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Case study

Studying wall paintings in Berati Castle (Albania): Comparative examination of materials and techniques in XIVth and XVIth century churches

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Abstract

In this paper the study is focused on the continuation of the Byzantine wall painting iconography in Albania through the study of two characteristic churches of the 14th and 16th centuries situated in the Castle of Berati. The town of Berati has a long history that goes back to the Bronze Age, and the old castle, situated on top of a hill, has always been the nucleus of the town and is still inhabited. Several churches within the castle walls are decorated with beautiful wall paintings and icons, beautiful examples of Byzantine and post Byzantine art and architecture. The techniques used to analyze the samples were optical microscopy, TXRF, micro-FTIR and SEM-EDS. Similar materials were used in the construction of the wall paintings of both churches, marking a continuation in the Byzantine technology in the construction of wall paintings. The presence of calcium carbonate reveals the use of the fresco technique. Colors were rendered by the application of calcite, azurite, green earth, cinnabar, ochres and carbon black. Plaster was composed in all cases mainly of calcite with small amounts of silicates and organic fibers while there were characteristic differences between the plaster samples of the church of the 16th century in the presence of gypsum, originating to its use by the painter as a constituent element. All painted samples suffered from deterioration, identified even visually.

Keywords: Onoufrios; Albania; Byzantine wall paintings; Church; Fourier transform infrared spectroscopy; Total reflection X-ray fluorescence; 14th century; 16th century

1. Introduction

1.1. Historical

Albanians are an ethnic outcropping of the Illyrians, who inhabited the country for the first time in the 2nd millennium B.C. In the 2nd century B.C. Albania was conquered by Rome. After the division of the Roman Empire into two parts (eastern and western), the territories of modern Albania became part of the Eastern Roman Empire (Byzantine Empire). At 732 A.C. the entire Balkan Peninsula belonged religiously to the Eastern Church. However, by the end of the 11th century the Albanian territories were religiously divided. At that time the north Albanian territories fell under the influence of the Roman Catholic Church while the other part of the country continued under the Eastern Orthodox Church [1]. This situation still exists although during the Ottoman occupation part of the population in all the country was converted to Muslim religion.

The town of Berati is situated in central Albania. During the late Byzantine period Berati had been an important centre for the empire and often was governed by officials strongly

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related to the emperor himself. By the 14th century, Berati fell under the influence of the Serbian King Stefan Dushan and some years later turned under the dominion of the Musachi. In 1417 Berati was conquered by the Ottomans who held it until the beginning of the 20th century when Albania was proclaimed independent.

Several old churches that still exist within the castle are an indication of the cultural and artistic development of the city. They belong to the period from the 13th to 19th centuries. The most important school of Albanian iconographers, known as the 'Berati School', was created in Berati at the beginning of the 16th century. This school is related with the name of the famous painter Onoufrios from Neokastra (Onufri in Albanian language). Onoufrios is considered as one of the best icon painters of the whole Balkan region and the best painter that had ever worked in Albanian territory [2]. He managed to combine the local painting tradition with the best tradition of the eastern (Paleologian) and western (Italian) schools, resulting in a realistic and natural drawing.

1.2. The monuments

The first church, the church of Saint Trinity, is situated in the south-eastern part of the castle of Berati, within its surrounding walls. It is a single aisle basilica with narthex (7.5×12.5 m), built in the form of a Greek cross with dome, not later than the first half of 14th century [3]. This small but beautiful church reflects the features of Byzantine architecture and is one of the best-preserved monuments of this kind in Albania. The remaining fragments of the wall paintings indicate that the whole interior of the church had been decorated with beautiful wall paintings of an anonymous author. The wall paintings, being of the Byzantine style, are attributed to the period of construction of the church.

The second church, the church of Saint Theodori, is a single aisle chapel (9×3.6 m) with undecorated stone walls, low tiled timber roof and no architectural value compared to the church of St. Trinity. Although the foundations belong to an earlier period, the present church was built during the first half of the 16th century when the famous painter Onoufrios decorated it with wall paintings [2,4]. The work of Onoufrios is partly preserved on the eastern wall. Some wall painting fragments on the northern and southern walls indicate that part of the church would have been painted by an anonymous painter, whose work cannot be compared with the artistry of Onoufrios.

2. Experimental

2.1. Sampling

A total number of 30 samples were accumulated from the two churches. In the church of St. Trinity the samples were collected from the dome, while in that of St. Theodori all samples were collected from the eastern wall except two plaster samples collected from the north and south wall. A list of the samples is given in Table 1, where STR stands for St. Trinity and STH for St. Theodori.

Table 1
List of the samples

Color	St. Theodori	St. Trinity
White	STH 7-W, STH 16-W	STR5-W
Yellow	STH 3-Y, STH 13-Y	STR1-Y
Red	STH 15-R	STR3-R
Light red	STH 2-R	–
Dark red	STH 1-R, STH 10-R	–
Green	STH 8-G, STH 9-G	STR2-G
Dark green	–	STR6-G
Blue	STH 5-Bl, STH 12-Bl	–
Brown	STH 4-Br, STH 6-Br, STH 14-Br, STH 17-Br	STR7-Br
Black	STH 11-B	STR4-B
Plaster	STH 18-Pl (East wall, painted by Onoufrios), STH 1-Pl (North wall), STH 2-Pl (East WALL, painted by Onoufrios), STH 3-Pl (East wall), STH 4-Pl (South wall)	STR8-Pl

In each of the sampling points two types of samples were collected. The first one consisted of small pieces of pigment and plaster (about 5 mm^2), carefully chosen from areas with less iconographic value, these being the samples for Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy/energy-dispersive spectroscopy (SEM-EDS) and optical microscopy. From the same sampling points, pigment microsamples for total reflection X-ray fluorescence (TXRF) analysis were collected according to the method proposed by Klockenkamper et al. [5], these being the second type of samples.

2.2. Methodologies

Samples were examined by optical microscopy using an Olympus BX60M optical microscope equipped with an Olympus DP10 digital camera.

The TXRF analysis system is composed of a total reflection module (Vienna Atominstitut [6]) attached to a tube excitation system (Philips PW 1729 X-ray generator and PW 2215/20 Mo anode X-ray tube), an X-ray spectrometer (Canberra Si(Li) detector) and spectrum acquisition system (Canberra Mod 2024 fast spectroscopy amplifier, Mod 8076 ADC, Mod 3105 high voltage power supply and Genie 2000 MCA) together with quantification software (QAES package [7]). The substitution of the cut-off reflector by a tungsten/carbon multilayer monochromator (Osmic Inc., USA.) allowed us to achieve a spectrum with low background in the region 2–15 keV. During the measurements the generator was operated at 40 kV and 40 mA, the samples being measured for times varying from 200 to 1000 s.

FTIR spectra were obtained using a Perkin–Elmer FTIR microscope model i-series equipped with a nitrogen-cooled MCT detector, connected with a Perkin–Elmer FTIR spectrometer model Spectrum1000. For the FTIR measurements tiny species from the painted surface or from the substrate of the samples were removed with a sharp tip of a microscalpel and placed on a freshly prepared KBr pellet. The IR spectra, in transmittance mode, were obtained from different areas of the specimens with an aperture 20–100 μm in the MIR spectral region.