CHARACTERIZATION OF YEAST-LIKE STRAINS ISOLATED FROM DETERIORATED AREAS OF TWO MARBLE STATUES

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One of the most common cause of blackening on artistic marbles and limestones is their colonization by the so-called dematiaceous fungi, a group of darkly pigmented fungi including black yeasts, meristematic and microcolonial fungi. These microorganisms share common growth and morphological features, even if they can be phylogenetically distant. In many cases they form cauliflower-like microcolonies on and in rocks incrusted with melanins deposited in their cell wall, giving them a dark, blackish brown appearance. Some authors consider them the most harmful microorganisms for stones. The cause of damage seems due to a physical attack with cracks and fissures formation rather than to chemical dissolution of minerals.

Here we report a blackening biodeterioration case of two very valuable marble statues outdoor exposed in Piazza della Signoria, Firenze (Italy): the “Ratto delle Sabine” realized in 1583 by Giambologna and the “Copia del David” realized in 1910 by Luigi Arighetti. Both statues showed dark-grey spots widespread in some areas of their surface. From the superficial marble particulate sampled in different times from the deteriorated areas, three black fungal strains were isolated called M4 (from the “Ratto delle Sabine”), D1 and D3 (from the “Copia del David”). Their growth and morphological characteristics were very similar; microscopical analysis showed in each case a yeast-like morphology and colony morphology resembled that of microcolonies observed by ESEM in the sampled marble. Moreover, two pink-red yeasts called RS (from the “Ratto delle Sabine”) and D (from the “Copia del David”) grew from the marble particulate as colonies strictly close to those of black fungi. All the isolated strains were characterized by molecular methods based on small subunit and internal transcribed spacer regions of rDNA. To better investigate the phylogenetic relationship among black as well as red yeasts, they were also characterized by AFLP analysis.