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ANCIENT MURALS OF THE SHAKHTY ROCK SHELTER IN THE LIGHT OF RESEARCH METHODS DEVELOPMENT (BASED ON V. A. RANOV'S ARCHIVE MATERIALS AND MODERN DATA)

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Abstract. The article discusses the rock images of the Shakhty rock shelter. The authors' archival research in 2021 and 2022 revealed field diaries, photographs and colour photo slides of V. A. Ranov, who was the first to find the site, in the archive of A. Donish Institute of History, Archaeology and Ethnography of National Academy of Sciences of Tajikistan. The combination of evidence obtained from these sources, and a modern examination of panels with images, made it possible to shed light on the method of recording the murals of the rock shelter in 1958. The rerecording of these images in 2019 and DStretch colour filtering of the obtained photographs made it possible to refine the contours and details of some images that are important for the attribution and subsequent interpretation of individual images. The authors assume that murals of the Shakhty rock shelter were not all created at the same time, as suggested by V. A. Ranov, dating them from the Mesolithic — early Neolithic. The presence of paint of different shades, varying degree of preservation of the shelter murals, numerous palimpsests and refined details of the images on the rock give the grounds suggest different times of their creation. Based on the results of modern research, the images of the Shakhty rock shelter can be dated from the Mesolithic to the Bronze Age.

Key words: Eastern Pamirs, Shakhty rock shelter, rock art, painted images, rock art recording, DStretch, V. A. Ranov

ДРЕВНЯЯ ЖИВОПИСЬ ГРОТА ШАХТЫ В АСПЕКТЕ РАЗВИТИТИЯ МЕТОДИКИ ИССЛЕДОВАНИЯ (ПО АРХИВНЫМ МАТЕРИАЛАМ В. А. РАНОВА И СОВРЕМЕННЫМ ДАННЫМ)

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Резюме. Статья посвящена наскальным изображениям грота Шахты. Благодаря архивным изысканиям, проведенным в 2021 и 2022 гг., в фондах Института истории, археологии и этнографии им. А. Дониша Национальной академии наук Республики Таджикистан были выявлены полевые дневники, фотографии и цветные фотослайды первооткрывателя этого памятника — В. А. Ранова. Совокупность информации, полученной из этих источников, и современное обследование панно с рисунками позволили пролить свет на методику фиксации наскальных изображений грота в 1958 г. Благодаря повторному документированию этих рисунков в 2019 г. и цветовой фильтрации полученных фотографий с помощью метода DStretch были уточнены контуры и детали некоторых изображений, важные для атрибуции и последующей интерпретации отдельных образов. Предполагается, что наскальные изображения грота Шахты не одновременны, как предполагал В. А. Ранов, относя их к периоду мезолита — раннего неолита. Наличие краски разных оттенков, разная сохранность рисунков грота, многочисленные палимпсесты и уточненные детали представленных на скале образов позволяют говорить о разном времени их создания. По результатам современных исследований наскальные изображения грота Шахты могут быть датированы в пределах от мезолита до эпохи бронзы.

Ключевые слова: Восточный Памир, грот Шахты, наскальное искусство, крашеные изображения, документирование наскальных изображений, DStretch, В. А. Ранов

Introduction

Over the past decades, significant developments have been made in the methodology for recordings rock art sites. The expansion of the methods base is largely due to the advances in the technical tools used in dealing with rock art. The improvement in the technical equipment of researchers has affected the quality of field and laboratory work, and hence

the results of research itself, which sometimes leads to the opportunity to revise common ideas about a particular site. One of such cases is the modern research in the ancient murals of the Shakhty rock shelter, which has led to the identification of new details clarifying the set of images on the rock panel, the technological features of creating the images and their chronological boundaries. However, these data would not be complete without an analysis of the unpublished materials of V. A. Ranov kept in A. Donish Institute of History, Archaeology and Ethnography at the National Academy of Sciences of the Republic of Tajikistan. These include diaries, colour photo slides, photos and drawings of the researcher who was the first to uncover the rock images in the Shakhty rock shelter. The totality of these data reflects the high professionalism of the researcher, despite the specific and complex character of the site, the absence of materials that could be used copying pained images in the middle of the 20th century.

