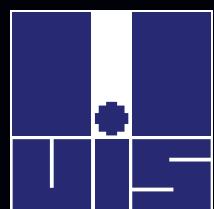
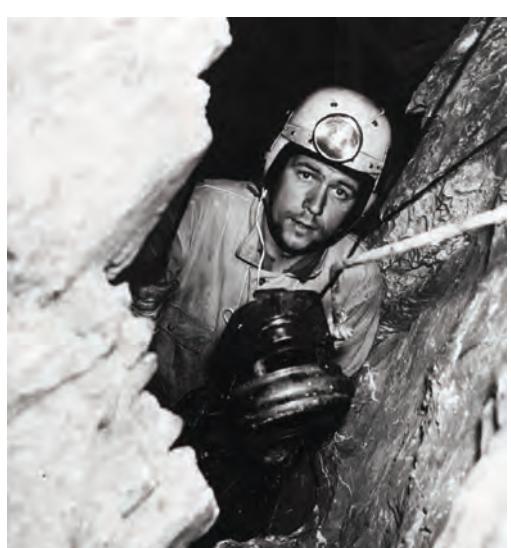


# 16<sup>th</sup> INTERNATIONAL CONGRESS OF SPELEOLOGY

## Proceedings

VOLUME 1



Edited by  
Michal Filippi  
Pavel Bosák

16<sup>th</sup> INTERNATIONAL  
CONGRESS OF SPELEOLOGY



WHERE HISTORY MEETS FUTURE

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OF SPELEOLOGY**  
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**July 21–28, 2013**

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### **Cover photos** (some photos were adjusted/cropped)

Top left – José Bidegain, on his way for the recovery Marcel Loubens' body. Author unknown. For details see the paper by A.A. Cigna.

Top right – “Walking Mammoth” – a prehistoric drawing from the Kapova Cave, Russia. Photo by O. Minnikov. For details see the paper by Y. Lyakhnitsky et al.

Bottom left – “Astronaut” David Saint-Jacques (CSA) collecting microbiological samples for the scientific programme of the ESA CAVES course. Photo by V. Crobu. For details see the paper by Bessone et al.

Bottom right – The long-legged cave centipede *Thereuopoda longicornis* – a typical species of Lao caves. Photo by H. Steiner. For details see the paper by H. Steiner.

# RESULTS OF STUDYING THE PALEOLITHIC KAPOVA CAVE (SHULGAN-TASH) IMAGES

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Kapova Cave (Shulgan-Tash) is located in the Southern Urals, Russia. In 1959, A. Ryumin discovered Paleolithic paintings in it. Current research of a team from VSEGEI and RGS resulted in the discovery and classification of more than 140 new images. There is an assumption of long process of creating the images and informative value of abstract symbols. A conclusion was made that in the Southern Urals, a center of ancient human culture rather similar to the Western European one had existed during the Paleolithic.

## 1. Introduction

Kapova Cave (Shulgan-Tash; Fig. 1) is located in Bashkortostan, the Southern Urals, in the "Shulgan-Tash" reserve. In 1959, A. Ryumin discovered Paleolithic drawings in it (Ryumin 1960). Later, they were studied by O. Bader (1965) and V. Scelinskij (Scelinskij, Sirokov 1999). Our team from VSEGEI and RGS has been engaged in studying and fixation of Kapova Cave paintings for more than 10 years under a contract with the Ministry of Culture of Bashkortostan. During this time, more than 140 new images were discovered. Totally, 195 images are known, which are very diverse. They can be divided into zoomorphic (anthropomorphic) realistic drawings, abstract geometrical symbols and obscure spots – relics of the images. A very important characteristic of the image is the colour. Previously it was thought that this is almost monochromatic red ochre with some variations, but now it is clear that a variety of dyes from scarlet to brown and black was specially created.

Based on image morphology, style, colour and location in the cave, it is possible to develop a classification that will take into consideration all peculiarities of the images and allow conclusions about ancient "artists" ideas, epochs of image creation and the intended purpose. The Kapova Cave drawings form several groups depending on a set of features and image location in specific parts of the cave; they show different stylistic features, reflect different traditions and concepts of world perception and possibly were created in different epochs. Image classification is required for the historic and art review of the "painting."

