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## **Restoration of the murals of the corridor of the Shahrستان palace (Qala-i Qahqaha I)**

The present paper is devoted to the problems of restoration of the monumental mural painting of one of the walls of the main corridor (room 7) leading to the Minor reception hall of the famous palace of the Afshins of Ustrushana at Qahqaha I.

It was in 1967 when in archaeological excavations at the site Qalai Qahqaha I in Shahrستان a multi-figure mural was excavated which became famous for the depiction of a she-wolf feeding two infants.

The whole of the six-meter composition which decorated the western wall, comprised five scenes. On the left-hand side we see a male figure sitting on a wide throne (*takht*) with his legs bare up to his knees. The supports of the throne are executed as some animals, maybe canines.

On the right hand side of the throne a naked woman is kneeling with her long black loose hair. Next is the second scene, a man in long black kaftan is kneeling, raising his hands to the small figure of an infant.

To the right of him is another kneeling woman who passes or received the infant. To the right of her another man is depicted in rich garments and fluttering coat.

Next is depiction of a river; an animal is floating in it. The muzzle has big ears, wall-eyes, and helicoid moustache is at two sides.

On some spots of the river the depiction of walls can be recognized; the bay of the river is executed with floral ornament. The river was the third scene and the forth one is to the right. Here we see three figures: a man in long dark-grey richly decorated robe and blue wavy coat; another character is a short blue tunic fastened by wide red belt, and in long skirt with strait sharp indentures, his bare feet are bound with strips with jingle bells at his ankles. To his right is another barefoot figure in light coat. They are all proceeding towards the river at their left.

The best preserved one of these scenes is the final scene on which the she-wolf feeding two human sucklings is depicted. To the right of the she-wolf is the last human figure of which only the right leg, the lower part of the robe and floating coat are preserved.

The fire and destruction of the building destroyed the upper part of the painting completely.

It is not in my competence to discuss the narrative and its origin any further, and now I turn to the technical side of the painting and its restoration.

The loess plaster for the murals in Shahrستان was executed in two layers above the pakhsa wall which was furnished with small cuts for better adhesion of the plaster. The first layer was rough, with large admixture of straw. The second was fine and thin made of clean loess. Its surface is levelled if not glossed. The adhesion of two layers of plaster was not sustainable enough so during the fire the upper plaster separated from the lower one and fell down.

Unfortunately in the course of the discovery there were no qualified restorers in the expedition. It was only in 1968 that the restorer of the laboratory of monumental painting of the State Hermitage museum, Vladimir Mikhailovich Sokolovski was detached to the Shahrستان excavations to conduct the necessary work to remove this painting. The work was done according to the method developed for murals with archaeological provenance in the State Hermitage Museum in the late 1940s by the team of a restorer and a chemist which helped urgent decision to remove, consolidate and preserve the mural. This method was slightly changed in the course of this work.

The painted plaster was located on very solid adobe walls which prevented from the sustainable technique of chiseling it out. Instead, a method of cutting the mural on versatile shield was developed and used here. This method spared the timing of drying of the mural after penetration. The murals were dried to semi-wet condition which enabled its pliability and permitted removal of the mural from the wall without damage. The limitation of timing of drying minimizes the surplus of salt from the body of the wall to the mural. By this method, the fragments measuring 1,5 X 1 meter were removed.

Of course, the main attention was addressed to the restoration of the fragment with the she-wolf, which was in burned and significantly polluted condition as the whole of this wall-painting. A preliminary tracing was taken from the body of the mural which showed its general composition. It helped to see the interaction of different characters and follow the development of the complicated plot. All the fragments were transmitted to the Laboratory of scientific conservation and restoration of monumental painting of the State Hermitage museum.

In the laboratory, the transmitted murals were supplementary desalinized, consolidated and fragments were mounted. In the following decades (until 2015) they were preserved in the storage.

## SECONDARY RESTORATION

Since these murals came down to us in seriously deteriorated condition, the elevation of them to exhibitional condition was quite difficult. The fragments were mounted on different backgrounds: wax, foam plastic, cellulose, urethane plastic foam, on wooden frames, and in this dispersed condition it was stored until the present day; only the fragment with she-wolf was exposed.

The whole composition of 9 fragments was transmitted for restoration in 2015 in the Laboratory of scientific conservation and restoration of monumental painting. The main and most outstanding fragment—the one with she-wolf—was taken as well.

As usual, the work started with autopsy, photographic documentation, dust removal and chemical analyzes of salts.

Most of the fragments were in lamentable condition. The plaster background, despite visual sustainability and previous consolidations, appeared to be very fragile, bulk and exfoliating. The dismantlement was very labor consuming, because the fragments had different mounts: on vax and resin mix, on soft and loose foam plastic, on assembly foam, with many inclusions of different materials (wooden filing, gauze, cotton wool etc)

Only three fragments could be removed dry without preparatory consolidation. In order to avoid possible danger, all the other fragments were firstly covered with protective foam of polybutylmethacrylate (PBMA) on acetone solution.

