EARLY AND MIDDLE PALAEOLITHIC FLINT ASSEMBLAGES FROM THE AREA OF SHIROKA POLYANA DAMP, WESTERN RHODOPES MOUNTAIN

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(summary)

I. INTRODUCTION

I.1. The Western Rhodope Mountains – geomorphologic and petrographic characteristics, and geographical boundaries of the studied area

The Rhodope Mountain is a part of the Macedonian-Thracian massif and occupies the eastern part of the Rila-Rhodope massif. The mountain lies in the current territories of southern Bulgaria and northern Greece. It is a complex system of high hills and deep river valleys. The western part of the Rhodope Mountain, where the studied area lies, has an average height of 1098 m. Flat ridges of 1450–1650 m are typical of the area (fig. 1).

No Quaternary terrace could be formed due to the extensive rising (with almost 500 m) of the Western Rhodope Mountains that took place during the end of the Pliocene.

The studied area is located in the Devin part of the mountain at 1100 m–1600 m above the sea level. The area is to the south of the highest parts (over 2000 m) of the Western Rhodope Mountains, and close to the watershed of Maritsa and Mesta rivers.

There is a distinctive flattening of the terrain at 1250–1300 m (80–100 m above the river valleys) which is probably related to the lower Pliocene levels of the Rhodope Mountains.

At the time of the latest glaciation the area was close to the forest belt, while the middle-height valleys and the lower (500–1000 m) mountain parts were a refugium of tree species (Bottema 1974). At that time, the pre-glacier belt in the Mediterranean areas was situated much lower – about 1000 m. During the last period of dry and cold climate – about 30,000 BP, rivers reached the basis of the 4 - 6 m terraces. At the same time, groups who were hunting and producing flint tools (Starkel 1984) inhabited the higher terraces.

During the interglacial period, the forests reached more than 1000 m above see level. The sediments and formations found in the mountain slopes provide evidence for a long period of low temperatures during the Late Würm. However, there is no data for glacier valleys or mountain circuses in the Rhodope Mountains. There are only a dozen peaks of above 2000 m and none over 2200 m in the whole Rhodope massif (Mihnevski, Cenkova 1989).

I.3. Localization of the Paleolithic deposits in the Western Rhodope Mountains

The flint artifacts are usually uncovered in the slopes of the river valleys and on the flat hilltops at 1200–1700 m. Artifacts in the river valleys are usually at the inundation terraces or at the 4–6 m high terraces. Artifacts at the flat hilltops are usually found in the trenches of the multitude of forest roads.

The assemblages from the inundation terrace are in most of the cases not homogenous, as a small number of late Paleolithic artifacts are found in the sediment along with the middle Paleolithic finds. The finds from the 4–6 m high terraces are usually homogenous and are dated to the late Paleolithic. The artifacts concentrated on the flat hilltops are dated to the middle Paleolithic.

I.4. The flint raw material – origin and distribution

The term "flint raw material" here refers to the silicate rocks that were formed by post-volcanic activities characteristic for this part of the Rhodope Mountains. The silicate rocks are a major source of raw material for the production of tools during the Paleolithic period.

There is ample and easily accessible flint raw material in this region. Its availability is due to the specific geologic structure of this part of the Rhodope Mountains. The lower levels of the Oligocene here consist of sedimentary rocks (limestone, etc.) while on the upper levels there are eruptive rocks (rhyolitic, lava, tuff). The flint raw material is a result of post-volcanic activity at the end of the Oligocene. The carbonates had silicated at the rhyolite-marble (or limestone) contact zones, and at some places, were replaced by hydrothermal solutions of opal-chalcedony rocks. In the area of Borino village, they are exposed as rock "beams" and are easily noticed even nowadays at the hilltops and ridges of the mountain. In the Shiroka Polyana Damp area, the rocks are covered with contemporary precipitations and are not exposed on the surface.

Because of volcanic activity, low-thermal solutions, rich in silicid acid, entered the rhyolite-limestone contact zones and precipitated forming opal–chalcedony rocks – silicate "beams". Black is the predominant color of the opal–chalcedony rocks in the area of Borino village, situated to the east of Shiroka Polyana. Chalcedony in yellow, whitish, grey, red and brown, incl. their nuances, is also found. The raw material with black or dark grey color is most often found and is with the best quality for prehistoric exploitation.

The flint raw material from the area of Shiroka Polyana Damp is a result of the penetration of post-magma products along line channels that had been formed in the rhyolite layers of the Bratsigovo-Dospat depression.

The opal-chalcedony raw material in the area is characterized by a great variety of colors, level of transparency, smoothness and glitter of the break and the natural surface, as well as by a very diverse cortex and rock macrostructure.

The features of the raw materials from Shiroka Polyana and from the area lying to the east are characteristic enough to allow for defining two types of raw material from this area of the Western Rhodope Mountains, namely – "Shiroka Polyana" and "Borino" types.

II. THEORETICAL DESCRIPTION

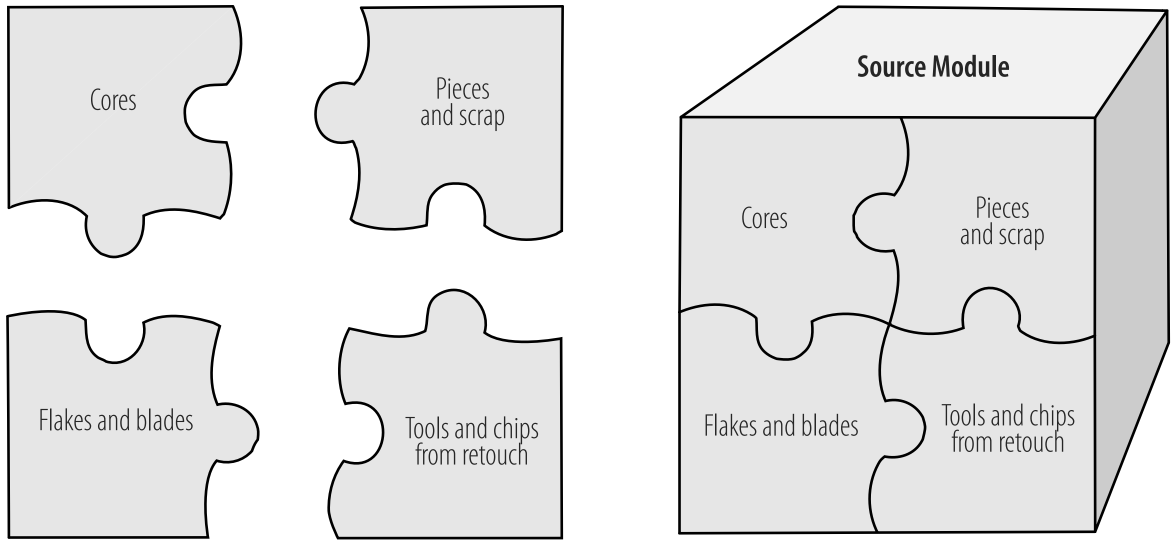
II.1. Characteristics of the Paleolithic flint assemblages from the Western Rhodope Mountains – basic principles of research methodology

