using stone of abrasive characteristics. In order to prevent the tip he is working on to become brittle due to the low temperature the hunter while working on one tip kept another one or two in his mouth thus keeping them warm. When the one in hand had become too brittle he would put it into the mouth and continued to work on the other warm tip. Finished arrowheads were

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5 Knapp and Becker 2000.
7 Knapp and Becker 2000.
8 Coles, Higgs 1975, 235–236, Fig. 97.
up to 3 cm long and up to 1.5 cm wide with denticulated edges. The bow string was made of the tendon from the foreleg of guanaco. If they went hunting in the wet weather they kept the string in the bellows where they also carried the steel and placed it on the bow immediately before the hunting.

Before releasing the arrow the hunter would take off his leather overcoat and approached the game as near as possible holding in his mouth two or three arrows. He used to hold the bow with his left hand and the arrow with thumb and forefinger of his right hand. In the moment of arrow releasing he extended his left arm as much as possible and thrust his body forward to maximize the kinetic energy. The most appropriate moment for releasing the arrow was in the moment when the game tried to escape as it made possible to aim behind the ribs so the arrow could pierce the body and vital organs and not reach the bones. The wounded game, most probably guanaco, could move away from the spot even few kilometers before it died. Hunter usually released another arrow after the running animal and then he followed his prey. The valuable arrows were carefully collected so the hunter after finding his game used to return in order to find and retrieve the arrows, which missed the target.\(^9\)

The quoted data are illustrative evidence to what extent the skill of manufacture and use of bow and arrow had been mastered in the course of many millennia. The fact is that this exceptionally efficient hunting weapon very soon turned into the weapon of warriors that stayed in extensive use in Europe until the end of the Middle Ages and the introduction of gunpowder and firearms. The North American Indians continued to use chipped projectiles even after the arrival of white men until the end of 19th century and Australian Aborigines sporadically use chipped projectiles even today making them of broken glass bottles and porcelain insulators from long-distance electric lines.10

**FINDS OF PROJECTILES IN SERBIA**

Distinct shape of the chipped stone projectile is so easily recognizable hence we believe that even the first investigators of the prehistoric sites in Serbia could not have overlooked such kind of artifacts disregarding the confirmed deficiencies in the excavation method. This assumption should be borne in mind because despite exceptionally large number of prehistoric sites and thousands of chipped artifacts the projectiles are the least recorded and studied type of these finds.

In the course of many years of studying the chipped stone projectiles it has been confirmed that in the available material almost half of the finds are chance finds without precise data about finding circumstances. Fortunately, for certain portion of characteristic specimens coming from the excavations there are the data, which make possible chronological determination, so on the basis of these specimens it is possible to date at least generally also the chance finds.

All discovered chipped projectiles could be related to the six great prehistoric periods: Paleolithic (Middle and Late), Mesolithic, Neolithic (Early/Middle and Late), Eneolithic, Bronze Age and Iron Age. As raw materials for their production had been used exclusively different types of chert and obsidian and in only one instance the so-called light white stone had been used.

**Paleolithic – Middle**

The earliest projectiles in the prehistory of Serbia are morphologically very distinctive and they fortunately come from clearly stratified layers of the Risovača cave near Arandjelovac so their chronological determination is very clear. There were found one classic Mousterian triangular point (Pl. I/3) and two leaf-like bifaces (Pl. I/1, 2) representing so-called Szeletien facies of the Middle Paleolithic11 and these finds are very significant for understanding the processes happening in the territory of present-day Serbia in the Middle Paleolithic period.

Triangular point is the representative of one, very numerous and distinct type of Middle Paleolithic artifacts according to which is often possible to date the site even if there are no reliable stratigraphic data. This type of artifacts could have had manifold function as is the frequent case in the Middle Paleolithic but already mentioned find from Umm el Tlel clearly defines it as very efficient weapon. Although there is no direct evidence for that the osteological finds of possible game within Middle Paleolithic layers in Risovača indicate that this point should also be identified as projectile.

More interesting is the find of two leaf-like bifaces, which author of excavations dates in the Szeletien facies of the Middle Paleolithic on the basis of analogies from the Szelete cave in Hungary.12 These two projectiles are for the time being the isolated finds among the chipped stone inventory of Middle Paleolithic sites in Serbia. Their occurrence should be related to the analogous specimens from the immediate geographic surroundings: Bulgaria,13 Romania14 and Hungary. This group of leaf-like bifaces represents the link with identical finds from Russian and Ukrainian sites and opens up the question of provenance of later Solutrean leaf-like bifaces, which in their primary area had predecessors in the form of similar specimens from the Middle Paleolithic layers at the West European sites.15

**Paleolithic – Late**

One remarkable specimen, which could be related to the Late Paleolithic is shouldered point from the site »Ekonomija 13. maj« near Zemun (Pl. I/4). It is a chance find originating from the collapsed high loess profile and from the area where many thousands of chipped artifacts from different periods had been found.16

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10  Nougier 1974, 146.
11  Gavela 1988, 53, Fig. 21.
14  Пăнэеску 1970, Fig. 3/10.
15  Тытов, Эрдел 1980, 51–53, Puc. 18–19. Specimens of bifacial projectiles from Szelete are according to the author dated in the Upper Paleolithic.
17  Щарц 1984, 5–33.
Artifacts were made of dark gray/brown chert, i.e. radiolarite on thin and narrow blade. On the left lateral edge was applied indirect abrupt retouch, which created the shoulder. On distal part of right lateral edge the point was emphasized by indirect partial normal retouch. Proximal end is bifacially shaped by normal retouch removing the bulb of percussion and thus the tang for hafting was created.

Although such artifacts are known in literature as atypical shouldered points they are in fact very typical specimens. Distinguished shape and characteristic abrupt retouch assign the Zemun specimen to the Gravettian cultural circle. Such dating is supported by the specimens from the immediate geographic surroundings including the point from Jama v Lozi (Slovenia) dated into the Tardigravettian and point from Sandalja I near Pula (Croatia) that was found in the layer of advanced Gravettian. Many identical specimens originate from Kastritsa in Greece and although they are determined just as the products of Late Paleolithic they confirm the suggested dating.

In addition to the shouldered point from the site »Ekonomija 13. maj« and which was dated on the basis of its characteristic and typical shape the Late Paleolithic projectiles are represented by one specimen originating from archaeological excavations (Pl. I/5). It is a small point with curved back from the fourth layer of Šalitrena pećina therefore attributed to the Late Paleolithic but according to its morphological traits it is related to the epi-Gravettian technocomplex. This type of projectiles was encountered at many Late Paleolithic sites throughout Europe but even more important is its presence also at the sites in the neighboring regions including Croatia, Bosnia and Montenegro.

