

Bacteria cause old buildings to feel off-color

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The assumption that time, weather, and pollution are what cause buildings to decline is only partly true. Bacteria are also responsible for the ageing of buildings and monuments – a process known as biodeterioration, where organisms change the properties of materials through their vital activities. Leonila Laiz from the Institute for Natural Resources and Agrobiology in Seville, Spain, and colleagues have just isolated five new strains of bacteria that degrade old buildings. Their work¹ is published online this week in Springer's journal *Naturwissenschaften*.

Over the last decade, both microbiologists and conservators have been studying the microbial colonization and biodeterioration of both mural paintings in ancient monuments and plaster walls in churches. A specific family of bacteria, *Rubrobacter*, is commonly found in aged monuments and is thought to be responsible for their rosy discoloration. Until now, only three *Rubrobacter* species have been identified, and they all thrive in high temperatures of 45 to 80 degrees Celsius (thermophilic bacteria).

Laiz and her team studied three indoor sites showing overt biodeterioration: the Servilia and Postumio tombs in the Roman Necropolis of Carmona in Spain and the Vilar de Frades church in Portugal. Their microbiological and molecular analyses identified five new *Rubrobacter* strains. The strains are partly involved in the process of efflorescence formation, where salt residues form on buildings, due to the loss of water after exposure to air for a prolonged period of time. Efflorescences lead to damage in the porous structure of the rocks and the gradual deterioration of these buildings.

Two of the newly isolated strains were then grown onto rocks to replicate the biodeterioration process in the laboratory. The *Rubrobacter* cells penetrated the mineral matrix and crystals formed in contact with the bacterial film. When the film separated from the rock surface after exposure to heat, it removed mineral grains, producing a mechanical deterioration. These three processes are characteristic of biodeterioration and confirm that the isolated bacteria are actively involved in the ageing of the studied buildings.

This study of new *Rubrobacter* that thrive at lower temperatures (non-thermophilic bacteria) gives another insight into the physiology and activity of these bacteria present in monuments.

Citation: Laiz L et al (2008). Isolation of five *Rubrobacter* strains from biodeteriorated monuments. *Naturwissenschaften* DOI 10.1007/s00114-008-0452-2

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