The flint assemblages are objects of various scientific researches:

• Archeological excavations – including larger trenches (i.e. Transformatora, Chuchura, Nossa, Dermen Chair);

• Trenches (Tenekien Obor – trench, Chakaloto);

• Finds on the surface with known localization (Chakmakla Dere, Tenekien Obor, Hizha Orfei, Hamam Bunar, Sadzhak Su Dere, etc.);



Tabl. 8. Elements from the production cycle in the exploatation of the flint module.

• Collections (Shiroka Polyana, Kremenete).

Most of the studied middle-Paleolithic flint assemblages are re-deposited. Thus, there are no sealed deposits and structures, nor bone or other organic finds.

This feature of the middle-Paleolithic flint assemblages from the Rhodope Mountains limits the possibilities for interpretation and determines the specific research methodology.

II.2. Research Methodology

The objective that determines the research methodology is to define an explicit and unambiguous characteristic of the flint assemblages and to reconstruct all elements of the production cycle.

The cycle of production of flint artifacts comprises the following elements:

✓ Selection of appropriate raw material;

✓ Testing of the raw material (pebbles, flint, nodules, etc.);

✓ Preparation of the selected piece for the production of a proto-core;

✓ Production of pre-manufactured parts from the core such as flakes and blades;

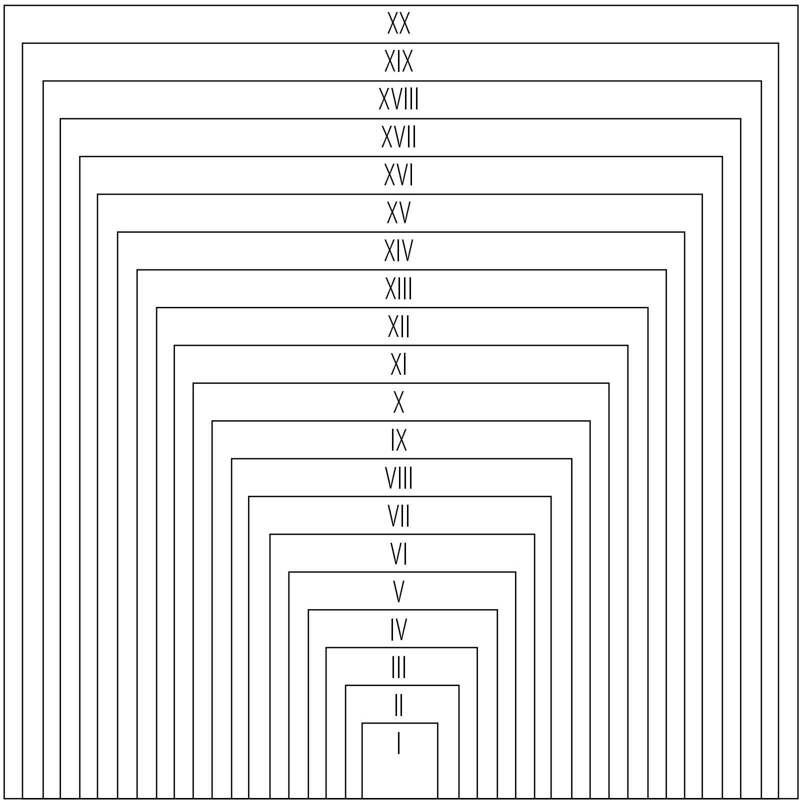
✓ Production of various tools from the pre-manufactured parts by applying various retouch techniques;

✓ Repair of the used cores to continue their usage;

✓ Re-exploitation of the repaired cores and production of new pre-manufactured parts flakes and blades;

✓ Secondary production of various tools from the pre-manufactured parts by applying various retouch techniques (tabl. 9).

The method applied for the analysis of all elements of the technological chain for the production of flint tools is based on a detailed and informative description of the artifacts. The description is done with the help of differentiated and hierarchically structured features as well as by comparative analyses of combinations of features. Thus, the described artifacts can be included in the comparative analyses at different levels of general conclusion.



Tabl 9. A matrix of size samples of flakes.

II.2.1. Description of the applied criteria

We use several types of criteria in order to describe the artifacts in a full and unambiguous manner.

II.2.1.1. Metric

II.2.2.1. Metric features

In addition to the conventional description of the size of an artifact (by its length, width and thickness), we introduce a measurement of its area. We believe that the purpose of the prehistoric man was not to get a flake with specific length and width, but rather to get a flake with a specific size (area), thickness (thick-thin), and a certain length-width ratio (long-wide).

- **Size of a flake**

We determine the size of a flake by comparing its area (calculated by multiplying its maximum length to its maximum width) to the size of a sample. That is, the area of a flake has to cover as much as possible of the area of the sample.

We introduced a matrix of samples for the size of the area of flakes. The minimum area is equal to a square with a 1 cm-long side. The step of increase of the area of each sample is 0.5 cm added to the length of the side of the previous square. We mark the size of the area of a flake (the size group) by the Roman number of the corresponding sample that best fits the area size.

For example, the flakes with an area equal or close to the area of a square with a side long 1 cm are determined as Group I (tabl. 10.)