Mesolithic

Most of the projectiles dated into the Mesolithic period originate from one distinctive geographic region, from the Iron Gates and moreover from one site – Padina. This is a group of small blades with curved back (Pl. I/6–9 and 14), few segments (Pl. I/12, 13, 15 and 16) and two triangles (Pl. I/10, 11).

Another two projectiles dating from this period were encountered at the site »Ekonomija 13. maj«. One is a narrow segment (Pl. I/18) and the other is a blade with abrupt retouched truncation (Pl. I/17) and although they are chance finds their morphological characteristics are so distinctive that they could be without doubt dated to the Mesolithic period. Dated finds from the excavations at Padina as well as morphotechnical characteristics of the most of collection from the site »Ekonomija 13. maj« are arguments for dating also two above mentioned specimens from that site in the immediate vicinity of Zemun in the Mesolithic period.

Two miniature projectiles with tang for hafting also come from the site »Ekonomija 13. maj« and they were made of chert of dark red color (Pl. II/1, 2). On both specimens the tip was created at the distal end by direct abrupt retouch on both lateral edges while rather small tang was shaped at the proximal end by coarse and asymmetrical retouch on ventral and dorsal side. These two projectiles do not have direct analogies in the other stone material from the territory of Serbia. Absence of clearly defined barbs is not a characteristic, which could date this artifacts more precisely. In fact, more significant is the presence of classic abrupt retouch, which was besides on these projectiles encountered in its classic form also on certain amount of other artifacts. Although there is no possibility for more precise dating, these two projectiles certainly could be dated within chronological framework between the end of Late Paleolithic and the beginning of Neolithic.

Neolithic – Early/Middle

At this very moment only four projectiles could be dated into Early/Middle Neolithic of Serbia and it is really insufficient to establish clear picture about this type of artifacts in that period.

Pentagonal bifacially worked projectile from Rudnik near Srbica in Kosovo (Pl. II/3) is an isolated find but by a stroke of good fortune it has been found in the course of archaeological excavations. Unfortunately, the exact stratigraphic data are not known but projectile certainly comes from the Starčevo horizon.

If for a moment we leave aside the possibility of autochthonous origin of this projectile within Starčevo group then as only source could be identified the area of the Adriatic zone and contact with the bearers of the Danilo culture. Namely, identical pentagonal projectiles were encountered at Butmir but taking into account the Late Neolithic date of the Butmir culture the only

18 Brodar, Osoble 1979, 159–194; Malez 1974a, 7–44.
19 Coles, Higgs 1975, 321, Fig. 131.
22 Malez 1979, 227–276.
23 Basler 1979c, 331–355.
24 Basler 1979c, 387–403.
27 Radinsky, Hoernes 1895, T. XIV/71.
possibility for comparison left are not identical but very similar rhomboid projectiles from Smiljičić.28
In any case, it is the fact that this type of projectile appears in the prehistory of Serbia only once again as the rhomboid specimen from the later, Vinča settlement at the site Jela – Benska bar near Šabac (Pl. II/14).29
The most rudimental shapes of projectiles are two triangular specimens made on flakes, one from the site Popovića brdo near Zablaje (Pl. II/4) and one from Orašje near Dubravica (Pl. II/5).
Even though the site Popovića brdo was at one time identified as dating from the Vinča–Plocnik phase30 later investigations revealed that there is no other material but that from the Starčevo culture. It means that also the projectile is without doubt the real representatives of the Starčevo culture.
Specimen from Orašje (Pl. II/5) comes from the excavations31 but, unfortunately, the documentation is lost so it was impossible to date this artifact more precisely. According to the analogy from Popovića brdo there is a possibility that it belongs to the Starčevo horizon the existence of which was subsequently indicated by the autopsy of the material in the museum collection.32
Main characteristics of these two projectiles are that they were made on short and broad flakes with retouch on both lateral edges – as bifacial direct on the specimen from Popovića brdo and as direct and inverse on the specimen from Orašje. The angle between retouched edges is too large for artifacts to be used as perforators and tapering of proximal end only confirms that this adaptation was intended to make possible easier mounting into the wooden body of an arrow thus distinguishing these artifacts without doubt as projectiles.
Elongated trapeze found at the site Blagotin near Poljna is still another exception among the chipped projectiles in the prehistory of Serbia (Pl. II/6). Most recent investigations of the settlement at Blagotin date this site into final phases of the proto-Starčevo culture33 suggesting that this projectile also dates from that time. It is the flake on which were created two straight and slanting edges by combining the direct raised to abrupt retouch and thus the flake got the shape of very high trapeze and was clearly defined as transversal arrowhead.34 It is without doubt that such type of trapeze was not used in any case as element of composite tools (in particular sickles and knives) and it has direct analogies in the specimens from the Scandinavian Mesolithic and Neolithic sites.35 From geographic and cultural point of view two much closer analogous specimens come from within Starčevo – Criș complex, from the Romanian site Cuina Turcului – Dubova.36 
The occurrence of transversal arrowhead at Blagotin despite the analogies from the territory of Romania could be the typical example of convergent evolution in technological procedures, which disregarding the period, geographic distance and cultural traditions result in identical outcomes in the process of manufacture and especially in the final shape of the artifact.

Neolithic – Late
Find, which is indubitably of Late Neolithic provenance although it was a chance find is a hoard consisting of 15 arrowheads discovered at the site Bele vode in Ripanj.37 This hoard of arrowheads was found in a vessel, which according to the description of the finder by its shape and decoration corresponds to the pottery of Late Neolithic, more concrete of the Vinča culture.
All specimens are nicely worked with clearly distinguished barbs and tang and they could be classified into four groups:
– miniature arrowheads made of flakes and short blades, 1.6 cm to 2.0 cm long and span of barbs from 0.8 cm to 1.0 cm (Pl. III/1–4).
– arrowheads made of rather broad blades making possible more prominent molding of barbs, 2.8 cm to 4.8 cm long and span of barbs from 1.2 cm to 2.1 cm (Pl. III/5–11).
– arrowheads made of longer blades with slightly less prominent molding of barbs, 4.7 cm to 5.0 cm long and 1.1 cm to 2.1 cm wide (Pl. III/12, 14),
– arrowhead made of long blade with triangular section of the tip and denticulated barbs. Length is 6.6 cm and width 1.4 cm (Pl. III/15).
All arrowheads are retouched on both sides but the retouch is restricted mostly to the edges. On only two specimens (Pl. III/7, 11) the splintered retouch executed by pressure covers the entire dorsal side. This is one of very essential characteristics of this collection.

