

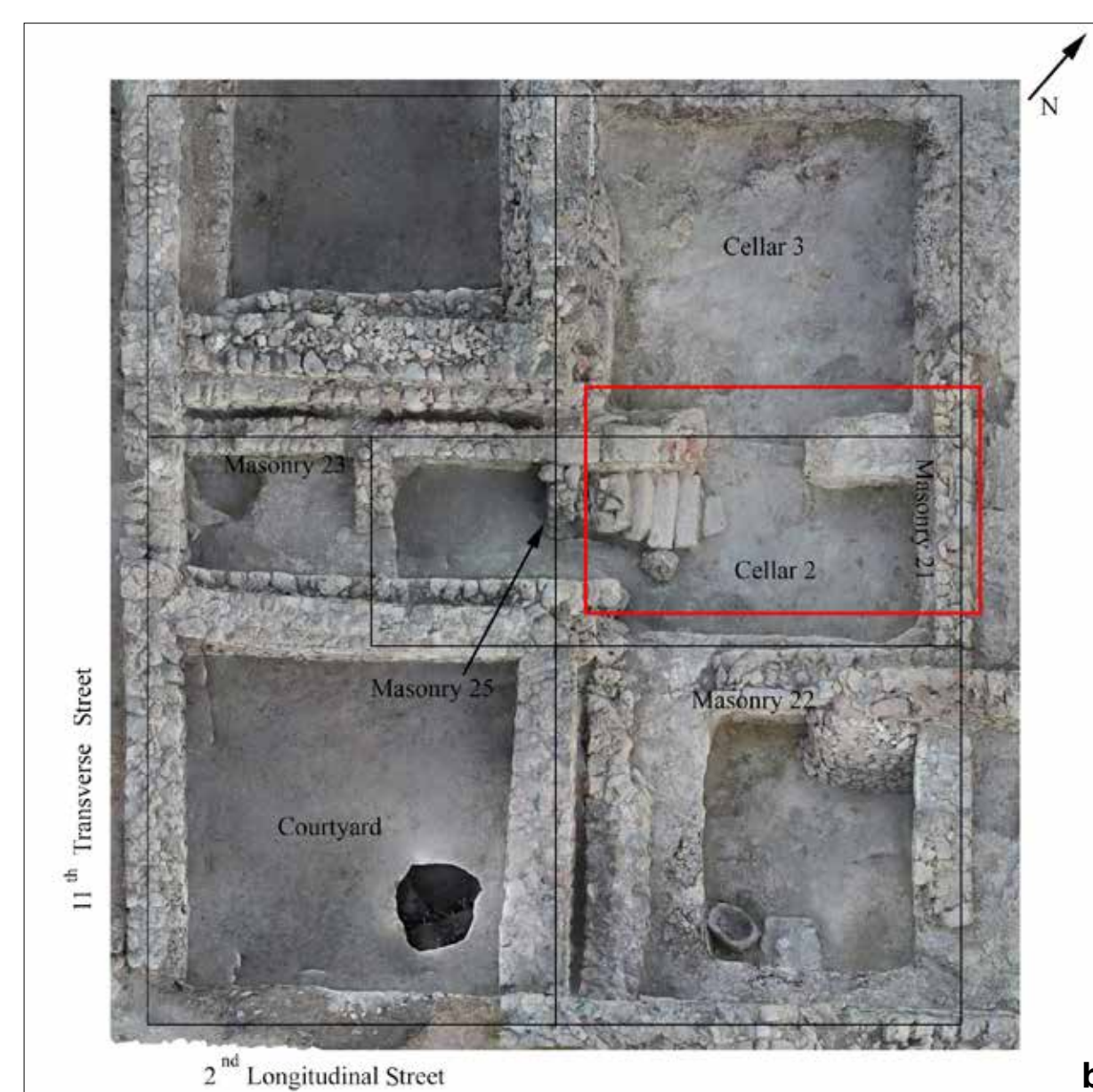
**PARETI DIPINTE
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The Masters of Decorative Mural Paintings from *Chersonesus Taurica*