Values (in cm^2) of the area of the samples	Reference number (Group) of the sample	Length (in cm) of the side of the square of the sample
1.0	I	1.0
2.2	II	1.5
4.0	III	2.0
6.2	IV	2.5
9.0	V	3.0
12.2	VI	3.5
16.0	VII	4.0
20.2	VIII	4.5
25.0	IX	5.0
30.2	X	5.5
36.0	XI	6.0
42.2	XII	6.5
49.0	XIII	7.0
56.2	XIV	7.5
64.0	XV	8.0
72.2	XVI	8.5
81.0	XVII	9.0
90.2	XVIII	9.5
100.0	XIX	10.0

The area values of the size samples for flakes

• **Length of the flake**

The value of the length is expressed in centimeters. Measurement is done with a caliper-gauge. There are several types of length measurement:

✓ a_1 - the value of the length measured along the longitudinal axis of a flake;

✓ a_2 – the value of the length measured along the line that connects the two most distant points on the circumference of a flake (maximum length);

✓ a_3 – the length of a fragmented flake - the value of the length of the fragment measured on the line that connects the two most distant points on the circumference of the fragment (maximum length of the fragment).

• **Width of a flake**

The value of the width is expressed in centimeters. Measurement is done with a caliper-gauge. There are several varieties of width measurement:

✓ b_1 – the value of the width measured along the transverse axis of the flake;

✓ b_2 – the value of the width measured along the line that connects the two most distant points on the circumference of the artifact and that is perpendicular to a_2 (maximum width);

✓ b_3 – the width of a fragmented flake – the value of the width of the fragment, measured along the line that connects the two most distant points on the circumference of the artifact and that is perpendicular to a_3 (maximum width of a fragment).

• **Thickness of a flake**

The value of the thickness is measured in centimeters. Measurement is done with a caliper-gauge. There are several varieties of thickness measurement:

✓ c_1 – the value of the thickness of the flake measured in its largest part;

✓ c_2 – the value of the thickness of the flake measured in its point part;

✓ c_3 – the value of the thickness of the flake measured at its base

- **Length-to-Width Ratio**

This feature describes the value of the ratio between the length and the width of a flake. We use the values for the maximum length and width to calculate this ratio.

When the values of the length and the width are close or equal, the ratio is ≈ 1. We refer to such flakes as "square".

When the length exceeds the width, the value of the ratio is > 1, and the artifact is referred to as "long". When the width exceeds the length the value of the ratio is < 1, and the artifact is referred to as "broad".

For a more precise grouping of the artifacts according to their length-to-width ratio, we introduce the following arbitrary ranges:

Broad	≥ 0.41 ≤ 0.8
Broadened	≥ 0.1 ≤ 0.4
Square	≥ 0.81 ≤1.1
Prolonged	≥ 1.12 ≤1.5
Long	≥ 1.51

- **Metric Characteristics of Flake Angles**

✓ α (ventral angle) – the angle between the lower surface and the base of a flake, measured in degrees;

✓ β (dorsal angle) - the angle between the upper surface and the base of a flake, measured in degrees;

✓ γ (angle of dislocation) – the angle between the axis of a flake and the line that connects the two end side points of the edge between the base plane and the dorsal plane of a flake. This angle is a characteristic of the change of the direction of exploitation, that is - of the movement of the striking point along the edge between the striking face and the flake surface.

We introduce four arbitrary groups of angle values:

Groups of Flake Angles Values	Types of Angles			Range of Angle Values per Group
I	ά	β	γ	≤ 70^{0}
II				≥ 71^{0} ≤ 90^{0}
III				≥ 91^{0} ≤ 130^{0}
IV				> 130^{0}

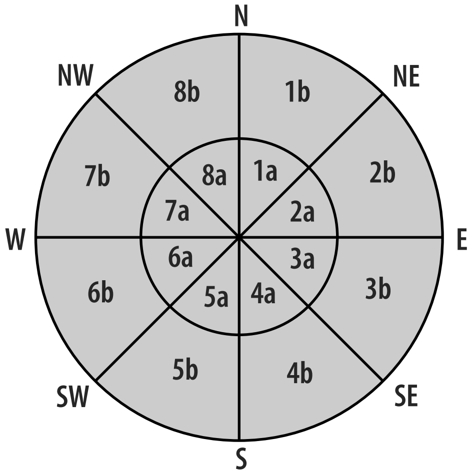
- **Metric Characteristics of a Flake's Base**

The size of a flake's base is one of its metric characteristics. We measure the length and the width of the base by a caliper-gauge and express it in centimeters.

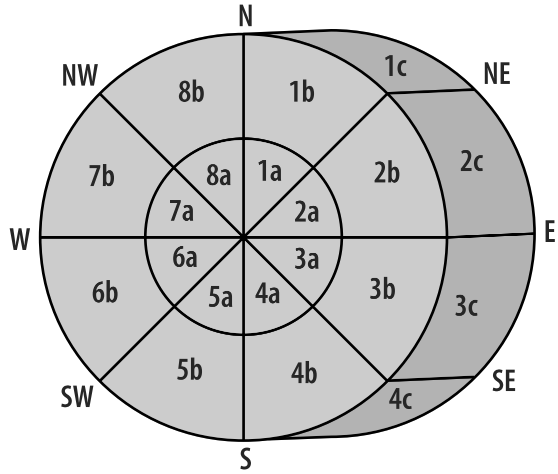
II.2.2.2. Technological Characteristics:

When analyzing flakes it is required that, all researchers follow the same algorithm for describing the elements of flint assemblages.

The identification of the precise location of technological marks on the flakes is crucial for their analysis. This requires the development of a single unified system for the description of the various elements of the technological characteristics.



Tabl. 10. Scheme of Type I Flakes



Tabl. 11. Scheme of Type II Flakes

The method, suggested below, has proven to be very successful in our efforts to reconstruct the production stages followed during the Early Paleolithic. This is a period for which we have insufficient factual data and very limited knowledge on the production technology.

We can differentiate two types of flakes:

- **Type I Flakes:**

Flakes with a circumference that is a line formed by the detachment of a flake from the flaked surface(s) lying in the same plane (tabl. 11).

- **Type II Flakes:**

Flakes in this group have a circumference that is partly a line and partly a surface that is formed by the detachment of a flake from the flaked surface and of a crossing surface(s) of the sides, the face, the point or other flake parts of the core (tabl. 11).

Basic Positions

When a flake is analyzed, it should be placed over its ventral surface; its base should be directed to the South; the axis of the flake should be perpendicular to the horizontal axis and the flake's axis should lie on the North-South axis. The transverse axis of the flake should lie on the West-East axis. The dorsal surface of the flake should be separated in eight zones (sectors). Each sector has a central (indexed "a") and a peripheral (indexed "b") part, and can also have a wall (in Type 2 flakes) (indexed "c"). The sector borders run along the geographical directions of the world. Numbering is ascending clock-wise.