28 Malez 1974, T. LXXXI.
29 Трубухов, Васильков 1983, Table XVII/1.
30 Гарапанин, Гарапанин 1951.
31 Мано-Засе, Мари, Гарапанин 1950.
32 Јапановић, Ђорђевић 1990.
33 Николић, Зечевић 2001.
34 Transversal or bleeding arrowhead in the English literature.
36 Păunescu 1970, fig. 21–4, 12.
Namely, when finds from Ripanj are concerned the absence of real bifacial retouch, long and narrow clearly distinguished tangs and nicely defined and emphasized barbs distinguish these specimens from the projectiles so characteristic and numerous at the Neolithic settlements in the mountainous regions of Bosnia. Only from the settlement at Butmir come much more specimens than from the entire prehistory of Serbia. This fact and similarity of projectiles always prompted authors to explain all Late Neolithic finds from Serbia as import from the Butmir culture. It has been overlooked that most of Butmir arrowheads had been executed by complete bifacial retouch, that barbs are usually not straight but slightly convex, that tang is often short and wide, that conversion from tang into the barbs most often is not abrupt and that many arrowheads have slightly rounded tip. These many differences between the finds from Serbia and from the eponymous site Butmir leave open the possibility that arrowheads from the Vinča culture are nonetheless not imported and that they are local products.

Asymmetrical triangular projectile from the site Zbradila near Korbovo is still another in a series of similar finds (Pl. II/7). It is made of so-called »Balkan flint« on asymmetrical flake whose triangular shape is emphasized by direct semi-abrupt retouch on the left lateral edge and inverse semi-abrupt retouch on the distal end. This projectile has neither tang nor specially modeled base and as segment for inserting in the wooden body of the arrow was used asymmetrical but thin right edge of the flake. As we have already said this type of projectile represents the most rudimental form and in the Neolithic of Serbia it has been encountered only at the earlier sites Popovića brdo near Zablače and Orašje near Dubravica, at the contemporary site Trsine near Gornja Gorevnica as well as in the Eneolithic horizons of the site Livade near Kalenić.

Despite the fact that this projectile is a chance find from the Danube bank, from the collapsed profile, it was found in the zone of highest concentration of the material corresponding with block II at the coastal plateau whence comes the most of the material from the excavation. Hence, it could be assumed that projectile also originates from that part of settlement and this dates it in the period between phases Vinča – Tordoš II and Vinča – Pločnik IIa.

To this type of the most rudimental projectiles is ascribed also the specimen (Pl. II/8) from layer B of the site Trsine near Gornja Gorevnica. V. Bogosavljević-Petrović identified magnesite as raw material of which the artifact was made, without detailed analyses. If she considers the raw material known in literature as »light white stone« or »soft white stone« then defining the artifact typologically as perforator as the author does is out of question. It is soft and friable stone, which could not have been used for artifacts expected to be exceptionally resistant to wear. However, for making projectile tips this stone could be used in exceptional circumstances as it could pierce the skin or fur thanks to the relation of speed and mass having impact on rather small area. Confirmation for this assumption is the similar specimen made of the same kind of stone, found at the site Livade near Kalenić and which we will discuss later.

Projectile made of black translucent obsidian found at the site »Ekonomija 13. maj« near Zemun (Pl. II/9) is most probably semi-finished specimen. Retouch covers only the edges on the dorsal side. Artifact is of the heart shape with slightly emphasized tip and small, thin tang. All this indicates that it is an artifact whose modeling was not completed and it differs from all other projectiles by the raw material it was made of – obsidian. Use of obsidian became widespread in the Neolithic of Serbia only with Vinča culture so this fact as well as the fact that projectiles with barbs and tang have not been registered so far dates this specimen from »Ekonomija 13. maj« into the Late Neolithic, i.e. Vinča culture.

Projectile from Belo brdo in Vinča (Pl. II/10) has the characteristics of classic Late Neolithic projectiles, the same we encountered on the specimens from the Ripanj hoard. Considering the reliable finding circumstances this projectile was dated in the phase Vinča – Tordoš IIb. Total amount of chipped stone artifacts from the site Belo brdo in Vinča and only one identified projectile are clear indication of relation of Vinča population to the hunting. Position of the settlement on the fertile plateau above the Danube and possibility for fishing certainly pushed hunting into the background in spite of the fact that proximity of hilly hinterland certainly offered good opportunities for it. Vinča in fact represents the symbol of relation of the entire culture to the hunting activity as small number of projectiles at other Vinča culture settlements situated just in that

40 Babović 1986, 95–98.
43 Bogosavljević-Petrović 1998, 155–166.
44 Radovanović 1984, 31–53.
hilly surroundings clearly disclose the relation of the entire population to that at one time the most important way of food providing.

As classic form of the Late Neolithic projectiles in Serbia are identified also one specimen from the site Jela – Benska bara near Šabac (Pl. II/11) dated in the period of the Late Vinča culture and the projectile from the site Divlje polje near Ratina (Pl. II/12) dated in the phase Vinča–Pločnik I–II. Also the chance find from the vicinity of Negotin (Pl. II/13) could be certainly ascribed to this classic form with clearly distinguished tang and barbs but this projectile also has nice and precise bifacial retouch, which almost completely covers both sides.

PROJECTILES OF RHOMBOID SHAPE, SPECIMEN FROM THE SITE JELA–BENSKA BARA NEAR ŠABAC (PL. II/14) DATED IN THE PERIOD OF THE LATE VINČA CULTURE AND SPECIMEN FROM PETNICA (PL. II/15) DATED IN THE PHASE VINČA C–D RESEMBLE IN SHAPE ALREADY MENTIONED EARLIER SPECIMEN FROM RUDNIK NEAR SRBICA (PL. II/6). OCCURRENCE OF IDENTICAL SPECIMENS IN THE LARGE COLLECTION OF PROJECTILES FROM BUTMIR BEAR WITNESS THAT THIS TYPE EFFICIENTLY EXISTED ALONGSIDE THE DOMINANT TYPE WITH CLEARLY DISTINGUISHED BARBS.

ENEOlITHIC

One of very specific finds among the chipped stone projectiles from the territory of Serbia is large very nicely shaped arrowhead with prominent barbs and broad fan-like base of the tang (Pl. IV/1). Unfortunately it was a chance find and according to the insufficient information provided by the finder we only know that it was found in the north of Bačka, within a wide area between Odžaci and Subotica. Keeping secret the exact data about finding circumstances in particular the exact site has already become proverbial among the hunters for archaeological objects. Due to such insurmountable reasons the only way to try to determine this artifact considering cultural and chronological elements is the analysis of its morphotechnical characteristics and the raw material it was made of.