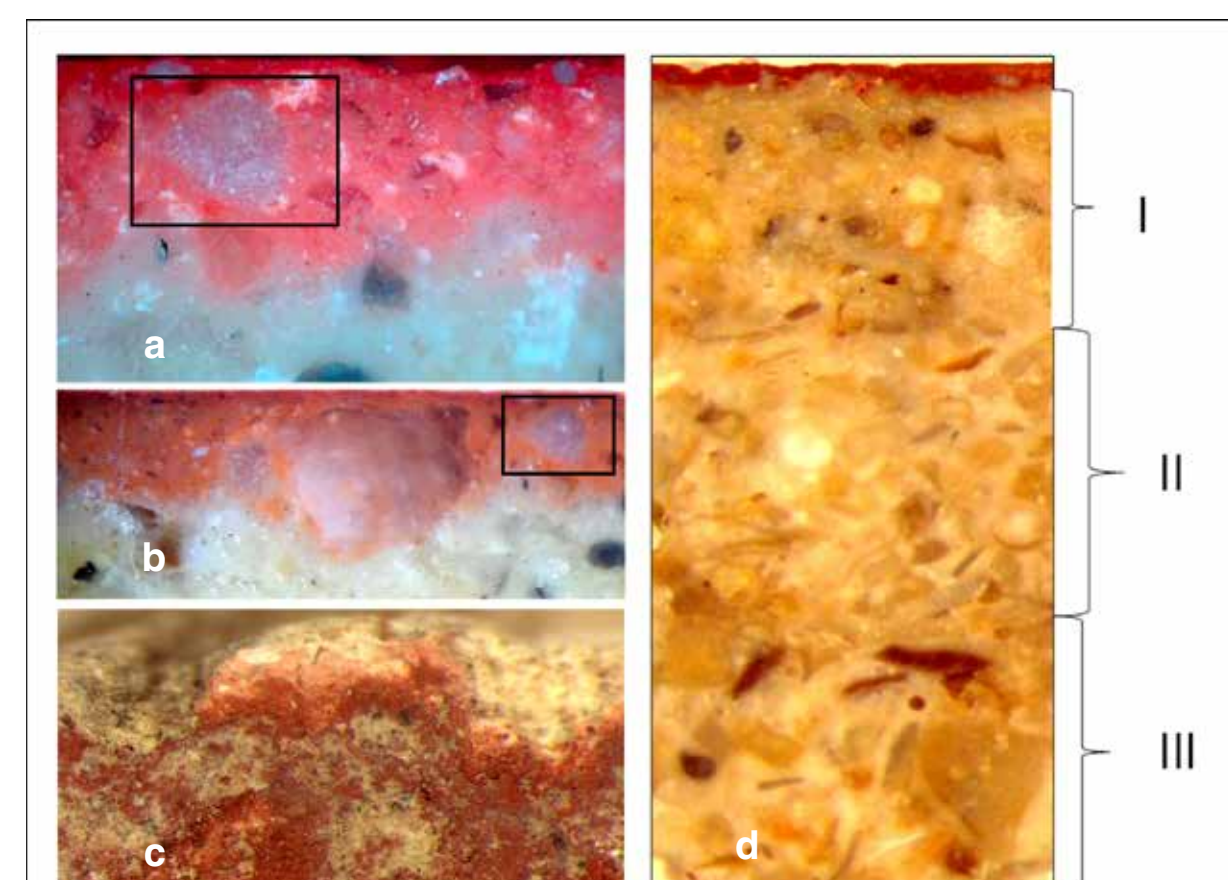


1. Location of the Greek colonies on the northern shore of the Black Sea, including *Chersonesus Taurica* (left).

2. (a) Location of the Arkhelaia's House and (b) its plan. Red line depicted the place where the fragments of fresco were discovered.



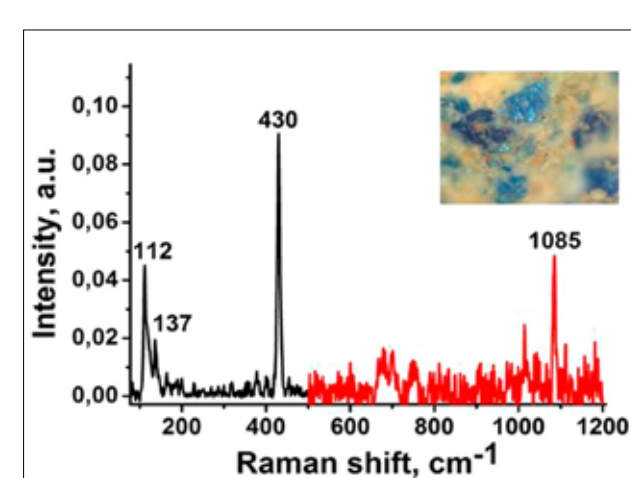
3. The fragments of the mural painting after the excavations and after the preliminary conservation.



