International Master Degree in

Science for the Conservation - Restoration of Cultural Heritage

CAMPUS DI RAVENNA

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http://corsi.unibo.it/scienceforconservation/Pages/default.aspx

ORGANISATION OF THE COURSE

BIOLOGY FOR BIOARCHAEOLOGICAL MATERIALS AND CULTURAL HERITAGE

Module 1 + LABORATORY:
Study of archeological bones reconstruct the anthropological characteristics, life conditions and health of individual specimens and ancient populations.

Module 2+ LABORATORY:
Radiocarbon of archeological

Module 3+ LABORATORY:
Biological degradation of natural and artificial stones, techniques suitable to prevent and to eradicate the biological growth on stones

BASIC KNOWLEDGES TAKEN FOR GRANTED

MAIN PRINCIPLES OF BIOLOGY

- Cells
- Types of organisms (autotrophic, eterotrophic, photothrophic)
- Definition of tissues and organs
- Classifications

BIOLOGY FOR BIOARCHAEOLOGICAL MATERIALS AND CULTURAL HERITAGE

Biodeterioration of stone materials and control methods of the biodeteriogens+LABORATORY

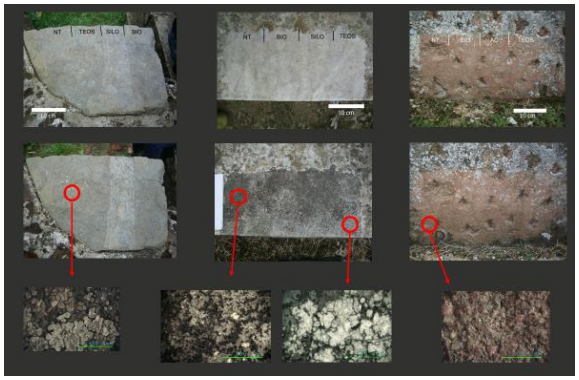
Limiting factors of biological growth
Bacteria (cyanobacteria, heterotrophic bacteria, actinomycetes)
Algae
Fungi
Lichens
Bryophytes
Vascular plants
Mechanical and chemical processes of degradation caused by biodeteriogens
Prevention and devitatization of biological growth

Innovative substances to prevent the recolonization of cleaned stone monuments

Archaeological area of Fiesole, Firenze

After cleaning of some areas, innovative products containing Cu nanoparticles were applied

Product	Consolidant/water repellent	Biocide
Bioestel	Ethylsilicate	Tributhyltin oxide
Silo 111 + nanoCu	Polyxiloxane	Cu nanoparticles
Acrilico 30 + nanoCu	Paraloid B72	Cu nanoparticles
Estel 1000 + nanoCu	Ethylsilicate	Cu nanoparticles



One year after the application

Eight years after the application

The 8-year-long study showed that the recolonization of sandstone, marble and plaster after the treatments related mainly to their bioreceptivity and to the climatic conditions. Marble showed the highest bioreceptivity. Copper nanoparticles proved to be a suitable alternative to traditional biocides because they did not alter stones colour and contributed to the prevention of recolonization.