II.2.2.2.1. Characteristics of the dorsal surface

The characteristic of the dorsal surface is based on an analysis of the following features:

✓ Availability of a cortex and/or natural surfaces, size and location of the cortex-covered dorsal surface of the flake;

✓ Direction of the scars and their location at the dorsal surface (Type I flakes);

✓ Direction of the scars and their location at the dorsal surface, as well as direction of the scars and their location at the preserved natural (untreated) sides of the flake. This applies to flakes that are detached with a fragment of the flake's sides, its point or the striking platform of the source core or flint module (Type II flakes).

II.2.2.2.2. Characteristics of the platform (butt) of a flake

The characteristic features of the platforms of the flakes are:

✓ The availability of a cortex, a natural surface or patina;

✓ The method of its forming (by a single strike, by more than one strikes, faceted, double-sided)

II.2.2.2.3. Characteristics of the striking point

This feature provided information about the hardness of the striking tool used and the force of the strike applied used to detach the flake. The types of striking points are:

✓ Visible-invisible;

✓ With a protruding or a flat bulbus;

✓ With a visible or invisible striking cone.

II.2.2.2.4. Production Stage

This feature is in most cases defined by the subjective observations of the researcher based on the analysis of the rest of the characteristics (this feature may be statistically defined when analyzing the data from large series of flakes). We believe that this feature is worth introducing (when statistical analysis is not possible), despite the higher level of subjectivism.

The flakes can be defined as being a result of the following stages of production:

✓ Testing of the raw material;

✓ Preparation of a core;

✓ Exploitation of a core;

✓ Repair of an used core;

✓ Re-exploitation of a repaired core;

✓ Retouch

II.2.2.2.5. Type of the flint raw material

In addition to the reference number of the flint raw material (according to the sample collection of raw material), we also describe:

✓ The quality of the raw material of the artifact (high, medium, low);

✓ The characteristics of the patina (thin, thick, spotted);

✓ The status of a flake's edges, including those between the scars (sharp, slightly smoothed, smooth, blunt);

✓ The status of a flake's surfaces (fresh, slightly smoothed, slightly polished, polished, well polished).

Many other characteristics are excluded from the analysis of the output material of the studied flint assemblages in the Rhodope Mountains, because of the specifics of these assemblages. That is why in this study we do not analyze the fragments of flakes.

II.2.2.3. Morphological characteristics

We can define the following morphological features of flakes:

• Form of a flake;

• Form of the vertical sections;

• Outline of the vertical sections (straight line, convex, concave, S-like)

• Form of the butt of a flake.

The forms of the butt and of the sections are described according to a reference table, prepared as a result of the analysis of a statistically valid number of flakes.

II.2.3. Characteristics of the cores

An algorithm has been developed in order to structure the research and provide basis for comparative studies. When describing a core the artifact should be positioned in a way that the latest surface exploited should face the researcher and be parallel to the horizontal surface. The striking points of the scars of each flake should be directed to the North. This should be the basic position to be used for the description of a core.

The description of a core is always done in the same way, following a pattern. Thus, the data about the artifacts can be statistically analyzed and compared. This approach also eliminates the possibility for intentional selection of preferred reoccurring schemes of cores' preparation and exploitation in a single assemblage. This approach is very effective in the study of Early Paleolithic assemblages, where the lack of larger series of artifacts is an obstacle to the reconstruction of the technological chain of a core's exploitation.

The first step in the analysis of cores' features is the detailed description of their sides. This makes it possible to localize the sides in a unified manner and to compare their characteristics with those of other assemblages. The core should be revolved along the horizontal surface (by the X-axis) and the vertical one (by the Y-axis) and at each 90-degree turn, the facing side of the artifact should be described. We begin from the basic position of the artifact and turn it to the East along the horizontal axis, and to the South, along the vertical axis, until we make a full turn.

Often, especially with Early Paleolithic cores, there are more than one surfaces or flakes in a single position (side), situated side-by-side, one above the other or having a shared edge. Giving a reference name to each side allows for the precise localization of all features.

Example: Position S1 (the first turn to the south from basic position) is characterized by its metric, technologic and morphologic features and is still comparable to the same position of each core in the assemblage. By following a single algorithm of analysis, we can identify intentional, recurrent technological operations for the forming of cores and their exploitation.

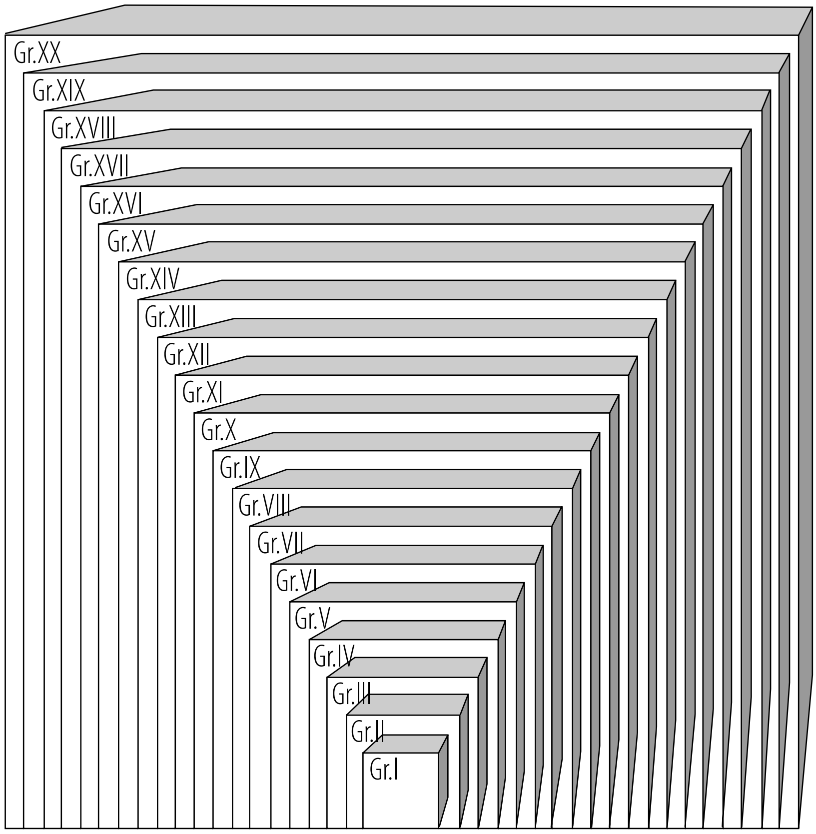
II.2.3.1. Metric Characteristics of Cores

✓ Size of a core

The size of a core is expressed by its volume. The size is determined by comparing the volume of a core to a reference matrix (group). We assume that the value of the minimum volume (size) is equal to the volume of a cube with a side of 1 cm. The side of the cube of each group is larger by the previous one by 0.5 cm. The size of the core is described by the number (Roman number) of the module (group), which corresponds to the volume of the respective core. The value of the volume of the core is calculated by multiplying the values of its length, width and thickness. The result is referred to the volume closest in value according to the samples matrix.