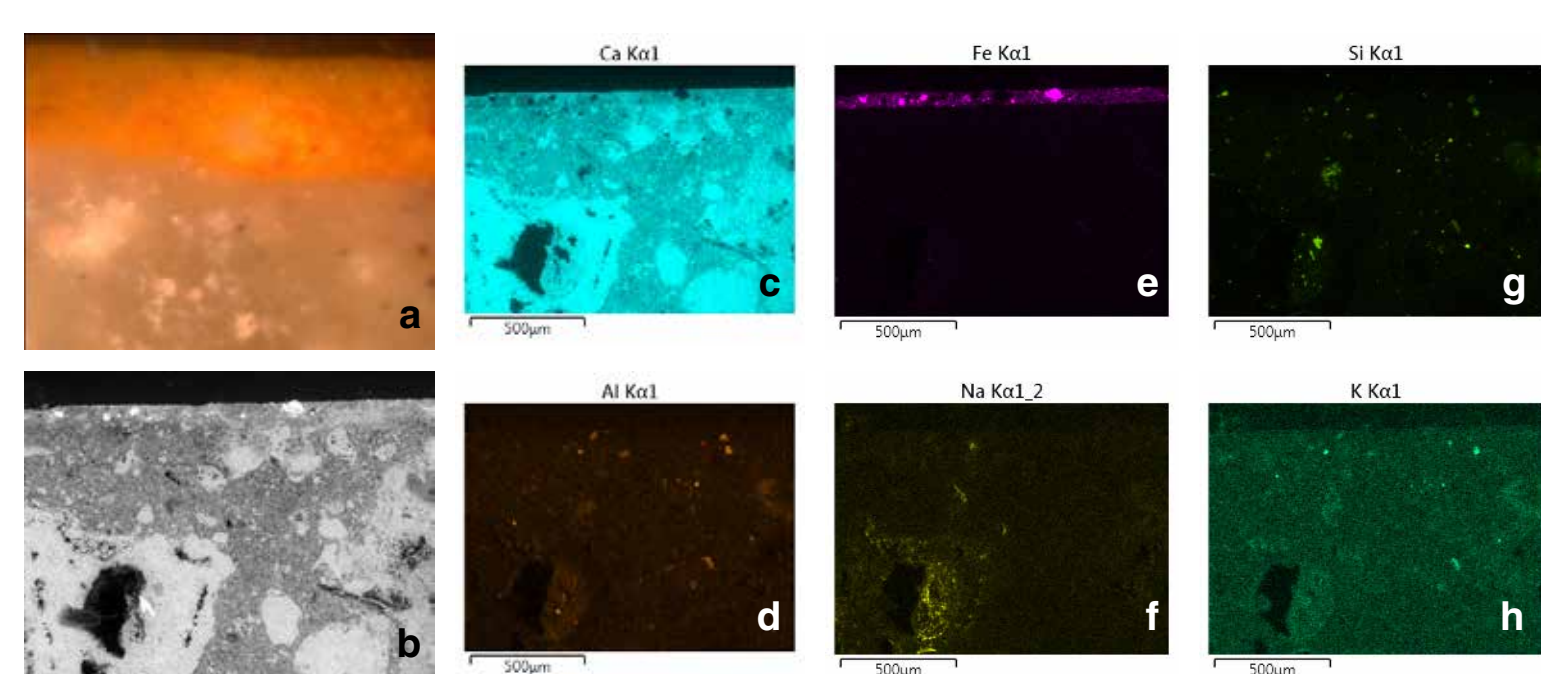
4. (a, b) Images of cross-section from a red colored fragment, (c) images of the fragment and (d) a fragment with a red paint layer and at least three plaster layers with different morphological characteristics (marked I, II, III).



5. (a) An example of schematic reconstruction of the mural painting and (b) a fragment of one of cornice types in the middle of the painting, (c) – fragments of gypsum ionic, probably from the upper part of the wall, (d) – fragment where the traces of the rope can be seen.



6. Raman spectra of the blue pigment.



7. (a) image of yellow colored cross-section (PL), (b) a BSE image of cross-section, (c-h) elemental mapping of the same cross-section

8. The mural found by G.D.Belov in 1974, after the restoration.

Introduction

Chersonesus Taurica was an ancient Greek colony in the Black Sea (fig. 1) and it was found in the 5th century BC. The excavations began here in the 19th century, however, only in 1974 the first discovery of a mural painting from Hellenistic period was made in Chersonesus by G. D. Belov. In 2016, during the archeological expedition of the State Hermitage Museum, more than 1,000 mural fragments of Hellenistic period were found out in one of the cellars of a house with the provisional name "the Arkhelaia's House". The primary aim of the present study was to classify the fragments in accordance with their morphology and properties, trying to make the reconstruction of the painting. The secondary aim was to determine the contents of paint layers and plasters of the fragments.