Study Object

The ancient murals of the Shakhty rock shelter was found by the archaeological group of the Pamir expedition of the Academy of Sciences of the USSR under the leadership of V. A. Ranov in 1958 (Ranov, 1961). The rock shelter is located in the valley of the Kurteke-say River, 40 km southwest of the village of Murgab in Gorno-Badakhshan Autonomous Region. The absolute height of the site is about 4200 m above sea level. The rock shelter is composed of a huge limestone massif open to the east and aligned almost exactly to the cardinal points. It is dry, bright and well lit by the sun. The shelter is formed by two walls with a negative tilt which shape a small subtriangular cavity. The entrance is 7.5 meter metre wide, the rock shelter goes 6 meters deep, the ceiling height is 25–30 meters at least (Ranov, 2016, p. 45). The images are located on the southern wall of the rock shelter, which is inclined by about 45–50° and is composed of reddish field limestone. The images are located 1.6–2 m above the floor; they were made with red ocher paint, which has two tones — light ruddy and darker burgundy. According to V. A. Ranov, material for the paint could be taken from powdery deposits of ferruginous compounds in the cracks of the cave wall. Judging by the thickness of the lines, the murals could have been 7 made with a finger (Ranov, 1958, p. 27–29, 35). Among the interpretable images, animal figures stand out: a wild boar; bear (or two boars); a large animal, possibly a Bovinae, and an anthropomorphic character, which Ranov supposes to be disguised as a bird (Fig. 1; Ranov, 1961, p. 71). The researcher combines these images into a single composition interpreting it as a hunting scene (Ranov, 2016, p. 45–47).

Directly below the plane with images. excavations were conducted in 1960, during which mainly stone artifacts were found. Their appearance allowed V.A. Ranov to attribute the cultural layer to the Mesolithic. Based on these materials, as well as on the images depicted on the wall, not typical for the high-mountainous regions of the Pamirs (wild boars, bears) together with their archaic style, the researcher attributes the images of the Shakhty rock shelter to the Mesolithic–Early Neolithic, although he notes that the Mesolithic finds in the rock shelter cannot be direct evidence of such an age of the images on its walls (Ranov, 1961, p. 81).

Research on the site was resumed only 60 years later using state-of-the-art capabilities (Zotkina, Abolonkova et al., 2022; Zotkina, Bobomulloev et al., 2022).

Methods

During field work in the Shakhty rock shelter, the images were photographed using Nikon D750 camera equipped with Nikkor AF-S 60 mm f/2.8G ED Micro and Nikkor AF-S 105 mm f/2.8G IF-ED VR Micro lenses. Photographic recording was made at different scales (gener-

al view, macro-details) and at different lighting conditions (natural daylight and flash). Macro photography of images was used to record technological features, overlapping areas of different pigment colouring. To fix the maximum number of details, the authors shot panels with images in separate fragments with their subsequent merging to obtain a photo panorama several times larger than the original (Miklashevich, 2012, p. 167; Mukhareva and Tishkin, 2016, p. 94–96). In this case, merging was performed with Agisoft Metashape Pro software; an orthorectified image was later made based on the 3D model. This technique made it possible to identify in the laboratory conditions even almost obliterated areas with remains of the ancient pigment that are elusive to the eye. To enhance the contrast and refine the contours of some images the authors used DStretch — a method based on colour filtering of photographs of rock images, namely, on working with image channels of different colourspaces (Harman, 2015; Fig 1.-2).