The problem of image conservation is very serious. As for their state, only 14% of the images can be assessed as satisfactory, 15% are of intermediate state, and the majority (71%) are in poor condition, i.e. the degree of degradation is so high that it threatens their total loss.

## 2. Survey groups of drawings

Red realistic outline drawings in the Drawings Hall of the first floor (Going Mammoth, Big Horse, etc.) are best known and best preserved. These zoomorphic drawings are rather realistic, resemble in their style the Magdalenian paintings of Western Europe. They are contour; some of them show zones of contour line widening and shading of

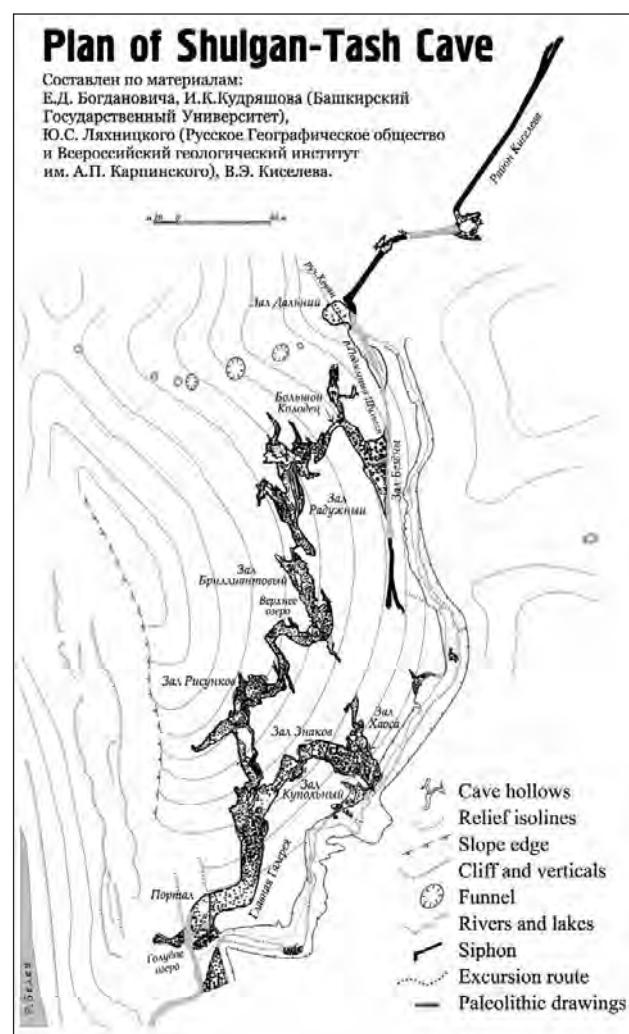


Figure 1. Plan of the Shulgan-Tash Cave.

details, parts of figures (Big Horse and Rhino). Only the Red Mammoth is a silhouette figure dyed almost completely, but the intensity of the dye varies. Drawings of this type are dominated by mammoths (7); there are woolly rhinoceros (2) and a bull. The colour of these images is red; the intensity of the dye is medium and low. Almost all of them are made in the same style, as if following a certain canon. Besides, two anthropomorphic images occur in different compositions. There is only one geometric symbol in the hall – a large trapezium with twelve edges at the bottom right corner of the first composition. This is a single formation group that resembles most of all the West

European Madeleine. According to the classification of Leroi-Gourhan, the images belong to the transitional group between the third and the fourth. The painting is dated from the age of the coal from the O. Bader's prospecting shaft in the Drawings Hall (Tatiana Shcherbakova material); according to VSEGEI laboratory data, their age is 16,000–17,000 years. This is undoubtedly the Upper Paleolithic.

Drawings of the ground floor with distinct styling elements accompanied at least by two geometric symbols (trapezia) can be assigned to the second group of realistic red images (apparently originally polychrome). Horses from the Chaos Hall and the Bison from the Symbols Hall are assigned to this group. There are already no mammoths among the animals. Drawing stylization is expressed in further elongation of horses' neck, contour distortion of the upper horse silhouette, unnatural sharp bend of the tail, exaggerated mane luxuriance. Near the animals, there are characteristic "trapezia" found only in the Kapova Cave. They widen upward, have internal near-vertical edges and "earlets" hanging from the upper corners; the right one is short and left one is long. Sometimes the "earlets" are bifurcated. The trapezia are geometrically correct, have a different number of edges and peculiar internal features of the structure. A new figure appears – one-sided bent staircase above the Upper Horse. The drawings in the ancient time were covered with thick sinter calcite crust owing to which they are well preserved. They were multi-colour (from red to black and brown). These compositions are situated on the ground floor of the cave: at the entrance to the Symbols Hall and the Chaos Hall. This is the continuation of the ancient tradition with the observance and development of its rules. They belong to the fourth group of Leroi-Gourhan's classification. The age of the drawings of this group is probably the most recent stage of the Paleolithic.

