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# Microbiological Analysis of the Mummy of St. Marcian

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## ABSTRACT

*The paper provides the results of the microbiological analysis of samples taken from the mummified remains of St. Marcian. Microorganisms found belong to bacteria and fungi of the genera Aspergillus, Bacillus, Penicillium, Sarcina, and Shewanella which are all a part of the common air, soil, and human microbial flora and therefore present no health hazard.*

## Introduction

In 2010, the mummified remains presumed to be of St. Marcian, were given to the Croatian Conservation Institute for analysis. Allegedly, the remains were donated to the city of Rijeka, Croatia in 1662 by Pope Alexander VII. The relic was first stored in the Church of Saint Mary of Assumption, but later was moved to the Church of Saint Sebastian and Fabian, where it had been found in 2004. The body of St. Marcian was laid down in a sarcophagus measuring 41x56x147 cm. The sarcophagus is made of glass surrounded by a wooden frame (Figure 1) while the interior is covered in red cloth with silver lettering »Marcianus M«. St. Marcian's remains have been dressed in a ceremonial dress embroidered with gold-plated parts with a gold laurel wreath worn around the head. Semi-precious stones sewn into the textile highlight the impression of luxury. The gloves and shoes are also embroidered and decorated in a ceremonial fashion like the rest of the textile. Although a lot of questions about the relic arise, the first aim of the study of St. Marcian's remains was to attest the presence, if any, of pathogenic microbiological agents, such as bacteria and fungal moulds on the relic's exterior. The main research questions were to determine which, if any, pathogens

(e.g. bacteria and fungi) are present and on which parts of the body, if the pathogens still present danger for people, and are the microorganisms present on the body a part of the normal air flora. Depending on the results, we can proceed with a radiological study in the Department for Diagnostic and Interventional Radiology of the Dubrava University Hospital.



Fig. 1.

**TABLE 1**  
LIST OF SAMPLES TAKEN AND MICROORGANISMS FOUND

Area sampled	Microorganisms found
Swab of the fracture on the vertex of the cranium	sterile
Swab of the left eye orbit	<i>Bacillus</i> species <i>Shewanella putrefaciens</i>
Swab of the posterior side of the neck (head on the pillow)	<i>Bacillus</i> species <i>Penicillium</i> sp.
Swab of the fabric underneath the left palm	sterile
Swab of the fabric from the chest	<i>Sarcina</i> sp. <i>Bacillus</i> sp. <i>Aspergillus terreus</i>
Swab of the gaze beneath the colorful fabric (right knee)	sterile
Swab of the left shoe sole	<i>Bacillus</i> sp.
Swab of the red pillow near the left foot	<i>Bacillus</i> sp. <i>Penicillium</i> sp.

## Materials and Methods

The samples were taken (Table 1) from the head of St. Marcian, as well from the textile wrapped around the body, the pillow in the vicinity of the relic's left foot and the sole of the left shoe. Three swabs were taken from the body: one from the »fracture« at the cranial vertex, one from the left eye cavity and the last from the posterior side of the neck, while the relic's head was placed on a pillow. Five additional swabs were taken from the textile under the right palm and near the relic's chest, the gauze under the colorful textile (right knee), the sole of

the left shoe and the pillow near it. The microbiological study was done at Department for Microbiology and Hospital Infections at the University Hospital Dubrava and in the National Reference Laboratory for Systemic Mycoses of the Croatian National Institute of Public Health. Gathered samples were inoculated on four nutrient media: Blood agar bases supplemented with 5–10% sheep blood; Mac-Conkey agar; Brain Heart Infusion Agar with vitamin K and hemin for the enrichment of anaerobes and Sabouraud glucose agar with chloramphenicol for fungal isolation<sup>1</sup>. The media for bacterial and fungal isolation were incubated at different temperatures during several periods of time. The media for bacterial cultivation were incubated at 35°C in aerobic and anaerobic atmosphere through 7 days<sup>1,2</sup>. Isolation and identification of bacteria was carried out according to the routine microbiological protocol<sup>1,3</sup>. The media for fungal isolation were incubated at 27°C and 37°C in aerobic condition during 14 days<sup>1,4</sup>. Identification of fungal isolates was conducted according to their macro and micro morphological characteristics<sup>4</sup>.

## Results and Conclusion

The results of the analysis show that the microorganisms found on the remains of St. Marcian are mostly saprophytic and belong to bacteria and filamentous fungi – moulds. The microorganisms were found more or less evenly distributed on the body. Five genera are present: *Aspergillus*, *Bacillus*, *Penicillium*, *Sarcina*, and *Shewanella* (Table 1). It is interesting to note that similar microorganisms were found on the Ancient Egyptian mummified body, described by Čavka et al.<sup>5</sup>. All isolated species of microorganisms are ubiquitous in nature and can be found in soil, air, and/or are also part of normal human microbial flora, and therefore present no health hazard.

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## MIKROBIOLOŠKA ANALIZA MUMIJE SV. MARCIJANA

## SAŽETAK

U radu su izneseni rezultati mikrobiološke analize uzoraka uzetih s mumificiranih ostataka Sv. Marcijana. Mikroorganizmi prisutni pripadaju bakterijama i gljivicama rodova *Aspergillus*, *Bacillus*, *Penicillium*, *Sarcina* i *Shewanella* koji pripadaju uobičajenoj flori zemlje, zraka i čovjeka te ne predstavljaju opasnost po zdravlje.