Macroscopic inspection of the rock of which it was made suggests that it is good quality gray chert with lighter and darker zones. Surface is slightly lustrous and the rock is opaque. Primary deposits of this type of chert are absolutely impossible to locate on the basis of these data and the additional problem is that there are no exact geological data about potential deposits of this kind of chert in the territory of Serbia. Therefore, we have to focus our attention entirely to the morphotechnical characteristics of the artifact.

Arrowheads shaped as this specimen from Bačka are completely unknown in the prehistory of Serbia but also in the neighboring countries. In fact, there is another similar specimen in the City Museum of Belgrade but its tang is broken (Pl. IV/2) so we do not know if these two artifacts are identical. Finding circumstances for this specimen are also unknown and S. Perišić indicates as possible place of origin Adriatic coast or some even more distant region.

Shape of the projectile from Bačka with slightly convex edges, clearly distinguished barbs and broad fan-like tang has direct morphological analogies in the specimens used by North American Indians. It is the type of arrowhead known as Dovetail, St. Charles and Hardin in the eastern half of the continent, in five out of nine large geographic regions into which USA are divided. These types of arrowheads are dated in the so-called Early Archaic period that in absolute dates means between 10th and 7th millennium before present. Considering that there can be no question about any cultural contacts with that regions in that time we must cite so-called convergent evolution, which at certain level of technological development generates identical results disregarding chronological, geographical and cultural distance. However, such phenomena are never limited to individual specimens as is the case with our projectile. Usually one local type is developed, that always provides many specimens of the distinct product. E. Cosack was also faced with identical problem related to chronological and cultural determination of one group of chipped projectiles while studying similar specimens found in Hildesheim, Lüneburg, Werlaburgdorf, Bissendorf, Capellenhagen, Holzort, Haimar, Weibeck, Latterde, Heede, Sehlem and Achterdeich. This concerns 19 projectiles discovered at 12 sites. Problem was in the fact that they are all chance finds not accompanied with the material, which could help their attribution and that such projectiles were not encountered among the material from any prehistoric culture in the territory of Germany.

Despite the fact that author had 19 specimens at his disposal he did not have enough evidence to quote the results of already mentioned convergent evolution and

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45 Trbušović, Vasiljević 1983, 26–44.
47 Trbušović, Vasiljević 1983, 26–44.
48 Jež 1985, 43–57.
49 Perišić 1984, 61.
50 Overstreet 1999.
he resorted to a daring and interesting theory. During American war for independence (1777–1783) about 30,000 Germans from the Hessen region were engaged as mercenaries on the English side. On both sides, American and English, took part also the Indians of whom many still had been armed with spears and bows and arrows. German mercenaries of whom 17,000 returned to Germany also came into contact with them. It is probable that many of them brought with them as souvenirs some objects of Indian provenance. In the course of time these objects were lost and sold by heirs or they were presented to friends and relatives. As objects, which lost their original meaning for the new owners they had easily been discarded. Some of them could have ended up in rubbish heaps and as at that time the main method of fertilizing the fields was to scatter manure it is not impossible that as a consequence some of these finds reached the fields. This theory is very imaginative but not illogical. Thus we can assume that when Germans started to colonize Vojvodina in the time of Maria Theresa and continued the process under her son Joseph II with some volunteer from the American war or his family also the specimen we are discussing reached the region of Bačka. Of course, there is still a possibility that this artifact was a product of convergent evolution and that it will be confirmed by some new investigations.

In favor of the local origin speak rather rare finds of not identical but to a certain degree similar finds from the territory of Romania. This concerns large and nicely executed bifacial Eneolithic projectiles of the Gumelnita culture from the sites Vidra and Gumelnita.52 Significant form in the Eneolithic are large triangular bifaces with slightly convex base. Projectile from Bačka represents in fact the derivative of triangle with convex base and with corners removed by making of deep encoches. If therefore this projectile is of local origin we assume that without known circumstances of discovery it could be dated in the Eneolithic period.

Archaeological excavations at the site Livade on the right bank of the river Kladnica in the southeast periphery of village Kalenić included the segments of settlement from the Neolithic and Eneolithic periods. Among the chipped stone artifacts from the Eneolithic horizon three projectiles have been also identified.53

Two projectiles were made of chert and identified as bifacially chipped type of triangular shape with straight base and straight sides (Pl. IV/3, 4).

Pentagonal, coarsely trimmed projectile with direct semi-abrupt to abrupt retouch on the edges and thinned platform for hafting (Pl. IV/5) represents already mentioned most rudimental form, which we encountered already in the Starčevo culture. This specimen is made of silicified tuff,54 the raw material certainly not suitable for production of chipped artifacts but nevertheless used from time to time as compromise between the need for tools and weapons and difficulties in obtaining the raw material of better quality.

When Eneolithic projectiles are concerned particularly interesting is a group of seven specimens discovered in the course of archaeological excavations at the site Kudoš near Šasinci, in a layer identified as phase II of the Eneolithic house, i.e. structure 5.55

Three projectiles are of the triangular type but one is bifacially worked with straight base (Pl. IV/6), one is bifacially worked with convex base (Pl. IV/7) and one is bifacially worked but only partially and has concave base (Pl. IV/8). Another bifacially retouched specimen is identified as short rhomboid projectile (Pl. IV/9).

Particularly interesting are three specimens also bifacially retouched but the retouch does not cover completely both surfaces and they are morphologically different from the other as they have asymmetrical tang for hafting (Pl. IV/10–12). According to this characteristics they actually represent reminiscence of considerably earlier shouldered projectiles, which we encountered in the cultures of Late Paleolithic.

Significant in this find is the predominant use of obsidian because out of seven projectiles even five of them were made of this raw material (Pl. IV/6–8, 10, 11) while other two were made of chert (Pl. IV/9, 12).