The conventional measures (expressed in cm) of cores also belong to their metric characteristics:

✓ Length, width, thickness
✓ Length-width ratio
✓ Length-thickness ratio
✓ Width-thickness ratio



Tabl. 12. Samples matrix of the groups of core sizes.

Value (in cm³) of the volume of the samples matrix	Group Reference Number	Length (in cm) of the side of the cube in the samples matrix
1.0	I	1.0
3.4	II	1.5
8.0	III	2.0
15.6	IV	2.5
27.0	V	3.0
42.9	VI	3.5
64.0	VII	4.0
91.1	VIII	4.5
125.0	IX	5.0
166.4	X	5.5
216.0	XI	6.0
274.6	XII	6.5
343.0	XIII	7.0
421.9	XIV	7.5
512.0	XV	8.0
614.1	XVI	8.5
729.0	XVII	9.0
857.4	XVIII	9.5
1000.0	XIX	10.0

Volume Values of the size samples matrix of cores

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Length-Width ratio	Length-Thickness ratio	Width-Thickness ratio	Values Range
Broad	Narrow	Broad	≥ 0.1 ≤ 0.4
Broader	Narrower	Broader	≥ 0.41 ≤ 0.8
Square (long-wide)	Square (long-thick)	Square (wide-thick)	≥ 0.81 ≤ 1.1
Prolonged	Larger	Narrowed	≥ 1.12 ≤ 1.5
Long	Large	Narrow	≥ 1.51

The list of the metric features also includes:

✓ The width (in degrees) of the angles between the surfaces of cores. There are six groups of angles based on their width:

Group I	$\leq 30^0$
Group II	$\geq 31^0 \leq 60^0$
Group III	$\geq 61^0 \leq 90^0$
Group IV	$\geq 91^0 \leq 100^0$
Group V	$\geq 100^0 \leq 120^0$
Group VI	$> 120^0$

✓ Area of the sides of a core – expressed by a number according to its size (as with flakes);

✓ Size of the different flakes – determined by the measures of flakes' scars on the flake surface. The size of the flakes comprises the following elements:

✓ Length;

✓ Width;

✓ Length-Width ratio.

II.2.3.2. Technological characteristics of cores

II.2.3.2.1. Type of the module of the source raw material

- Bouloer - whole, half, sector (between two chords), segment (between two radii);
- Con-creation - whole, half, sector (between two chords), segment (between two radii);
- Piece – prismatic, multifaceted, oval, amorphous;
- Flake – intentional, unplanned, unintentional.

II.2.3.2.2. Type of treatment of the module of the source flint raw material

We can differentiate between intentional breaking of the modules, unplanned cracking and mixed (intentional-unplanned-unintentional) breaking of the modules. In some cases, it is not possible to determine the types of treatment applied.

II.2.3.2.3. Technological characteristics of the sides of cores

✓ Purpose of the treatment of the walls (sides) of a core – to determine the various technical actions that were applied for the preparation; the core production; the core production and retouch; retouch of the flint module (in some cases it is not possible to determine);

✓ Direction of the detachment of blanks from the walls of a core. We describe the directions of the scars on a core's surface by the geographical directions of the world. In addition, we note the availability or the lack of a starting striking point.

✓ Characteristics of the scars on a core's surface: shallow, semi-concave, concave;

✓ Characteristics of the retouch: flat, semi-steep, steep, ≥ 90^0, jagged, concave; at the edges, covering retouch, as well as various combinations (i.e. semi-steep-jagged, etc.);

✓ Characteristics of the raw material. The type of the raw material is noted by the respective reference number from the raw material samples collection;

✓ Quality of the raw material: high, medium, low, poor.

II.2.3.3. Morphological characteristics of cores

The purpose is to describe the morphological features of the cores and of their elements.

II.2.3.3.1. Form of a core

Forms can be described as:

Tetrahedral (regular or irregular), triangular (regular or irregular), multifaceted (regular or irregular), oval, semi-oval, amorphous

II.2.3.3.2. Morphological characteristics of the sides of a core

The morphological characteristic includes a description of all elements of a core's surface. In most of the cases, these are surfaces or parts of flaking surfaces with traces from preparation or repair of the core, as well as surfaces covered with a cortex or with patina, etc. The description aims to localize their position on the sides of the core, as well as their chronological order, i.e. whether an action that formed one of the surfaces preceded or followed another action that formed another surface on the same side.

The comparison of the morphological and the technological characteristics of the sides of a core reveals interesting data for the order of the actions taken and the technological chain of flint production.

We describe the total number of surfaces on each side and the angles between these surfaces. Observations and description should begin from the basic position, and turn to 90^0 to the south and once again from the basic position – to the east.

II.2.3.3.2. Form of the sides of a core

The form can be described as tetrahedral (regular or irregular), triangular (regular or irregular), multifaceted (regular or irregular), oval.

II.2.3.3.3. Relief of the sides of cores

Sides can be described as flat, convex, concave, straight-convex/concave, amorphous, uneven.

II.2.3.3.4. Condition of the edges between scars

The edges can be described as sharp (fresh), slightly polished, polished and blunt.

II.2.3.3.5. Types of a cortex

By an initial study of a statistically valid collection of the flint assemblage, we have developed a collection of samples of different types of raw material, as well as of types of cortexes, and types of patina. Each sample has a detailed description and a reference number.

When we describe the type of cortex, we give the reference number of the sample, which has the same characteristics.

II.2.3.3.6. Type of patina

When we describe the type of patina, we give the reference number of the sample, which has the same characteristics.