Fig. 1. Murals of the Shakhty rock shelter: 1 — Photo of recording the images of the Shakhty rock shelter (a photo from the archive of A. Donish Institute of History, Archaeology and Ethnography of the National Academy of Sciences of the Republic of Tajikistan); 2 — The result of DStretch processing a fragment of an orthophoto of a plane with images (based on a 3D model), 2020

Рис. 1. Наскальные изображения грота Шахты: 1— фотография прорисовки изображений грота Шахты (фотография из фондов Института истории, археологии и этнографии им. А. Дониша Национальной Академии наук Республики Таджикистан); 2 — результат обработки фрагмента ортофотографии плоскости с рисунками (на основе трехмерной модели) при помощи DStretch, 2020 г.

Fig. 2. The process of video filming in the Shakhty rock shelter, 1958
(a photo from the archive of A. Donish Institute of History, Archaeology and Ethnography
of the National Academy of Sciences of the Republic of Tajikistan)

Рис. 2. Процесс видеосъемки в гроте Шахты, 1958 г.
(фотография из фондов Института истории, археологии и этнографии им. А. Дониша
Национальной академии наук Республики Таджикистан)

Fig. 3. Image of a boar: 1 — A photo of 1958 (a photoslide from the archive of A. Donish Institute of History, Archaeology and Ethnography of the National Academy of Sciences of the Republic of Tajikistan); 2 — The result of DStretch processing a 2019 photo

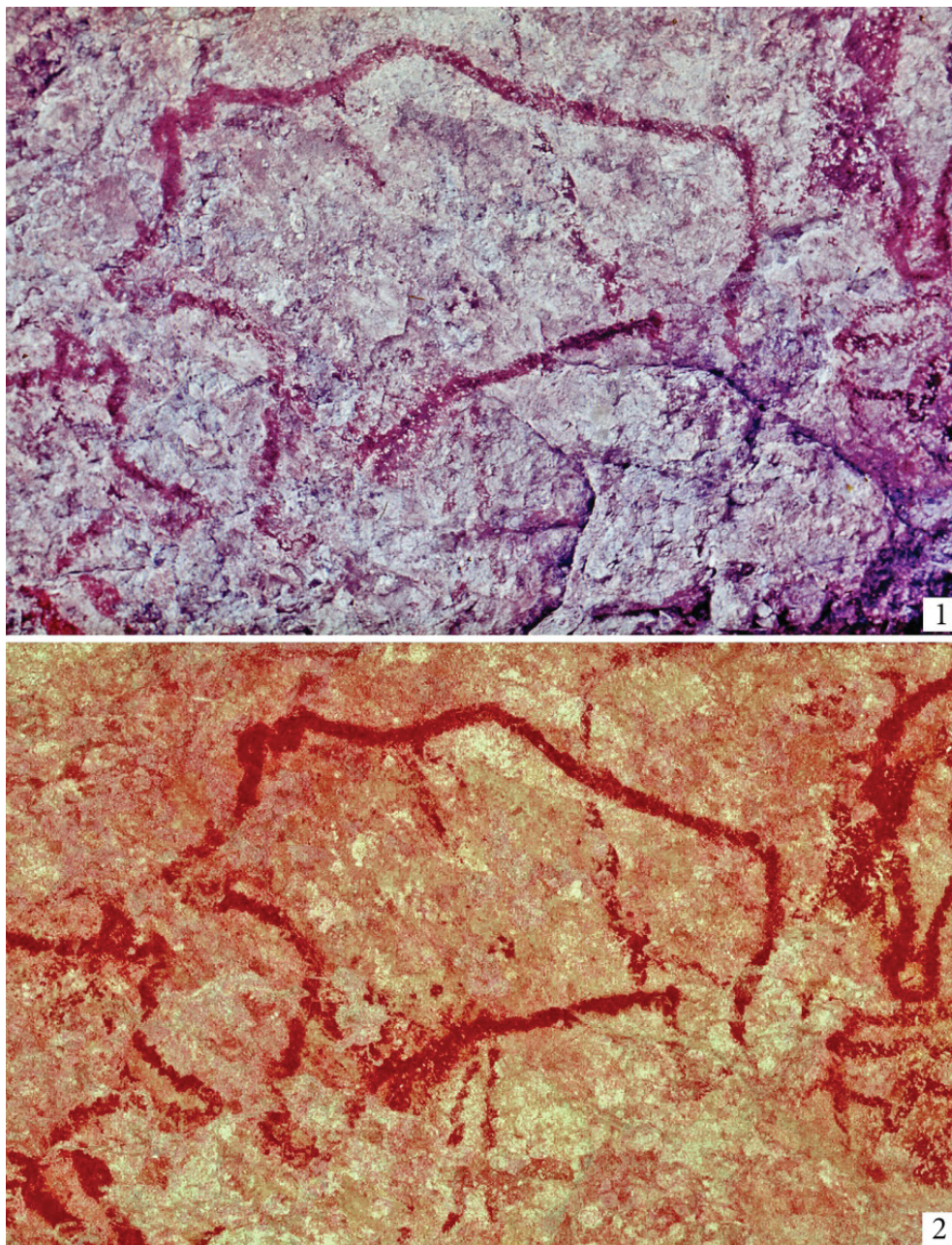Рис. 3. Изображение кабана: 1 — фотоснимок 1958 г. (фотослайд из фондов Института истории, археологии и этнографии им. А. Дониша Национальной академии наук Республики Таджикистан); 2 — результат обработки фотографии 2019 г. при помощи DStretch