The problem of the removal of gauze from the back side was the next one to solve after the dismantling. The gauze was attached with thick layer of PVA (horse glue) which made thick and rough film. It was the most time consuming task because needed much time and special approach. After a series of experimentations (dry removal, compresses, moisturizing) we selected the optimal solution: to attach a compress of ten folds of gauze 20 x 20 cm moistened in butanone. These compresses differed in exposition on different fragments: from 35 – 45 minutes to 24 hours. Then the layer of gauze was removed: with lancet and pincers, very carefully, centimeter by centimeter.

At the present stage, from the fragments with almost total loss of painted surface and background, after additional cleaning of dirt and smoke-black and filling with PBMA of barely legible contours of the

painting, which made it somewhat more legible, a new tracing was done, with greater detail of dress and outlook of certain characters.

After the whole of old mount was removed from all fragments, the total sum of losses of the background became visible. The loess plaster was very uneven, very rough (due to the fire it was somewhat like a baked brick), but also very fragile. The plaster layer had deep throughout crackle almost everywhere. The adhesive of plaster was very weak, and there were many exfoliations and deteriorations because the uppermost surface was very condense (being baked first and then consolidated with solutions of polyvinyl buteral, PBMA, fluoropolymer). Some parts were extremely fragile so they needed in depth consolidation in chemical chamber with PBMA on alcohol-xylene solution).

The whole of the painting had serious deteriorations and bulbs of plaster, deformations, unequal surface in the cracks. The throughout cracks and losses were filled with plastic foam, cellulose and other materials available in 1968 in the field. The bulbs and depressions were levelled with compresses (butanone, acetone). The plaster layer softened and the deformation were levelled either by hand or with a press of glasses or with putty knife.

The research showed the almost total loss of background under fragmentary preserved paint. The spots of gypsum were also observed. During many centuries of being in the soil, the ground was deteriorated with moisture. It is typical that the background of the plaster still

attached to the wall was more intensively damaged than the one on the fallen parts.

The colour scheme of the Shahrستان painting was very rich. The red and yellow ochre was used, charcoal, ultramarine of varying gradation. The green colour was also typical for Shahrستان murals as well as ultramarine. It was first noted visually, then the chemical analysis confirmed the presence of copper oxide (the copper-based pigments after being baked), the pigments of malachite and chrysocolla. The yellow pigment of massicot was also used as well as red pigments on the base of iron. In some cases, gold leaf coating was also used. Since the painting was damaged in the fire, only mineral pigments survived, the ones which can be identified even if the painting was charred. It cannot be excluded that organic pigments were used as well (luminescence in ultra violet of certain parts of painting which was not damaged by fire).

So, the painted surface is preserved very weakly, fragmentary, in some places it lost cohesion with the ground and has numerous sores from rubbing on all the survived surface.

Due to the high temperature of fire, which cleaned off all the material remains, it is not possible to analyze the adhesive of the painting.

The front side of the painting was significantly darkened, contained extra polymere from previous consolidations, dirty with much soot and pieces of coal. Lightening of the surface was required and it was done with compresses slightly moistened in butanol with exposition

of 1 to 10 minutes, or with fast moistening with brush in solutions of butanol; butanol and water (1 x 1), acetone and water (1 x 1) and fast removal of surplus of solution with gauze sponge.

The cleaning was very time consuming and difficult and included not only loess attached to the painted layer but also elicitation of remaining color and drawing. The uncovering of the colours was often prevented by the fact that the ground was almost totally absent.

Consolidation of painted surface with 5 % acetone solution of PBMA was done simultaneously. The minor dirt was removed very carefully under microscopic observation, with butanol, brush and lancet.

This work was done according to the principles of restoration of archaeological painting used in the State Hermitage.

The losses of the plaster were filled with “native” material, that is mastic of desalinized loess mixed with 12 % acetone solution of PBMA. For mastic of darker tone, the PBMA solution of various percentages as well as natural pigments was used. For lightening of mastic, butanol was occasionally used.

Almost all losses of plaster were filled with slight abasement of the surface so that they could be distinguished from the authors’ surface, so that they would be of similar tone and would not annoy observers’ eyes.

During the mounting we decided to join dispersed fragments into larger blocks (2 – 3 fragments each) and place them on single frame. The installation was based on foam plastic plates CompacFOAM-CF-100 of Austrian production.



The restores followed the principle of absence of toning. For clearer visibility of colour scheme filling of various colours and contours with PBMA was used.

In the case of unification of cuts between the blocks, the mastic with usage of pigments was used.

Presently the large restoration work is close to its finish. Nine restorers have been working on it, with the assistance of research fellows, for more than 2 years. Despite many efforts, the elucidation of painted surface is hardly achieved. We have to remember that the painting has fragmentary preservation and remained in soil for more than a millennium. The painting undoubtedly has scholarly and artistic potential and can be exhibited in the museum.