II.2.3.3.7. Area covered with cortex and/or patina

We differentiate four groups of sizes of the area, which is covered with cortex and/or patina. These are the four groups' range values:

Group Reference Number	%
Group I	≥1 ≤ .25
Group II	≥ 26 ≤ 50
Group III	≥ 51 ≤ 75
Group IV	≥ 76 ≤ 100

II.2.4. Characteristics of tools

II.2.4.1. Typology

We determine the type of a tool, based on the tools typology descriptions of F. Bordes. However, it turned out recently that when we study Middle Paleolithic assemblages from the current territory of Bulgaria, there is a considerable number of tools that cannot be referred to Bord's typology. For this reason, when studying the Middle Paleolithic assemblages from the Rhodope Mountains we try to provide very detailed and precise descriptions of the types of tools, which cannot be referred to any of the established typology lists. In some cases, based on its description, a tool can only be referred to a group from Bord's typology in very general terms. Then we list it straight after the last number in the respective group in Bord's list. Tools, which require full and detailed typological description, are included at the end of the typology list.

II.2.4.2. Characteristics of the debitage flake for the production of a tool.

We use all features that characterize flake (metric, technologic and morphologic). In the metric description, we provide, if possible, the measures of the flake as well as the measures of the tool.

II.2.4.3. Characteristics of a tool

We describe a tool with its primary and secondary features (type of blank material, size, form and section, type of retouch, location of the retouch, morphology of the edges, type of the source material, type of cortex, type of patina, destructions, etc.).

III. SHIROKA POLYANA – LOCATION, RESEARCH HISTORY, GEOMORPHOLOGIC CHARACTERISTICS, STRATIGRAPHIC CHARACTERISTICS.

The area studied is located at 1500 m above the sea level on a large flat hilltop that is dated to the Early Miocene denudation levels. The area is smoothly slided, cut by widely meandering brooks, which form shallow subtle micro-valleys (30-100 cm deep). These valleys are the main source of the flint material finds. In the higher parts of the area, the layer, which covers the rhyolite basis, is hardly several centimeters thick. Because the area has poor drainage, it is swamped at places and also cut by small streams.

The artifacts are found on spots stripped of grass or they have piled up in the micro-valleys.

V.1. TECHNO-TYPOLOGICAL COMPARATIVE ANALYSIS

Quantitative distribution of the various types of cores of the flint assemblages from Shiroka Polyana:

		Tanin Ruchei	Ivanchovi Kolibi	Shenkin Sklad	Shevar Dere	Total
cores	Levallois	12	7	4	1	24
	Discoid	10	1	5		16
	Single-Platform	3	9	2		14
	Double-Platform			2		2
	With changed orientation	1	2	5	4	12
	Total	26	19	18	5	68

Quantitative distribution of the various types of tools of the flint assemblages from Shiroka Polyana:

		Tanin Ruchei	Ivanchovi Kolibi	Kremenliv Sklad	Shevar Dere	Total
tools	Levallois flakes	2	5			7
	Scraper	7	15	4		26
	Endscraper		6	1		7
	Borers	1	4	1	2	8
	Burins		2	1		3
	Natural-back knives	1				1
	Denticulate			2		2
	Notched			2		2
	Retouched flakes	13	34	9		56
	Chisels			1		1
	Points	1		1		2
	Bifacial leaf point	6	3	2		11
	Bifacial scraper-knives		5			5
	Bifacial forms	4		5		9
	Core-like tools	3	2	5		10
	Tools with unsimple interpretation		5			5
	Total	38	81	34	2	155

Generalization:

• **Levallois cores**

The preparation and exploitation of the Levallois cores from the Shiroka Polyana assemblages seems to be atypical. In the majority of cases, with single exceptions, the preparation of the backside of the core is only done at its periphery - at the flaking surface edge. The central parts of the backside of the core are covered with cortex fragments or a natural surface. The backside and the flaking surfaces are flat, which is primarily due to the use of flat pieces as source material. The direction of exploitation of the majority of cores is towards their centers. There is no predominant shape of cores used for the production of blades and points. There are several cases of single- or bi-polar exploitation. The angle between the striking platform and the flaking surfaces is 60^0 – 80^0. The method of a single-strike cutting of the core's edge was often used. The direction of the strike was from the flaking surface towards the back part of the core. However, there are no cases of using the broad flat surface of the thus created scar as a striking surface. The broad, the long and the 'square' artifacts are relatively equal in number.

The size of the cores from Tanin Ruchei, Shenkin Sklad and Shevar Dere is in the IX-XII group range. The Levallois cores from Ivanchovi Kolibi are smaller in size – IV-VI group range, and they are 1-2 cm thick. In the Ivanchovi Kolibi assemblage, there are Levallois cores with a flat flaking surface, a right-triangle shape and a scar that covers the whole flaking surface. No similar cores are reported in the other assemblages form Shiroka Polyana.

- **Discoid cores**

There is only one discoid core from the Ivanchovi Kolibi assemblage, while in the case of Tanin Ruchei the number of Levallois and discoid cores is almost equal. The discoid cores from Shikoka Polyana are larger than the Levallois ones. The core angle is also larger – 80^0-90^0. Cores in the preparation stage also have remains from the cortex or a natural surface in the central part of the backside. Often, such remains are also seen on the flaking surface that has been only exploited on its periphery. In Shenkin Sklad all the finds are with flat flaking surface or backsides.

The method is often mixed – with discoid elements in Levallois cores and vise versa. The technological characteristics of cores are close and in some cases, it is difficult to determine the type of a core. In single cases of discoid cores, preparation methods from later periods (Late Paleolithic) can be identified. A similar tendency is also observed with a Levallois core from Ivanchovi Kolibi. (In the latter case, after the core was broken along its longitudinal axis, an attempt was made to exploit the narrow long scar as a flaking surface. As a result, several blades were produces.) The size of the scars from the different flakes provides evidence for the fact that at the end of the cores' exploitation blanks of II-III and primarily of V-VII size groups were produced. The blanks produced from Levallois and from discoid cores do not differ in size.

V.1.2. Comparative analysis of the debitage

Number of analyzed flakes from Shiroka Polyana flint assemblages:

Tanin Ruchei	Ivanchovi Kolibi	Kremenliv Sklad	Shevar Dere	Karelova Reka
27	225	12	12	2

The majority of flakes from **Tanin Ruchei** assemblage is of size group VII, they belong to the production stage of exploitation and change in the orientation of the cores. The long artifacts are predominant. The butts of the majority of flakes are prepared by a single strike. The angles at the bases are 90^0-100^0. The direction of the scars on the dorsal surfaces coincides with the direction of the detachment of flakes.