The third group of drawings in the Symbols and Dome halls is characterized by small, scarce zoomorphic stylized and formalized "simplified" drawings of abundant abstract symbols. Instead of the traditional trapezia, various new symbols appear: U-shaped, radial, circular, various derivatives of trapezia, etc. In this case, there is no distinct relation between zoomorphic drawings and symbols. Probably they were drawn at different times on the same site. They are characterized by poor preservation, the lack of details, static figures of animals. New Mammoth and Red Horse are among typical zoomorphic images of this group. The image of a mountain goat from the Dome Hall probably also belongs to this group. This group includes numerous and variable images of the northern wall in the Symbols Hall and small spot symbols – indicators. In addition to the trapezia, there are also triangles. The best expressed Double Triangle is situated on the northern wall of the Symbols Hall. Another variety of symbols is a trident. These figures are derivatives of trapezia. They differ in the fact that they contain only one internal edge, side faces are parallel and the top face is almost invisible. The typical Trident is situated in the northeastern corner of the Symbols Hall. There are symbols, derivatives of a trapezium, with internal, sometimes complicated structure, usually parallel side faces and double short earlets. They can be exemplified by the Complex Trapezium in the Chaos Hall. U-shaped structures

are rather abundant. Several of such symbols are drawn on the northern wall of the Symbols Hall. There is an interesting variety of characters – Y-shaped sticks that remind an asymmetric "shanghai" (branch fragment with a spike) accompanied by a number of straight line segments, small triangles. Two of these symbols are in the Chaos Hall. Central-type structures consisting of segments of circles, arcs or spirals with a bright isometric spot in the center are distinctive. Such symbols are drawn on the northern wall of the Symbols Hall. There are also straight and slightly curved lines located, as a rule, in groups, vertically, e.g., oblique lines in the Chaos Hall. Three complex structures that resemble trapezium derivatives with elements of radial structure that remind cast of a huge hand are described. They are exemplified by the Radial Structure on the northern wall of the Symbols Hall.

In this group, symbols located in isolated flattened cavity under the eastern wall of the Chaos Hall are of interest. These are singular, specific, usually complex, composite symbols consisting of several elements. The most representative of them is "Tower" symbol consisting of two red rectangular structures with short horizontal black lines in between partly accentuated with red ochre. It is elongated vertically. There are also such symbols as Complex Trapezium and Tuning Fork, which are distant derivatives of traditional trapezia. Such symbols have not been described elsewhere.

Images of the ground floor are usually poorly preserved. This may be due to the loss of a methodology or unfavourable conditions, large water inflow, impact of condensate. Perhaps they were created during interglacial periods or in postglacial time, when hydrological and meteorological conditions in the cave deteriorated. In general, the group mainly consists of abstract symbols; they were created based on an entirely new concept, although some rare details came from old symbols of previous groups. For example, double earlets of some complex symbols. Apparently, this group of images was created already in post-Paleolithic time.

Next, very complicated and heterogeneous type of images is spots that usually look like unstructured irregular-shaped images. These are relics of very poorly preserved drawings, dye stains of destroyed images, and sometimes, perhaps, natural formations. Interpretation of the spots is a challenge. Computer image processing techniques allow in some cases the identification of the primary structure of the drawings or symbols, but often such an interpretation is ambiguous. In this case, the suggested interpretation is probabilistic, and the conclusion of the authenticity of the received version of the image depends on the skills and qualification of the operator. The spots are common in the halls of the ground floor of the cave.

The fourth group is "points". In fact, they are small spots. These small images consist of "points – indicators", small symbols, fragments of image relics, and natural mineral formations. Despite their small size, they sometimes show a distinctive geometric structure, small tails and other features. Their identification is even more difficult than that of the spots. A typical indicator is Acoustic Point in the Crossway Hall or triangular Secret Symbol in the Chaos Hall.