Archaeological context and samples

The Arkhelaia's House was located in the 20th district (on the corner of the 11th Transverse Street and the 2nd Longitudinal Street) of Chersonesus (fig. 2), outside the early berm of the territory which started to develop rapidly in the 4th century BC. Probably, the house was built in the second half of the 4th century BC and existed until the second half of the 2nd century AD. It should be noted that the house had a courtyard (fig. 3). The size of the house was about 11,4 x 12,6 m, the total area – 43,6 m². The fragments of the fresco were discovered in the cellar two (fig. 2). The preserved fragments of the mural painting were damaged and intermixed, covered with earth and mud. The size of the fragments differed from 1 to 15 cm. The fragments had various shapes, profiles, and colors of paint layers (fig. 3-4). Some of them imitated breccia, a rock composed of broken fragments of minerals. These fragments include upper layers with different colors (red, yellow, blue, black, and white) and partially preserved lower layers of plasters.

Preliminary classification and reconstruction

In 2018 the mural fragments were taken to work again. And the tasks were the following:

- to classify according to the color layer and profile, try to find the joints between the fragments and to connect small parts into bigger blocks,
 - to understand the composition of the mural and to make its reconstruction.
- After the preliminary visual observations the following categories are distinguished:
- with the traced lines from decorative quadres,
 - fragments with two different colors divided with a traced line (from different quadres).
- During the restoration work the joints have been found out, so the approximate size of the quadre is determined as 0,27 x 0,44m,
- fragments of two different types of cornices,
 - gypsum decorative parts,
 - the fragments are of different colors, some of them depict imitation of marble or breccia.

Using microscopy investigations and photos under UV-light it has been distinguished that the breccia imitation is a multi layered technique. Comparing the fragments, imitating breccias from the different houses of Chersonesus, it's possible to say that several groups of artists have been worked in the city. In one house the lines in breccia decoration are thin and vivid, in the other one are more thick and rough.

Red fragments are of two types:

- polished, looked like as covered with wax, the plaster from the backside is straight, from the quadres;
- seemed to be colored with glue paints, from the backside there are traces of straw and plants fiber, from the ceiling or upper part of the wall.

The preliminary reconstruction of the mural has been made (fig. 5 a). The length of the mural is determined 2,20 m – 5 quadres. The height is about 1 m. During the restoration work more than 40 joints of the fragments have been found out. So, small parts have been glued together into bigger blocks. Samples of Hellenistic murals from *Amphipolis*, *Delos* and *Pella* have been studied too. Bosphorian murals from *Panticapei* and *Nimphayon* are very rare.

The Investigation of Pigments

The investigation of pigments was held in the Scientific Department of the State Hermitage Museum. Multi-analytical techniques, including OM and PL, XRF, FTIR and Raman spectroscopy, SEM-EDX, LIF were applied.

The main components of a colored paint layers were calcium carbonate and kaolin. The bands of organic components were very weak.

The minerals and pigments, such as calcite, gypsum, kaolin, quartz, hematite, goethite, vermillion, Egyptian Blue (fig. 6), and pigments based on carbon were identified.

Plasters include several layers that differ in morphology and types of included particles (fig. 4 a-b). During the archeological excavations the samples of pigments were also found out.

Raman spectra of the blue pigment

The laser with 632.8 nm excitation to register Raman spectra of the pigment was used. So, the Raman spectra excitation wavelength was determined based on the LIF spectra and detector active pixel region control technique (fig. 6). Egyptian Blue was determined as a blue pigment. It is the first artificial pigment known from the ancient times.

SEM-EDX

The SEM-EDX analysis of a yellow colored fragment used to study the elemental composition of the sample layered structure. Earth pigments such as goethite (FeOH) was determined in yellow color layer.

Conclusion

It's necessary to notice that in 1974 during the excavations by G.D.Belov in the XXVIII district of *Chersonesus* polychromic plaster fragments were found out. Later it were conserved and mounted on a new basement by the restores of the State Hermitage Museum (fig. 8). But this work is still unpublished. The width of each row is about 0,15 m, the whole length is 1,5 m. But the fragments imitating breccia depicted with thicker lines than in Arkhelaia's house. So it's possible to suggest that there were several art groups in *Chersonesus*. Also in some other houses the fragments of red plaster were also found out.

The mural painting found in the Arkhelaia's House is a rare finding for the Hellenistic period. The main features of the founded mural paintings are: polychromic palette, detailed imitation of texture of breccia, different types of relief cornice, relatively large size as a whole (2.2 x 1 m), and the variety of the pigments.

In order to obtain representative results, it was crucial to apply various methods of investigation. In the nearest future, we intend to continue our investigation to define organic components used as binding media in the painting for more specific characterization of the techniques applied in the mural creation.