At the **Ivanchovi Kolibi** assemblage, the majority (80%) of the flakes belong to the IV-VIII size group. Most of them are of V-VI size group. In these groups, the number of prolonged and square flakes is almost the same. Broad flakes are considerably less. The majority of the striking platforms are prepared by a single strike and the angles at the base are 90^0-100^0. In all groups, the majority of the artifacts belong to the core exploitation stage. The largest number of flakes is from the exploitation of discoid and single-platform cores, as well as of cores with a changed in orientation. Some of the flakes in group III are products of retouched tools or of bifacial retouch. The number of broad artifacts is larger in groups III and IV.

The side the flakes from the **Shenkin Sklad** and **Shevar Dere** assemblages varies in the range of groups IV to VIII. The predominant number of flakes from Shenkin Sklad bare traces from preparation of the core and an early phase of exploitation. At Shevar Dere the flakes from exploitation of the cores are predominant. In both assemblages, in the majority of the flakes the direction of the scars at the dorsal surface matches the direction of their detachment. Most of the striking platforms are prepared by a single strike and the angles at the base are over 90^0. The hard hammer percussion technique has been often used. In Shenkin Sklad no flakes were identified that are a product of the exploitation of discoid cores. Most of the flakes are from single-platform cores.

The largest flakes (groups XVI and XV) from Shiroka Polyana area are found at the Karelova Reka assemblage.

V.2. Typological analysis

V.2.1. Flint artifacts with double-sided treatment – bifacial artifacts and shapes

Bifacial Artifacts	Tanin Ruchei	Ivanchovi Kolibi	Shenkin Sklad	Total
Leaf points	6	3	2	11
Bifacial scraper-knives		5		5
Bifacial forms	4		3	7
Core-like tools			3	
Unsimple interpretation		4		4

In the Tanin Ruchei assemblage, four artifacts with a bifacial treatment were identified (fig. 24, 25 *1*, 25 *2*). The size of the artifacts is XII-XV group. The majority is of group XIII.

Four of the artifacts from **Ivanchovi Kolibi** are treated with a bifacial retouch, mainly on the circumference area and partly on the surfaces. They are referred to the group of artifacts with unsimple interpretation. These artifacts are of the core-like bifacial-shapes type and are from the early stages of preparation. The bifacial artifacts from Ivanchovi Kolibi are larger in size (XIV, XVI, XIX groups) than the ones from Tanin Ruchei. They also differ by the type of the raw material.

The artifacts with a bifacial treatment from the **Shenkin (Kremenliv) Sklad** are referred to the atypical bifacial forms and to the tools with unsimple interpretation (fig. 27 2). These artifacts are large in size (XIV–XVII groups), with large, shallow scars covering the surfaces. Some of the edges are covered with slightly steep large scars**,** which form slightly exposed points.

V.2.2. Flint assemblages from Shiroka Polyana – leaf points with bifacial retouched treatment (fig. 13 *1, 3, 5*; 14 *1, 2, 4;* 15 *1-3*)

The bifacial leaf points can be divided in two groups based on their metric characteristics:

✓ Leaf points 5-7 cm long and ~ 3 cm wide;

✓ Leaf points 11-13 cm long and 4-5 cm wide;

Most of the points are 1.1 – 1.3 cm thick.

There are many peculiarities in the techniques used to form the leaf points from Shiroka Polyana assemblages. The leaf points have a flat lower surface and a bulging upper surface. The lower surface is formed by flat retouch covering the surface along the two side edges. After the lower surface was ready, the upper one was prepared by semi-steep retouch. Thus the bulging side of the tool was formed. Most of the leaf-shaped artifacts from Shiroka Polyana have an interesting bulging edge. It is formed by the points of the scars of the retouch, done on the artifact's upper surface, with a direction from the side edges towards the center, which meet the longitudinal symmetry axis of the tool. This bulging edge is primarily formed in the base or the point parts of the tools. This characteristic is observed in the smaller artifacts. We believe that the technique for forming of leaf point and the bulging edge in the base or point parts of the upper surface are specific features of the Shiroka Polyana assemblages.

V.2.3. Bifacial scraper-knives from the Ivanchovi Kolibi flint assemblage (fig. 22 *1-4*)

The diagnostic group of bifacial scraper-knives is only identified at Ivanchovi Kolibi and in none of the other assemblages from Shiroka Polyana. These tools have a convex back. The blunting scar and the axis following the opposite edge form an obtuse angle. The base and the point areas are retouched on both sides and thus form well protruding points. The retouch on the lower surface is indistinct and uneven and covers only the edges or the edge areas. Only one of the artifacts has a flat retouch that covers both surfaces. The artifacts are relatively close in size, with one exception of a larger artifact.

V.2.4. A bifacial scraper from Shenkin Sklad flint assemblage

The artifact is prepared from a large flat natural piece (XVI group) with a slightly convex edge formed by semi-steep, at some points - event flat, double-sided retouch (fig. 26 *2*).

V.2.5. Levallois flakes from Shiroka Polyana flint assemblages

Levallois flakes are found in only two of the assemblages – in Tanin Ruchei and in Ivanchovi Kolibi. In both cases, the prolonged and the broad artifacts are equally present. The flakes from Ivanchovi Kolibi are relatively larger in size (VIII-XII group), than those from Tanin Ruchei that are of VI-VII size group. The majority of the flakes belong to the exploitation stage with parallel scars on the dorsal surface. There is only one artifact from the stage of primary exploitation and cut the surface of the preparated pre-core.

V.2.6. Scrapers from Shiroka Polyana flint assemblages

The common features of the scrapers from Shiroka Polyana assemblages are their amorphous shape, the natural raw pieces used to produce the tools, the indistinct and uneven retouch. The scrapers from Tanin Ruchei and Shenkin Sklad are larger than the ones from Ivanchovi Kolibi.