Most of the Kapova Cave images are red and painted with ocher. But the ocher differed in composition. This was specially prepared red dye of different tints, which consisted of iron hydroxide, natural red (and other) clay ocher made of weathering crust and various mineral admixtures. The ocher composition was specific in different regions depending on the availability of natural components. There is a small brown ironstone occurrence not far from the Kapova Cave. In the immediate vicinity of the drawings in the Split of the Chaos Hall, there are nests of limonite, goethite and other varieties of brown ironstone. The choice of primary mineral components was very wide. Sampling of brown ironstone microadmixtures and ocher samples showed their high similarity and rather diverse composition of both. We managed to find an ancient “palette” – a plate with the ocher prepared by an ancient artist. We studied its composition. It turned out that the basis of the dye consisted of burnt brown ironstone and clay ocher. We carried out an experiment on the preparation of the dye. In order to get cherry-red hematite from the brown ironstone, it is necessary to anneal it intensively in the fire. The resulting hematite grains were grinded with clay and then mineral admixtures were added to this mixture to obtain necessary colour tint. Then, in order to give the adhesion properties to this mixture, the resultant powder was rubbed up with “animal glue” – a mixture of fat, blood and lymph. The resultant mixture could be brought to the consistency of oil and then rubbed into the rock.

Images (usually symbols) differing in tint from the typical “scarlet” colour are repeatedly found the cave. Darker, tinged with violet, dark red colour residing in some images is distinctive visually. An example is a bright line on the right side of Hash symbol on the eastern wall of the Dome Hall. One of the initial components for this paint was purple clay, which is found in the cave vicinity.

Monochrome drawings and symbols prevail in the cave; however there are many shades of scarlet with different saturation. Perhaps, they acquired such appearance under the influence of negative hypergenesis factors, which have destroyed the dye for thousands of years. The only composition that relatively quickly after its creation was preserved by thick calcite crusts (Horses from the Chaos Hall) was almost polychrome after opening. It is characterized by bright red and dark red lines of the main outline, red with brownish tint zones of acute neb, crest, and tail of horses, thin, black-brown lines of the external outline, pink, light red interior zones of paintings. Kapova Cave paintings were originally polychrome or had a richer palette than now, and that makes them more similar to the West European analogs. The question on the authenticity of black images is fundamental. Archaeologists have not considered black figures as a subject of study, but for one symbol of the ground floor. However, the presence of several black images requires a solution. Using of coal for black images is most probable, but perhaps this is pyrolusite ( $MnO_2$ ), which is found in the cave in the form of crusts and films of cavern filling.

The fifth group of images is distinguished conditionally, as paintings authenticity has not yet been proved. These are black archaic drawings with primitivism features, present only in the Paintings Hall on the first floor. They can be

exemplified by Black Mammoth, Black Fox, and Black Horse. According to Leroi-Gourhan, this is the first or the second group. It can be assumed with very great care that the age of these paintings may be close to the Middle Paleolithic.

It seems that the Kapova Cave drawings considerably differ from the West European samples, and the very concept of drawing pictures from the Kapova Cave and many paintings and symbols are quite specific and have the right to be considered original within the overall global cultural Paleolithic field.

The first composition on the eastern wall of the Drawings Hall is a solemn procession of animals, representing the totem of some groups of people. All of them are disposed regularly, compositionally bound together. All but one animal are on the hall perimeter from the right to the left. Lone Going Mammoth ahead, other animals in a large V formation move at some distance behind. One has the impression of a solemn procession. This is an esoteric painting drawn on a certain canon.

The second composition on the western wall of the hall is noted for the absence of solemnity and conventionality. It is more likely a sketch of an everyday scene, subordinate to the compositional unity, using the same stylistic devices. The wall is sufficiently large to accommodate many figures, however only 4 animals are drawn.

### 3. Conclusions

If we compare these compositions with the masterpieces from Western Europe caves, for the first time it seems that they are much more primitive, but thoughtful profound reading of the paintings shows that they are just different in conception. The difference between the Western drawn up in detail, multi-figured masterpieces of art and compositions from the Kapova Cave is about the same as between the splendor of Catholic churches decoration and imagery of Russian icons. Artist of the Kapova Cave sought not to reflect the external beauty of animals, but to create their images, to convey the inner solemnity of meeting people with the world of their totems, with higher forces in which they believed. This is sort of Paleolithic altar, not an art gallery. Hence the observation of certain canons, conditionality in paintings.

