A comparison of the internal and external biogeological structure of rusticles from the RMS Titanic

Jim McCarron[1], Henrietta Mann[2], and Frank Thomas[3]
[1]*Department of Biology, Dalhousie University, Halifax, Nova Scotia B3H 3J5, Canada*
[2]*Department of Biological Engineering, DalTech, Dalhousie University, Halifax, Nova Scotia B3J 2X4, Canada*
[3]*Geological Survey of Canada (Atlantic), Bedford Institute of Oceanography, P.O. Box 1006, Dartmouth, Nova Scotia B2Y 4A2, Canada*

Few natural sources of iron occur in the deep ocean. Shipwrecks deposited in this environment introduce massive amounts of processed iron and iron derivatives unnatural to the deep ocean, providing a new source of nutrients. As a result, microorganisms normally present in low concentrations are provided with a new iron-rich environment in which they can flourish, thereby creating a unique ecosystem.

Studies show that both biological and mineralogical activities play a major role in the corrosive process that forms this unique ecosystem. Micro-organisms precipitate iron-rich minerals, which form the brittle skeleton of stalactite-like structures termed 'rusticles'. The skeleton supports the newly formed structures, preventing them from washing away in local currents. After more than 70 years of uninterrupted growth, rusticles now cover the hull of the *RMS Titanic*.

Little is known about the structure of rusticles or about the microorganisms involved in their formation. The internal and external surfaces of rusticles differ in their morphology and mineralogy, suggesting that different bacteria and/or physical-chemical conditions prevailed during their formation. It is believed that more than 20 different species of microorganisms can be found in these structures.