When interpreting zoomorphic images, given their ambiguity, the authors correlated them with evidence on the fauna and climatic conditions in the Eastern Pamirs in the Pleistocene and Holocene. Thus, based on the concepts of images in the Shakhty rock shelter, it is possible to make indirect judgment as to their age (Zotkina, Malikov et al., in press).

An analysis of the notes and sketches in the researcher's diary, as well as a thorough examination of the panels with images in the Shakhty rock shelter, made it possible to clarify methods of the murals recording used by V. A. Ranov.

Results

When working in the archives of A. Donish Institute of History, Archaeology and Ethnography of the National Academy of Sciences of the Republic of Tajikistan in 2021–2022 the authors found numerous tracing-paper copies of rock images from various sites where V. A. Ranov had worked. However, copies of the images from the Shakhty rock shelter were not found. At the same time, previously unpublished photographs of the rock shelter were revealed including photos showing the process of video filming of the images (Fig. 2) and colour photo slides of the images (Fig. 3.-*1*), which made it possible to assess the degree of loss of the painted layer over the past 60 years (Abolonkova, Sayfulloev, Dedov, 2022). Another result of the archival search was the researcher's field diaries with descriptions and sketches of panels with images (1958), as well as a description of the excavation in the site (1960).

On the pages of the 1958 field diary, V. A. Ranov described in great detail not only the found images, but also the rock shelter itself, paying attention to the condition of the rock surface and the paint layer of images. V. A. Ranov pointed out that "the shelter wall, on which the images were made, is very uneven, rough and, as is common covered with limestone and layered, with individual "pimples" — spots rising 7, 5, 3 and 2 cm above the rock surface. There are hardly any smooth surfaces" (Ranov, 1958, pp. 29–30). According to the researcher, once the entire plane of the wall, starting almost from the entrance of the rock shelter and ending in the narrowest area along the southern wall, was covered with images. This is evidenced by numerous spots of paint and some individual lines or the remains of figures, which are not possible to interpret any longer (Ranov, 1958, pp. 29–30). For the convenience of describing images, V. A. Ranov conditionally divided the entire surface with images into three tiers. Only a few reddish spots remain from the images of the upper tier. The researcher admitted they could be nothing but streaks of the ferruginous substance found on the walls of the rock shelter. Spots of images from the collapsed lower tier are clearly visible 70 cm below the main "middle" tier, in which most of the images have survived (Ranov, 1958, p. 31). In total, Ranov identified seven main figures there: a human disguised as a bird, a wild boar; a bear (or two wild boars); a large Bovinae (?) and three badly preserved figures, one of which the researcher assumed to be a trap (?), and another was presumably interpreted as a bird hunted by the human. In addition, the researcher identified images of arrows, traps or other trapping devices used when hunting an animal (Ranov, 1958, pp. 32–33).