This classification is, in fact, genetic; of course, it is based on the general regularities and has a hypothetic character. Nevertheless, the actual material enables such grouping, beyond the timeframe. Perhaps the difference in the pictures character is to some extent due to the functional specifics of various areas of the cave sanctuary; however this is less likely for the Kapova Cave.

Thus, images from the Kapova Cave are quite diverse morphologically. This is one of its features, and it confronts future researchers with complex and difficult questions on understanding the collected material, which of course does not fit into the concept of “art” and represents a complex system of cultic, conventional symbols, abstract and perhaps information signs. Morphologically homogeneous trapezia always found next to pictures of totem animals are some “identifiers” providing additional information about

them. As they have a different number of internal edges, it is logical to assume, as a hypothesis, that these are a kind of numerical symbols characterizing a group of people worshipping these animals – totems.

Variety of symbols in the Kapova Cave is much greater than in the West. This can be explained by the fact that it apparently remained the largest regional sanctuary for a long time, and drawings and symbols of different traditions, at least of two epochs were telescoped in it. Thus, the described properties and features of the Kapova Cave images provide strong evidence of the originality of this interesting monument, which proves the existence in the Southern Urals during the Paleolithic of an independent source of the original ancient culture that has evolved for a long time, probably even after the end of the Paleolithic.

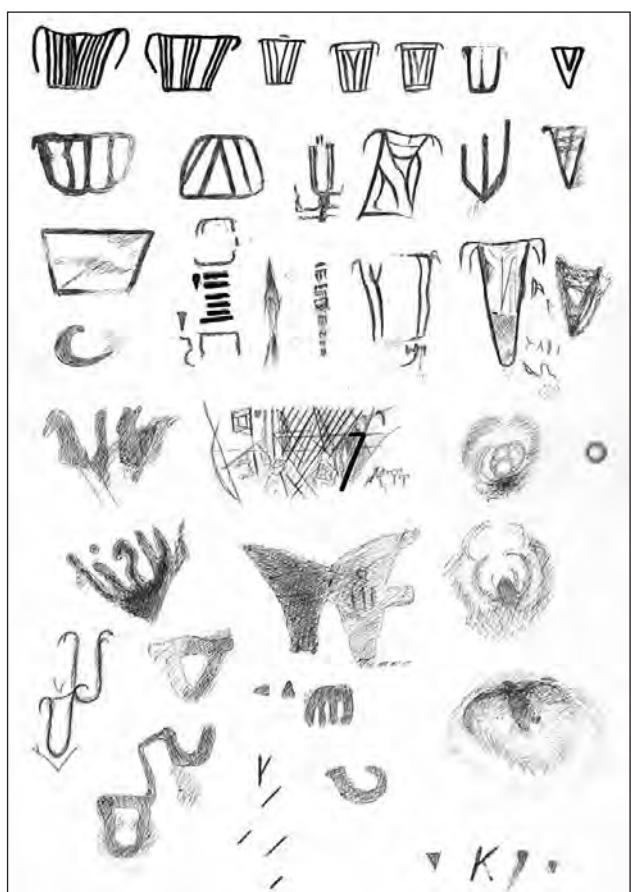
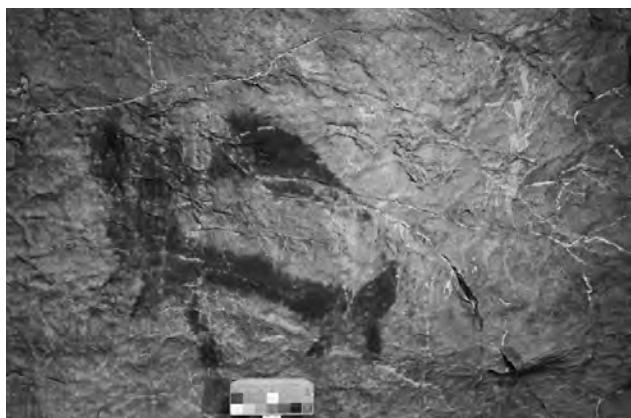


Figure 2–6. Zoomorphic (anthropomorphic) realistic drawings, abstract geometrical symbols and obscure spots – relics of the images. (Shulgan-Tash) Kapova Cave.

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