Probably the most beautifully chipped projectile in the entire prehistory in the territory of Serbia is large bifacially retouched triangular specimen with slightly convex sides and base (Pl. V/1). This specimen was at one time published as the find from the former lake terrace in the village Lozovik56 while somewhat smaller in shape but more crudely retouched specimen (Pl. V/2) was described as find from the bank of Velika Morava near the village Ribare. Both specimens were related to the Paleolithic on the basis of »the elements of Mousterian retouch«.57 In spite the fact that these are chance surface finds it is indubitable that neither of these two artifacts has any points of contact with the

52 Păunescu 1970, Fig. 32/1,2.
53 Šaric 2005, 87–111, Fig. 7.
54 Material often identified as »light white rock« or »soft white rock« as we already mentioned.
56 Vetnić, 1974, 123–168.
57 Vetnić, 1974, 124.
Paleolithic. It is uncontroversial that they belong to the circle of the Eneolithic cultures as it is confirmed by identical analogous specimens from the Gumelnita cultural complex.\(^{58}\) For the specimen in Pl. V/2 it is certain that it even morphologically really corresponds to the classic bifacially retouched triangular projectiles and the Gumelnita specimens are identified as arrowheads or spearheads. However, dimensions of the artifact from the Lozovik lake terrace that is only 0.4 cm thick suggest the possibility that this artifact is in fact a fragment of knife with flint blade and handle made of wood, bone or antler. Perfectly preserved knife of identical construction with bone handle and blade completely resembling the projectile was found, for instance, in the cave in the Fort Rock desert in Oregon, USA.\(^{59}\) This assumption is impossible to support for the time being with relevant evidence so we are still going to consider this Lozovik artifact as the best retouched projectile in the prehistory of Serbia.

Three projectiles, chance finds from the Danube bank near »Ekonomija 13. maj« in Zemun are identified as triangular bifacially retouched specimens with convex sides and straight base (Pl. V/3, 4), that is with straight sides and straight base (Pl. V/5). They are morphologically typical enough to be related with great certainty on the basis of dated specimens to the one of the Eneolithic cultures.

**Bronze Age**

Unfortunately, among the Bronze Age chipped projectiles in the territory of Serbia for only three specimens there are approximate chronological determinations.

Bifacially worked arrowhead with convex sides and concave base (Pl. VI/1) was found in grave 13 of tumulus I at the site Lugovi–Bent in Mojsinje and was dated as object of Vatin provenance\(^{60}\) while similar specimen (Pl. VI/2) with considerably more concave base from tumulus 1 from the site Krstac – Ivkovo brdo was dated in the Early Bronze Age.\(^{61}\)

Bifacially worked arrowhead with convex sides and very prominent concave (almost rectangular) base (Pl. VI/3) from the site Jela – Bensa bara near Šabac was dated as object of the Vinča culture.\(^{62}\) However, everything we know at this moment about the Neolithic, i.e. Vinča projectiles rules out this possibility. This objects dates from the later period and by all appearances from the Bronze Age.

Small, bifacially worked triangular projectile with concave base (Pl. VI/16) is the last specimen in the group of finds coming from archaeological excavations. It was found in trench II, sq. 3, A.L. 4 at the site Pojilo in the village Pojate near Paračin.\(^{63}\) Scarce finds from that area and from that layer are determined chronologically on the basis of pottery, which indicates the Eneolithic period, so the first conclusion is that this projectile also dates from the Eneolithic period. However, very characteristic and typical shape with elongated concave base rather suggests its Bronze Age provenance and implies an intrusion from later into the earlier horizon.

All other specimens in this work dated into the Bronze Age period are either chance finds or they come from the excavations but their finding circumstances were not recorded.

Bifacially worked triangular arrowhead with straight sides and straight base (Pl. VI/4) as well as the specimen with straight sides but concave base and bifacial retouch, which does not cover the entire ventral side (Pl. VI/5) come from the Danube bank near »Ekonomija 13. maj« near Zemun.

Similar specimen – triangular arrowhead with slightly convex sides and concave base (Pl. VI/6) was found on the Danube bank at the site Beljarica almost 2 km upstream of the site »Ekonomija 13. maj«. Retouch is bifacial but does not cover completely either dorsal or ventral side.

Two projectiles come from the excavations at Blagotin. Unfortunately, for neither of them there are recorded precise circumstances of discovery but they certainly originate from the scanty layer of the Early Bronze Age that was not precisely distinguished stratigraphically but it was positively confirmed on the basis of pottery finds.\(^{64}\) One projectile has straight sides and concave base and crude raised and abrupt retouched was applied only on the edges thus creating its shape so it became closer to those rudimental forms we encountered in the Neolithic period (Pl. VI/7). Second specimen is nicely executed bifacially chipped arrowhead with straight sides and deep concave base (Pl. VI/8).

Two bifacially worked arrowheads with convex sides and concave bases are chance finds from the Danube bank about hundred meters downstream from the confluence of Bolečica river, near Vinča (Pl. VI/9, 10). In the same area were found many fragments of undecorated pottery, which according to its shapes and

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58 Păunescu 1970, Fig. 30/5,8
59 Overstreet 1999, 73.
62 Trbuhović, Vasiljević 1983, 26–44, Table XVII/10
63 S. Perić, personal communication.
64 Nikolić, Zečević 2001.
Fig. 2. Typology of chipped stone projectiles in different periods
fabric is attributed to the Bronze Age and this generally dates also the mentioned two projectiles.

Projectiles from the vicinity of Jagodina (Pl. VI/11), from the vicinity of Negotin (Pl. VI/12) and three specimens from the site motel »Slatina« near Paracin (Pl. VI/13–15) are chance finds, which from morphological point of view do not differ in any aspect from the already mentioned specimens. They are all identified as bifacially retouched projectiles with straight sides and concave bases. Only when specimen from the vicinity of Jagodina is concerned (Pl. VI/11) that stands out for its size bifacial retouch does not cover the entire surface either of dorsal or ventral side.

In any case, all specimens are typologically clearly defined and most probably date from the Bronze Age but with a possibility that some of them could be even slightly later.

Iron Age

The only specimen, which could be precisely dated in the Iron Age period is the projectile from structure 106/102 from the site Panjevački rit near Jagodina.65 It is a small bifacially worked triangular arrowhead with concave base that repeats to the full previously established standards (Pl. VI/17). The comment of the author of excavation that »…stone arrowhead was made after the Mycenaean model…«66 is not correct. Perhaps this statement fits into the thesis about the Mycenaean influences at the Iron Age settlements in the central Balkans but the prototype for Mycenaean metal arrowheads are arrowheads of chipped stone, which had been produced throughout Europe thousands of years before the emergence of the Mycenaean culture and these are just those triangular bifacially worked specimens with concave base that as rare single finds had been known already in the Late Paleolithic.67

CONCLUSIONS

The phenomenon of so-called convergent evolution is well-known. It is the situation when at the certain level of technological development and because of specific needs of a given community within different cultures, different geographic areas and even in the different periods but without any cultural contacts objects of identical shape and for identical purpose are produced. Thus, it is not out of question that production and use of the earliest chipped projectiles could not be connected to only one region and members of a single population.

