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THE EFFECT OF BIOLOGICAL ACTIVITY ON ARCHAEOLOGICAL MARBLES IN MARINE ENVIRONMENT

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This contribution is focused on the study of alteration and degradation forms on archaeological marble fragments recovered from the Roman underwater archaeological park of Baia (Naples). This park includes ruins of the ancient city of *Baiae*, which, since the 4th century AD, started to be submerged due to the bradyseism phenomenon [1].
Diagnostic investigations were carried on 50 specimens, collected from covering slabs of different pavements of a specific area of the submerged site called *Villa con ingresso a protiro.* Several techniques including stereomicroscopy, transmitted light optical microscopy, scanning electron microscopy and Fourier transform infrared spectroscopy were employed to study the superficial weathering, bioerosion phenomena due to the action of marine organisms (Fig.1-2), interactions with the marble substrate and textural and structural features.
All these methods provide a set of diagnostic parameters that allow understanding the biodeterioration processes of submerged carbonatic artifacts [2, 3]. Marble samples revealed an intense bioerosion phenomenon, mainly attributable to endolithic forms, capable of excavating cavities and tunnels causing irreversible damage to the archaeological materials. In particular the main causes of decay are related to the action of boring sponges [4] and bivalves [4, 5]. In addition, very thick encrustations due to epilithic species such as barnacles, bryozoa, algae and serpulids have been detected. The latter colonize the material surface spoiling and leading an aesthetic damage. After microscopic investigations, the abundance of different organisms and degradation were evaluated by means of explanatory diagrams (Fig.3). They summarize the relationship among organisms and damage produced on surfaces and within stone material.

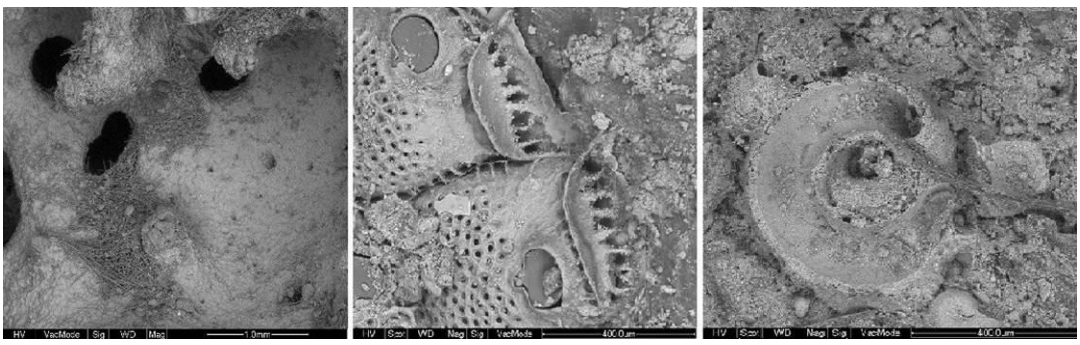

Fig. 1. SEM images of biological colonisation on archaeological samples

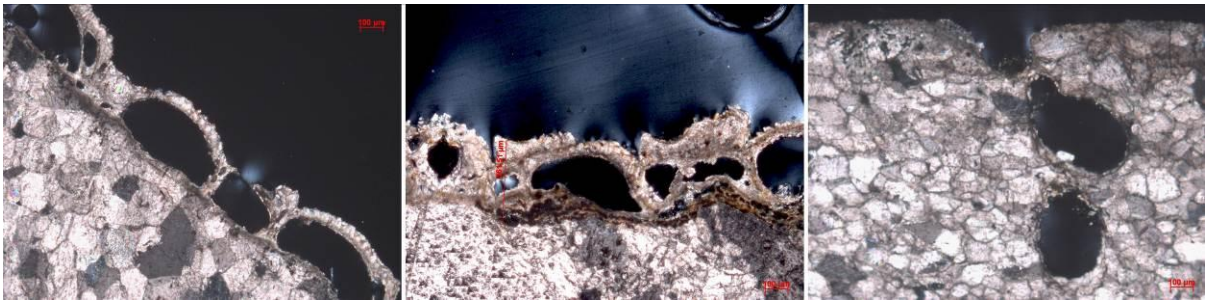

Fig. 2. Photomicrographs of superficial encrustations and bioerosion phenomena

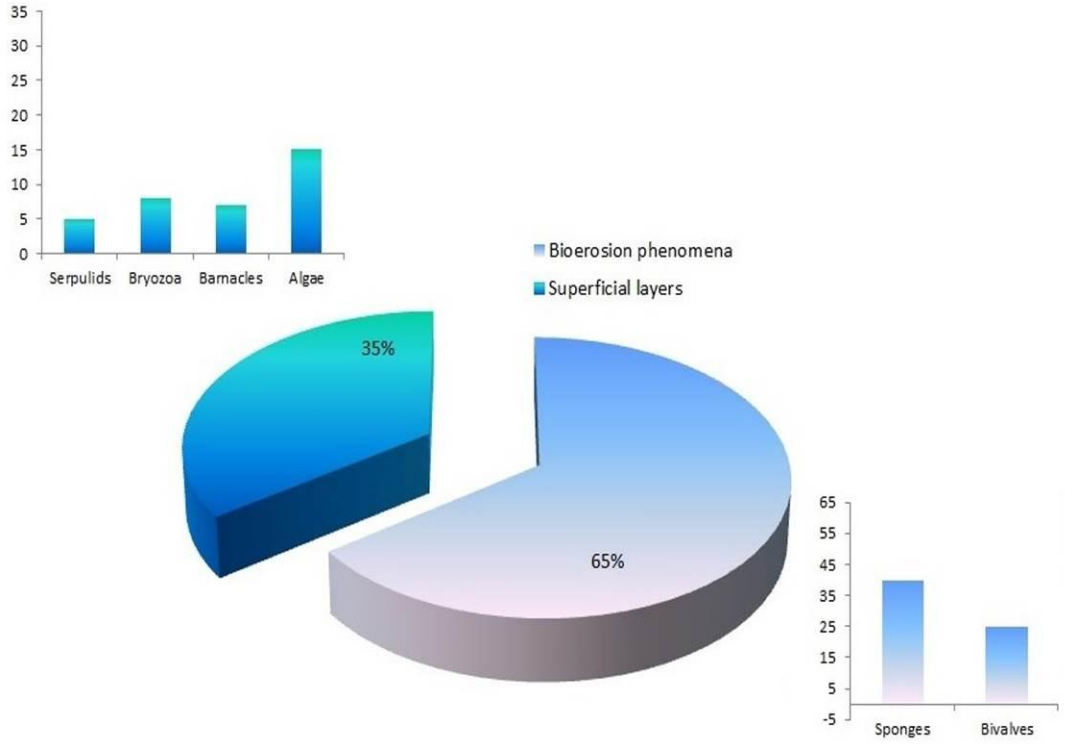

Fig. 3. Explanatory diagrams. The abundance of different organisms and degradation forms

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