It is noteworthy that describing images V. A. Ranov immediately suggested his interpretation of what he saw, combining the figures into a single composition. For example, describing the anthropomorphic character, the researcher noted: "...this 4ure resembles Bushman drawings or drawings of primitive peoples in which characters disguised themselves as birds — this is a man hunting a bird and, perhaps, the image above him, very poorly preserved, depicts ex-

actly an object of hunting — a bird…" (Ibid.). Describing the lines under the image of the left-most animal (Fig. 1) V. A. Ranov indicated "…crossing lines at the bottom of the image can be a palisade fence (a trap). On the other hand, the leftmost combination of lines may resemble a human figure" (Ranov, 1958, p. 36). It should be noted here that the latter guess was confirmed with modern graphic processing of photographs. Thus, without separating the description of images from their interpretation V. A. Ranov immediately combined what he saw into one composition, despite the varying degree of preservation of the figures, the presence of palimpsests and pigment of different shades, which he himself mentioned repeatedly. At the same time, V. A. Ranov paid quite a lot of attention to the description of paint of different shades indicating which figure was made in what colour, noting the thickness of the pigment layer, its features and the fact that the burgundy always overlaps the carmine (Ranov, 1958, p. 48). Pointing to a combination of arrows and traps, the presence of an anthropomorphic character disguised as a bird, V. A. Ranov suggested that the rock shelter wall depicted a hunting scene and dated it to the Mesolithic — early Neolithic.

Further, the authors will be comparing interpretations of the researcher with their own observations obtained in 2019 and later when working with photographic materials. On the copy of V. A. Ranov, under the image of the leftmost animal, there are spots of paint, which the researcher interpreted as trapping devices where the animal fell; other options suggested by V. A. Ranov include schematic representations of people or geometric signs characteristic of classical prehistoric art, such as "claviforms" (Ranov, 1961, pp. 73–74). Other interpretations cannot be excluded, however using the DStrech software the authors identified three anthropomorphic figures in this area (Fig. 1), which show a great resemblance to the left-most character, whom V. A. Ranov interpreted as a hunter dressed as a bustard. These images partially overlap the legs of the animal, which may indicate a later addition to the existing composition of zoomorphic images.

Another example of overlapping patterns is recorded in the area of the croup of the right-most zoomorphic image (presumably a wild boar (?)) — a bull, yak or bear as interpreted by V. A. Ranov (Fig. 1). During the DStretch processing of the photo, a darker spot that overlaps the tail of the animal was visualized as an anthropomorphic figure, which is invisible in a conventional visual inspection without colour filtering of the photograph and therefore had not been previously mentioned in the works of V. A. Ranov. The anthropomorphic character is depicted with hands raised up and fingers spread wide. Apparently, the image shows character's headdress with a plume resembling a Saka hat. It suggests a much later age of this image compared with the lower possible chronological boundary of the creation of the first Shakhty images.

Observations regarding the state of preservation of the painted layer are also remarkable. In some areas where pigments of different shades intersect, there is a pronounced difference in the degree of their preservation. When it does not refer to rock plane sections located far enough from each other but to the same area of the wall, difference in the preservation of pigment can be explained either by different paint recipes or by a difference in the time of the paint application.

Thus, at the moment it can be said with certainty that the composition depicting the hunting scene from the Shakhty rock shelter was not created on a single occasion, and the sequence of making the images of each stage requires special study.

Discussion

A rather detailed description of the Shakhty rock shelter, as well as a nuanced analysis of the images themselves accompanied with very accurate, albeit schematic sketches of individual images, made by V. A. Ranov in his diary are of great interest for modern research.