In any case, time and place of production and use of the first chipped stone projectile will remain unsolvable enigma for the science. But, it is without doubt that such a moment was one of the crucial events in the history of mankind. Periodical technological skips in the evolution of projectiles were of the same importance. Shifting from the spear, which had not been thrown to the hand throwing spears, then use of throwing devices atlatl, after that use of bow and arrows and finally use of sophisticated device as crossbow in the Middle Ages each time represented significant improvement in everyday life making hunting more efficient and making possible gathering of greater reserve of food of animal origin. Unfortunately, these improvements always resulted in the conflicts of people thanks to the improvement of warfare technique and thus bringing more and more deaths and anguish.

The earliest finds of chipped projectiles in Serbia are related to the period of Middle Paleolithic, i.e. to the Mousterian culture of the Homo Neanderthalensis. One of the most typical Mousterian artifacts the triangular hand point from Risovača (Pl. I/3) is indirectly on the basis of analogous archaeological find from the site Umm el Tlel in Israel identified as possible projectile. This type of artifact was in fact multiutilitarian tool – weapon. Its shape was suitable for using it as perforator, knife and scraper but also as find from Israel confirms as projectile.

Triangular points-projectiles had certainly been much more used in the Middle Paleolithic of Serbia judging by the numerous specimens from the neighboring regions in particular from the sites in Bosnia and Montenegro.

Two leaf-shaped bifacially worked points from Risovača belong to the so-called Szeletien facies of the Mousterian culture. As very characteristic specimens these projectiles are clear indicators of cultural and technological changes. By coincidence they are in the prehistory of Serbia so far isolated finds with closest analogies in the material from the eponymous cave Szelete in Hungary and from the site Bačo Kiro and from Malkuta cave in Bulgaria. Despite the absence of analogous specimens for additional comparison from the immediate surrounding it seems certain that assumption of B. Gavela that these specimens represent the south westernmost offshoots of the Middle Paleolithic

cultures from Russian, Don and Cuban steppes was right.\(^68\) When projectiles are concerned the influence in the Balkans of the Solutrean culture from the west is confirmed by the finds of arrowheads of Parpallo type in the island of Rab. Their occurrence further to the east has not been encountered.

Insufficient level of investigation of the Paleolithic sites in Serbia is probably the main reason for the large hiatus between the mention projectiles from the Middle Paleolithic and their successors represented by shoulered point of Gravettian provenance from the site »Ekonomija 13. maj« near Zemun. Identical specimens from Romania, Slovenia, Croatia, Herzegovina and Greece confirm that Serbia during the Late Paleolithic period characterized by the Gravettian culture was part of one large population group, which in its movements also reached the south fringes of Pannonian basin for which not before long was assumed that due to large swampy areas was not suitable for human residence. But large loess plateaus, which made possible existence of even the largest game including mammoths and proximity of water represented the ideal zones for temporary or even permanent stations of the Late Paleolithic hunters. From the Late Paleolithic also dates the small projectile from Šaltirena pećina. Both these specimens actually bear witness to the use of projectiles of smaller mass that being thrown using special devices reached larger distances than ever before and thus increased the productivity of hunting but unfortunately also the efficiency in the intertribal conflicts.

Mesolithic projectiles mostly represented by the specimens from the site Padina in the Iron Gates are at the very beginning of a series where time span has no more such large gaps so we can speak about certain continuity until the Iron Age. Shape of the projectiles from Padina with slight variations repeats in fact the shape of a blade with curved back that we already encountered in the Late Paleolithic.

Finds from Padina dated into the Mesolithic period correspond entirely according to their morphotechnical characteristics to the chipped artifacts from layers V–VII and VIII from the site Medena stijena in Montenegro.\(^69\) As in layer VIII was found material with characteristics of both earlier and later phase the attention should be paid to the precisely dated finds from layers V–VII, which date from the final epi-Gravettian. This conclusion imposes also the thoughts about Padina finds. Do they really date from the Mesolithic or they are earlier, i.e. whether if they are of Mesolithic provenance they preserved very strong component of epi-Gravettian industry, which certainly could have exerted an influence from the settlements on the left Danube bank?

Beginning of the Neolithic with changed cultural contents resulted in abandoning the use of this type of projectiles and as their successors (in a very small number) occurred most rudimental types of triangular shape without tang for hafting and retouched only along the edges. The appearance of so-called transversal projectile from Blagotin indicates still existing links with the inheritance from the earlier period.

Vinča culture as the main bearer of all changes in the Late Neolithic introduces a new standard recognizable in specimens with clearly distinguished bars and tang for hafting to the wooden body of an arrow.

Yet, one detail should not be overlooked – disregarding the period in question when hunting is concerned it should be borne in mind that specimens made of bone and antler and even hard wood were also used besides chipped projectiles. In addition, hunters practiced setting the traps as hunting technique and it was very efficient. These are details, which at least to some extent explain relatively small amount of chipped stone projectiles in the Neolithic cultures in the territory of Serbia. Evidence for parallel use of bone projectiles are the finds of so-called double awls particularly popular in the Vinča culture.\(^70\)

In any case, authors who in few instances wrote about chipped projectiles always explained them as import from neighboring regions primarily counting on the areas influenced by the Butmir culture and the Adriatic zone. Comparison with the material from the Butmir culture does not substantiate this assumption too much as the most frequently used types reveal certain differences in relation to the Vinča specimens. Material from the Adriatic zone is scarce and as it is even the more distant area it is less probable that we should count on such strong influence of the bearers of the cultures of the Adriatic Neolithic. This fact and absence of direct analogies mean also that specimen from the collection of the City Museum of Belgrade could not be related to the Adriatic zone and as it is the closest analogy for the exceptional projectile from the northern Bačka we are once again returning to the unsolved question of its origin.

There are only two possibilities and first is that it was a local product, which is an isolated and exceptional

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70 Babović 1984, 117–120.
step forward not so much from technological but more from morphological point of view.

Second possibility is related to the already mentioned almost incredible events recorded in Germany and that would mean that this projectile is of entirely different cultural provenance and that it reached the northern Bačka region together with some German colonist in the end of the 18th century. We should put aside this assumption as less probable but still not impossible oddity.

Special relationship of a man to the tool/weapon, which make possible the survival but also could cause death is illustrated in the custom of placing chipped projectiles as grave offerings as it is particularly well documented in the Megalithic cultures in western Europe but also in the Eneolithic of eastern Europe.71 Great migrations during Eneolithic period brought to the territory of modern Serbia new inhabitants from south Russian steppes and with them also arrived the new characteristics of material culture but the custom of placing projectiles in the graves has not been registered so far.

