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Unveiling Microbiota within the Rocaille-Adorned Garden Grotto at Condes de Basto Palace, Évora, Portugal

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Biodeterioration of Cultural Heritage is the consequence of interactions between living organisms, material support and environmental conditions. In stone materials, deterioration by fungi is mainly the result of mechanical, chemical, and physical processes, consisting essentially of penetration of hyphae, production of fruiting bodies, production and release of destructive extracellular organic acids, enzymes, and metabolites, as well as the development of biofilms and chemical reactions with inorganic compounds.

Eugénio de Almeida Foundation's Casa de Fresco is a heritage site of inestimable historic-artistic value that exhibits developments of biofilms due to growth of microorganisms in the stone and in the rocaille materials. The biodeterioration noticeable in this local were investigated within the scope of the Conservation and Restoration Project. Through advanced high-throughput DNA analysis, we successfully characterized the microbial population inhabiting the site. Our findings revealed the presence of various lichens or lichenized fungi, including genera like *Variospora*, *Verrucaria*, *Circinaria*, *Caloplaca*, among others. Additionally, we also identified some bacteria associated with the presence of these lichens. To address this microbiological challenge effectively and prevent rapid fungal recolonization, we tested commercial antimicrobial agents. Thus, the ongoing action is precisely aimed at ensuring the conservation of Casa de Fresco as an architectural, decorative, and functional element essential to the harmonization of the entire set formed by the garden. This work will be an opportunity to deepen knowledge about the historical, symbolic, and material dimension of this heritage.

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