The first acquaintance with these materials once again proves the relevance of tracing/redrawing images when recording rock art. This activity gives a researcher a better opportunity to better observe the pictorial surface, literally follow the hand of the image creator, trying not to miss a single important detail and concentrating on the way each image was made, on the location of the indentations, the engraved line or even the paint layer. However, in 1958, when the Shakhty rock shelter was found, transparent materials for tracing images simply did not exist. The researcher's toolkit included only tracing paper widely used at that time for recording mostly relief rock images and a pencil for making sketches on the diary page.

It should be noted that the sketches have been used from the very beginning of studying rock art sites. As any other method, sketching has both its undeniable advantages, primarily associated with training the professional "look", and disadvantages stemming from the subjective perception of often peculiar images on the rocks, as well as with the possible inaccuracy of the researcher's hand in the process of sketching. There is evidence of the use of a camera obscura in making sketches for more accurate recording of the Yenisei petroglyphs by L. F. Titov as early as in the late 19th century (Spassky, 1857, p. 145). At the beginning of the 20th century A. V. Adrianov noted the insufficient accuracy of this recording method and looked for ways to improve it. For example, in order to preserve the "true dimensions" of petroglyphs, he sketched images "cell by cell" on paper lined with 1×1 and 2×2 squares (Miklashevich, Ozheredov, 2008, p. 158). The sketches are still relevant for keeping field diaries.

Tracing paper, widely used as a recording material in the middle of the 20th century, also had a number of weaknesses. In order for the image to be better seen in the process of recording it on tracing paper, it was often oiled, and the image on the rock was first outlined with chalk. After that, drawing on tracing paper was performed.

We have found no traces of chalk on the surface of the images neither during studying previous records (descriptions or photographs), nor during our visual examination of the rock surface of the Shakhty shelter. However, upon careful observation, a barely perceptible grid (!) approximately 10×10 cm made with graphite was found on the rock (Fig. 4, 5). Those lines led us to the idea of a possible redrawing of the rock shelter images guided by squares of this grid. Obviously, given the poor preservation and vagueness of the painted lines in the drawings, as well as the peculiarities of the tracing paper, the previous researcher might reject the idea of using it to make a contact recording.

During our private conversation with E. A. Miklashevich, she recalled that before the emergence of various technical means of scale copying, there was a method of redrawing "in cells"[1]. A grid was lined over the image to be recorded, and then it was redrawn cell by cell. Even if some inaccuracies occurred within individual cells, the general proportions of the image were still maintained and the resulting recorded image was more accurate than if sketched by sight. After

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[1]   We take the opportunity to express our deepest gratitude to Dr. Miklashevich for the detailed description of this tracing method.

that, the light table was used to transfer the contours of the drawing from the sheet lined with cells, then the resulting image was outlined with ink and photographed. It is probable that a photograph the authors found among V. A. Ranov's materials in the archives of the Institute (Fig. 1.-*1*) shows exactly such type of paper with the outlines of the Shakhty images outlined with ink.
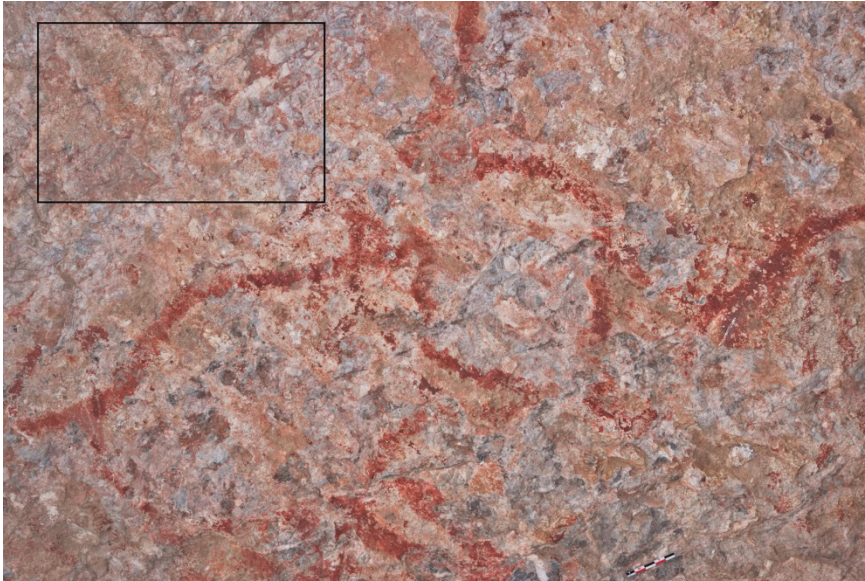