When chipped artifacts are concerned this population and cultural influence is reflected in the appearance of bifacially chipped projectiles without tang for hafting. Even though these projectiles appeared in the territory of Serbia in the Eneolithic and represent one of the essential characteristics of chipped stone industry of the period they have polycentric origin, which dates far into the Paleolithic period. It is certainly not incidental that they were brought to this area by population arriving from the same geographic environment where bifacially chipped triangular projectiles with concave base had been used even in the Late Paleolithic.72

There were no any significant improvement of chipped projectiles in the Bronze Age did. Only conspicuous thing is certain standardization of size, which reached its maximum of 3.5 cm and standard concave shape of the base. Increasing use of metal in everyday life resulted in substitution of material used for the arrowheads so first metal arrowheads were in fact replicas of the chipped stone prototypes.

Trend of discontinuation of use of stone as raw material for production of tools and weapons continues in the Iron Age and the results are more scarce and more isolated finds. There is only one chipped stone projectile from this period in the territory of Serbia and it does not differ in any aspect from its Bronze Age predecessors.

Considering huge time span between the earliest and latest projectiles and disregarding small number of finds very prominent typological diversity indicates dynamic movements of the bearers of many cultures, which brought with them innovations but also traces of technological inheritance much more ancient than the very population, which improved it by adding its new achievements.

Finally, coming to conclusion that chipped artifacts are always characterized by relative chronological indeterminacy the chipped stone projectiles still remain one of the most interesting categories of archaeological finds offering to the scholars permanent challenge in dating and their cultural determination.

Translated by Mirjana Vukmanović

72 Бориковский 1984.
CHIPPED STONE PROJECTILES IN THE TERRITORY OF SERBIA IN PREHISTORY

BIBLIOGRAPHY:


Специфичан облик пројектила од окресаног камена довољно је препознатио да треба веровати да његу првим истраживачима праисторијских локалитета у Србији ова врста налаза не би измишљала без обзира на потврђене мањаковствене у ископавањима. Ову претпоставку треба имати на уму јер и поред изузетно великог броја праисторијских локалитета и хиљаде примерака ових артефаката пројектили представљају најмање заступљен и најмање проучен тип ових налаза.

У току вишегодишњег рада на обради пројектила од окресаног камена потврдило се да у доступном материјалу скоро половина представља случајне налазе, без прецизних података о условима открића. Срећом, за један део карактеристичних примерака који потпуно са ископавања постају појачани који омогућавају датовање, тако да је на основу њих могуће извршити бар оквири датовање за случајне налазе.

Све налазе окресаних пројектила могуће је навести за шест великих праисторијских епохи: палеолит (средњи и мађани), неолит (старији/средњи и мађани), епохе, брзина до доба и дневно доба. За њихову израду коришћење се као ускрсно различито врст се роница и опционално само у једном случају тзв. лака бела стена.

Позната је појава тзв. конвергентне еволуције – када на одређеном степену технолошког развоја и специфичних потреба једне заједнице, у оквиру различитих култура, на различитим географским просторима чак и у различитим периодима, без било каквих културних контаката долази до производње предмета идентичних и по облику и по намени. Стога није изузетно да ни израда и употреба најранјијих окресаних пројектила не може да се веже само за једну област и припаднике једне попунације.

У сваком случају, време и место израде и употребе првог пројектила од окресаног камена остаје нерешени за разум. Но, неопходна је чињеница да је тај trenутак представљао један од главних момента у историји човечанства. Повремени технолошки сокови у еволуцији пројектила једнако су били значајни. Преласци са копала и које се није бацило на копала башта слободном руком, затим на баштцу спушта опако, на патун и стрелу, да би се у средњем веку појавила сложена направа самострел, сваки пут су представљали значајан унапређења у свакодневном живота, олакшавајући лов и омогућавајући стварање већих залиха краткотрајног порекла. Нажалост, та унапређења сваки пут су се рефлексивале и у умереним сукобима људи унапређујући ратне технике и допоноси са собом све више смера и борба.

Најстарији налази окресаних пројектила у Србији везују се за период средњег палеолита, односно, за муртенијенску културу чији је носилац био homo neanderthalensis. Један од најтипичнијих муртенијенских артефаката, троугласт ручни шиљак из Рисовича, аналогним археолошким налазом са локалитета Umm el Tel у Израелу, посредним путем је дефинисан као могући пројектил. Овај тип артефаката, за праву је био вишенашемско оружје-орује. Облик је дозволао да се користи као перфоратор, као нож и стругач, али као што је налаз из Израела доказао и као пројектил.

Троугласт шиљан-пројектили свакако су имали знатно већи заступљеност у средњем палеолиту Србије о чему сведоче бројни примери из суседних области, првенствено са налазишта у Босни и Црној Гори.

Два листолика, двострано обрађена, шиљак из Рисовача чије припадају тзв. селетенијском фацијусу муртенијенске културе. Као веома карактеристични примери ови пројектили су јасни показатељи културних и технолошких кретања. Стивијем околности, они су у праисторији Србије, за сада, усамљени налази, са најближим аналогијама у материјалу из епохе пењења Селете у Мађарској и са локалитета Бачко Киро и Малкута пењење у Бугарској. И поред недостатак аналогних примерака из непосредног окружења за датне коморације, чиви се извесном претпоставком Б. Гавеле да ови примерци представљају крајње јутападне ограњене култура средњег палеолита из руских, доњих и кубанских степа. Утицај солитерске културе на запад за Панонско басен, за које се до сега мислило, је реч о пројектилима, манифестује налази стрела Парцалло типа на острву Рабу. Њихово присуство даље ка истоку није забележено.

Недовољна истраженост палеолитских локалитета у Србији, вероватно и основни разлог због којег је био и хијатус између момената пројектилова који су обележили средњи палеолит и њихових наследника представљање мозаичног шиљама грађевинске провенције са лок. «Економија 13. мај» код Земуна. Идентични примери из Руманије, Словеније, Хрватске, Херцеговине и Грејце, потврђују да је Србија током мађарговог палеолита у периоду који је обележио грађевинску културу био део је већег културног басена за које се до скоро мислило да су због великих мочвара, били неповолjni за боравак човека. Но, велике лесне заравни које су омогућавају кретање и највећом ловима животињама какви су били мамути, и близина воде, представљали су идеалне зоне за привремене или чак дуготрајне стање и мађаргов палеолитским локалитетима.

Периоду мађаргов палеолита припадају и мало пројектили из Шалитрене пењења. Оба ова примера заправо су сведочица у око пројектила мање масе који су бациви помоћним средствима, достигнути веће даљине него како ради и тиме подижу ловну продуктивност али, нажалост, и учинак у умереним сукобима.