VI. THE EARLY AND MIDDLE PALEOLITHIC FLINT ASSEMBLAGES FROM SHIROKA POLYANA IN THE CONTEXT OF THE OLD WORLD PALEOLITHIC CULTURES

The earliest traces of expansion towards Europe are dated back to the end of the Pliocene (2 - 1.9 million years BP). Before the strait of Bosphorus was formed (and the

Black Sea was still a freshwater lake), representatives of the mega fauna migrated through the Balkans and inhabited Western Europe and the Mediterranean areas. The next expansion took place in the transition between the Pliocene and the Pleistocene, and is marked by the earliest presence of *Panthera* in Greece and Italy. The early migration of the big *Bovidae* from Asia to Europe and their appearance throughout Eastern Europe is also dated to the transition from the Pliocene to the Pleistocene. The emergence of the *Megaceroidos* is dated to the Jaramillo period of the Early Pleistocene (Спасов 2001).

VI.2. The first men of the European continent. Migration routes.

The first men followed the migration routes of the cold-loving fauna to the European continent as early as the Pliocene-Pleistocene transition. The evidence about this expansion that we currently have dates back to 1–1.8 million years. The earliest Paleolithic finds known so far are also dated to this period: Atapuerca (Spain); Isernia la Pineta (Italy); Kozarnika (Bulgaria); Dmanisi (Georgia); Ubeydia (Israel).

Three main migration routes to Europe are currently discusses:

✓ Through the strait of Gibraltar

The finds at Atapuerca (the Iberian Peninsular) are dated to be 1 million years of age. In the cold periods, the strait was not wider than 8-12 km. However, there is no evidence of an early migration of animals across Gibraltar. No traces of such an early migration on the northern shores of Africa (opposite to Gibraltar) have been found either.

✓ Through the strait of Bosphorus

There is ample evidence for early migration of animals through the Bosphorus. In the cold periods the both the Bosphorus and the Dardanelles were dry land. The Early Pleistocene finds at Ubeydia (to the South of the Bosphorus) are also of crucial importance, because they are precisely dated (1.4 million years) and have a clear stratigraphy. (Rolland 1995, Dennell, Roebroeks 1996) However, the earliest evidence of the human presence found in the territories of Turkey and Greece is dated as late as the beginning of the Middle Pleistocene (Darlas 1995).

✓ Along the northern shores of the Black Sea to Eastern Europe

The hypothesis for the existence of this route is supported by the evidence from the Early Paleolithic site of Dmanisi. However, there is no data so far from the territory of Ukraine confirming a human presence during the Early Pliocene. Many authors also emphasize that it might have been difficult to adapt to the cold and long winter in this area.

✓ From northern Africa through Sicily

This route is considered to be less probable (Villa 1994).

A very extensive migration to Europe begins in the middle of the Middle Pleistocene (0.6–0.5 million years).

VI.4. The Early Paleolithic on the Balkans

The Balkan Peninsular has a key place as a crossroad between Asia, Africa and Europe. It is situated on the most accessible way for the human invasion to Europe (Africa – Middle East – the Balkans).

Early Paleolithic finds on the Balkans are discovered in Turkey, Greece, Albania and Bulgaria.

- In Turkey, the earliest Paleolithic finds are from its European part – in the Yarimburgaz Cave.

• In Greece, Early Paleolithic fins are identified at the Petralona Cave; Kokinopilos open site; and Korisia (to the south of Corfu Island).

• In Albania, the Gaytan Cave (to the southeast of Shkoder) is dated to this period (Runnels, Van Ander 1993).

• In Bulgaria, Early Paleolithic finds are located in the Kozarnika Cave (northwestern Bulgaria, near the town of Belogradchik) and in the Western Rhodope Mountains (Shiroka Polyana, Kremenete).

✓ The finds from the Kozarnika Cave are so far considered the earliest Early Paleolithic finds in Europe. The Early Paleolithic assemblages are dated to 600,000–1,500,000 years BP. It is characteristic for the artifacts from the upper levels that they are small, there are many scrapers and rare atypical bifacial artifacts, some of which can be classified as atypical bifaces. The artifacts from the lower levels are larger and are often of prolonged shape (cores exploited in different directions, flakes and unintentional or unplanned pieces with traces of steep and indenting retouch).

✓ The finds from Shiroka Polyana are from open site. The bifacial artifacts may be dated to the Early Paleolithic. The finds are referred to a later period than those from Kozranika. Thus, they provide evidence for the inhabiting of the area during 800,000–500,000 years BP. Most of the Early Paleolithic finds in Europe are also dated to this period. The dating is also supported by the presence of Early Paleolithic axes (*hachereau*) in Kremenete, which is located about 10 km to the north of Shiroka Polyana. The closest parallels of these tools are found in the Caucasus – in the Tsona Cave, and are dated to 500,000 years BP (Lioubine 2002, 87; Ivanova 2003, 15).

The Early Paleolithic finds from northwestern Bulgaria (the Kozarkina Cave) and the Western Rhodope Mountains (Shiroka Polyana, Kremenete, Tenekien Obor) provide evidence of the fact that the route of the earliest migration to the European continent passed through the Balkan Peninsular.

• **Shiroka Polyana – Middle Paleolithic**

Many settlements and rich and diverse Middle Paleolithic cultures are discovered across the European continent. In the Bulgarian territory, we can identify the following ones: atypical Charentian; typical Mousterian (Levallois and non-Levallois type); East-Balkan Mousterian with leaf points (Иванова 1979; Иванова, Сиракова, 1995, 48-50). The presence of bifacial leaf points provides grounds to refer the Middle Paleolithic assemblages from Shiroka Polyana to the East-Balkan Mousterian with leaf points. However, some of the analyzed features of their technique and typology characteristics reveal elements that are not typical of the overall characteristics of the culture they are referred to. The assemblages from Shiroka Polyana also differ by the technique used to exploit the discoid and Levallois cores. The majority of the exploited cores are of the Levallois type. In many cases, a single artifact bears traces from both discoid and Levallois core exploitation techniques. There is a great variety in the technique and typology characteristics of the leaf points as well. The lower surface was formed first and then the upper one, unlike in the case of Muselievo, where an alternative technique for leaf points was applied. Yet another feature is the bulging edge in the point and base parts running along the longitudinal axis of the leaf-shapes tools. These features provide grounds for determining the Middle Paleolithic assemblages from Shiroka Polyana as a regional variance of the East-Balkan Mousterian with leaf points. The nature of the Micoquian elements in the Ivanchovi Kolibi assemblage (bifacial scraper-knives, bifacial artifacts, etc.) is still to be analyzed.