Fig. 4. Traces of a grid made with pencil on the surface with images in the Shakhty rock shelter. General view of the surface area with the lining

Рис. 4. Следы карандашной разлиновки сеткой скальной поверхности с изображениями грота Шахты. Общий вид участка поверхности с разлиновкой
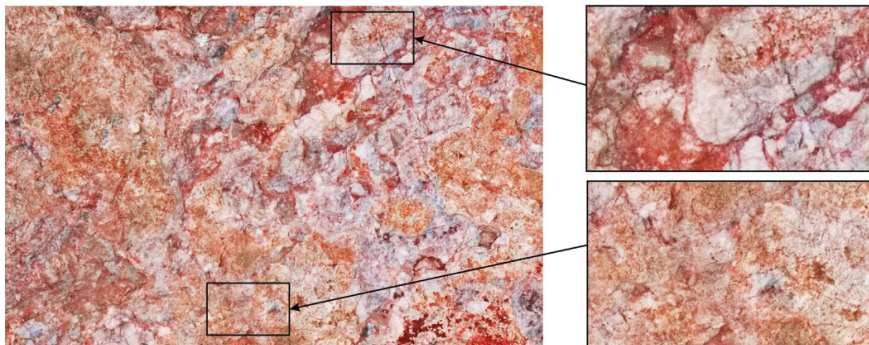

Fig. 5. Traces of a grid made with pencil on the surface with images in the Shakhty rock shelter. Photo of a fragment of the site with increased contrast. Arrows indicate traces of the pencil lining

Рис. 5. Следы карандашной разлиновки сеткой скальной поверхности с изображениями грота Шахты. Фотография фрагмента участка с увеличением контраста. Стрелками обозначены следы карандашной разлиновки

It is evident that a pencil lining right on the rock surface was needed to transfer the Shakhty rock paintings onto a sheet with smaller cells. Under the conditions of 1958, this technique seems to be quite suitable for the most complete recording of the rock shelter art. It is possible that the recoding, which was then widely replicated in many publications, had been obtained precisely in such a non-standard way for rock art studies. It is noteworthy that while working in the funds of the Institute, the authors found a tracing-paper copy of the famous plane with chariots from the Akjilga site, also lined with a pencil grid. It was this find that prompted the authors to think about the possible use of the described technique to make drawings of the Shakhty murals.

Obviously, it was the redrawing that allowed V. A. Ranov to accurately convey the poorly preserved painted images of the Shakhty rock shelter. It is not known whether the researcher did the redrawing himself or it was done by one of the members of his expedition (it used to be a common practice to invite professional artists in expeditions). However, detailed descriptions of the rock shelter murals reflected in the researcher's diary testify to a long and attentive examination into the surface with images. Such greatest degree of concentration on the images is achieved in creating a drawing or, in this case, redrawing from the original image.

Rerecording of the images in the Shakhty rock shelter in 2019–2020, including the use of colour filtering of photographic images with DStretch software, made it possible to identify poorly preserved images described above and allowed for their subsequent chronological attribution.

A few more remarkable details were recorded related to the content of the images and the peculiarities of their expression. For example, the ears of the central zoomorphic figure were depicted in two ways — both with a pointed triangle and with a rounded line (Fig. 3). This may indicate either an error, immediately corrected by the artist, as V. A. Ranov suggested (Ranov, 1958, p. 40), or a later alteration aimed at changing the concept of the image deliberately. Both of these options are possible. The same image includes such a detail as clearly traced fang, which is important for interpretation. V. A. Ranov also drew attention to it, additionally the researcher focused on the line of the mouth in this image (Ranov, 1958, p. 40; Fig. 6). It is significant that this image has morphological features and proportions typical of both a wild boar and a bear. The other two zoomorphic images located to the right and left of the above drawing demonstrate only features of the wild boar.