Мозаилитски пројектили, углавном представљени примерима са локалитета Падина у Бердапу, налазе се на са- мом почетку једног низа у којем временски хијатус више нема тако велике пукотине па можемо говорити о извесном континуитету све до дневног доба. Облик пројектола са
Паине, уз извесне варијације, уствари понавља облик се- чива са лучним хритом какве смо већ срел у млађем пале- олиту.

Налази са Паине датовани у мезолитски период сво- јим морфотехничким карактеристикама у потпуности одго- варају окренутим артефактима из слоја V–VII и VIII са локалитета Медена стијена у Црној Гори. Како се у слоју VIII налази материјал са карактеристикама и старије и мла- ђе фазе, пажљиво треба обратити на тачно датоване налазе из слоја V–VII који одговарају финалом енграптизетеу. Тај закључак намењен је и размиšљање о падинским налазима. Да ли они застађују мезолит или су старији, оди, да ли су, ако су мезолитске пројективеновије признају веома ја- ку компоненту енграптизетне индустрије која је свакако могла да утиче на насеља на зубуској страни.

Поштетак неолита са измењеним культурним садржајем доводи до напуштања употребе тог типа пројектила, а као њихове наслеђнице у скромном броју иака се налазе у претходног периода указују појава тв. транс- верзалног пројектила са Блатогина.

Винчанска култура као основни носилац свих промена у млађем неолиту доноси нови стандард у виду примерака са јасно дефинисаним крилицама и тром за усавиље у две- но тело стреле.

Ипак, један детаљ не сме се изгубити из вида – без обзира о ком периоду је реч, кад се говори о луку треба имати на уму да су осим окренутих пројектила који коришћени и примери израђени од кости и раковине па и тврдог дрвета. Осим тога, постојала је и ловна техника која је подразумевала постављање замка, а била је веома ефикасна.

То су детаљи који, бар делимично, објашњавају релативно слабу заступљеност пројектила од окренутог камена у неолитским културама на тлу Србије. Касније у паралелној употреби косираних пројектила су налази тв. двојних шила, посебно заступљених у винчанској култури.

У сваком случају, аутори који су у неколико наврата писали о окренутим пројектилима увек су их тумачили као импорт из суседних областит, превешено рачунајући на подручја утицаја Бутмирске култура и на јадранску зону. 

Поређење са материјалом Бутмирске културе не подузиру ту претпоставку суште, будући да најзаступљенији типови изражене разлике у односу на винчанске према- прикре. Материјал из јадранске зоне је малобројан, а како је реч о још удаљенја области мало је вероватно да треба ра- чунати са толико јаким утицајем носилац култура јадран- ског неолита. Та чињеница и непостојање директних анало- гија би значило да је примерак из збирке Музеја града Бео- града не може да се везе за јадранску зону, а будући да је он најближа аналогија изузетнијем пројектилу са севере Бач- ке, враћамо се на нерешено питање његовог порекла.

Постоје само две могућности, а прва је да је реч о локал- ном производу који представља усаљен и изузетан искорак, не толико у технолошком колну у морфологском смислу. Друга могућност је везана за већ поменуту, скоро невероват- тан, след догађаја забележен у Немачкој, што би значило да овај пројектил припада сасвим другачијој културној преиме- ници и да је на простор северне Бачке стигоа у пртлаж- гу неког од немачких досељеника крајем XVIII века. Ова претпоставка изолују, ипак, само као мало вероватан, али могућ куриозитет.

Посебан однос једнајека према орбуу/оружју које је омо- гућивало опстапанак од и од усавиље живот, ослика се у обичају стањавања окренутих пројектила као гробних прили- га који је посебно документован у магнетским културама западне Европе односно и у енеолиту источне Европе. Велика миграциона краћа је током енеолита на територију данаш- шње Србије довела нове становнике из јужноенорских степа, а са њима су стигле и нове карактеристике матерцијалне кул- тура и обичај полагања пројектила у гробне целине за са- да није забележен.

Кад је реч о окренутим артефактима овај популяциони и културолошки успли ослика се у појави двострано окренутих пројектила без трна за усавиље. Иако су се ови пројектили на територији Србије појавили са енеолитом и представљају једну од битних карактеристика окренуте ин- дустрије тог периода, они имају посебности чије се јесе далеко у палеолит. Сигурно није случајно да их на ове просторе довео се по тако што се из стог геогра- фског окружења у којем се и током млађег палеолита ва- љају двострано окренути тронути пројектили са кон- кавном базом.

Током бронзаног доба нема неког посебног унапређе- ња окренутих пројектила. Приметно је само извесно стандардизоване величине које достиже свој максимум од 3.5 cm док као стандард постоји дио конвексна база. Све већа употреба метала доводи и до замене материјала од кога се праве врхове за стреле па првим металним врховима заправо представляју напредке својих окренутих прототипова.

У гвозденом добу наставља се тенденција напуштања каме- на као сировина за израду орбуу и оружја које резултује у северовареном и усавиљом материјалном. Пројектили од окре- нутог камена у овом периоду на тлу Србије представљени су једним примером који се ни по чему не разликује од сво- jих бронзоводобних предштудија.

С обзиром на огроман временски распон између нај- старијих и најмлађих пројектила, и поред скромног броја налаза, веома изражена типолошка разноврсност указује на динамична кретања носилаца бројних култура које су са обоје доносили новине али и треноге технологије насеља знатан настарија од саме популација која га је унапређивала унисек своја нова достигнућа.

На крају, закључимо да, иако окренуте пројектике увек прати релативна хронолошка неостајковитост, пројектили од окренутог камена остају једна од најинтересантнијих кате- горија пружајући истраживачима сталан изазо у датовању и њиховој културној детерминацији.
Pl. 1 – Paleolithic: 1–3. Risovača, Arandželovac; 4. »Ekonomija 13. maj«, Zemun; 5. Šalitrena pećina, Brežđe

Т. 1 – Палеолит: 1–3. Рисовача, Аранђеловац; 4. »Економија 13. мај«, Земун; 5. Шалитрина пећина, Брезђе
Мезолит: 6–16. Паћина; 17–18. »Економија 13. мај«, Земун


T. III – Неолит: 1–15. Бела сијена, Ријань

T. IV – Енеолит: 1. Неизвестное местоположение, Бачка; 2. Неизвестное местоположение; 3–5. Ливаде, Каленић; 6–12. Кудош, Шашинци.

T. V – Енеолит: 1. Стара речна тераса, Лозовик; 2. Обала Мораве, Лозовик; 3–5. »Економија 13. мај«, Земун