Information about the Pleistocene and Holocene fauna of the region in question is not very rich, nevertheless, it is known that bones of the bear were found at the Oshkhon site. In addition, the image of a saiga deserves special attention in the faunal collection of that site. The animal was a typical representative of the tundra-steppe Pleistocene fauna, perfectly adapted to arid plains with a sharply continental climate (Sokolov and Zhirnov, 1998). Its habitat in the Pleistocene was much wider than now. Judging by the materials from the Oshkhon site, the saiga inhabited the territory of the Eastern Pamirs in the late Pleistocene — early Holocene. Its presence in the region, as well as the geomorphological data of the area under consideration, indicate rather severe climatic conditions during this period, which are not suitable for the wild boar. Thus, it can be assumed that the main part of the images of the Shakhty rock shelter belong to the Holocene, perhaps with the exception of the central figure, which could originally be conceived by the artist as an image of a bear (Zotkina, Malikov et al., in press).
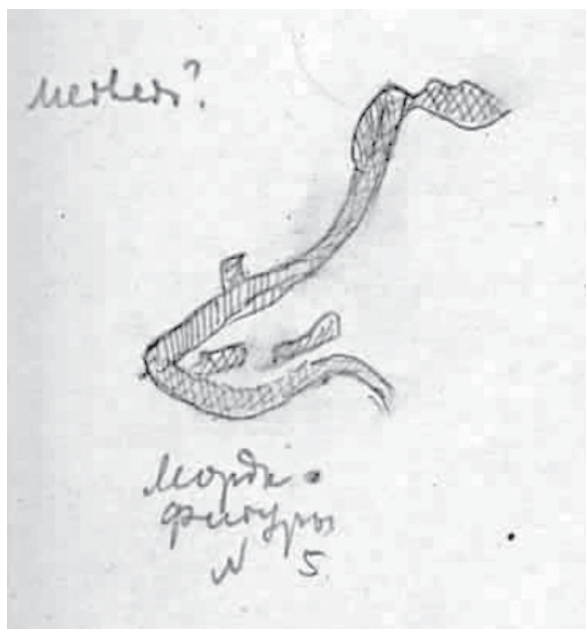
Fig. 6. Sketch of the head of a wild boar from the field diary of V.A. Ranov, 1958

Рис. 6. Зарисовка головы кабана из полевого дневника В.А. Ранова, 1958 г.

Conclusion

The change in research approaches and the improvement of working methods enable researchers to obtain more information at a qualitatively different level, however, the case of recording the murals in the Shakhty rock shelter once again proves that even a seemingly archaic method can be very effective if used by an expert with an attentive and thoughtful approach. Given the complex nature of the site, the technique of creation and the degree of preservation of the Shakhty images, V. A. Ranov conducted his activities of 1958 at the highest methodological level. From today's perspective, the possible weaknesses of his work include the pencil lining directly over the image surface, however, the authors are well aware that it was necessary for the researcher to capture the images as accurately as possible. As for the semantic and chronological interpretation of the rock shelter images, taking into account the new details and analogies to these images revealed recently, his assumptions should be reconsidered. It seems that the interpretation of the images in the process of their description led the researcher to a premature conclusion about the synchronism of all images of the rock shelter, despite a number of circumstances that the researcher himself noted (varying degree of preservation of the images, different paints and others).

The studies of 2019–2022 discussed above allow the authors to conclude that the murals of the Shakhty rock shelter were not created simultaneously. The images can be dated within a fairly long period — from the Mesolithic, the time of the Eastern Pamirs settlement and the age of the cultural layer studied by V. A. Ranov immediately under the plane with images, to the Bronze Age.

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