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INIFTA

## Microscopic aggressors

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CONICET researchers and a group of experts preserve funerary moments from the attacks of microbial agents at the Recoleta Cemetery in the city of Buenos Aires.

Some remarkable sculptures such as José C. Paz's and Rufina Cambaceres' have worn away, modified their colour and suffered different damages on the surface of the rocks. These damages were caused not only by the passing of time but also by the constant action of some microorganisms.

In terms of biodeterioration, it is important to recognise the characteristics of the substrate in which the biofilm attaches to. The organisms that develop in an organic substrate are different from those that grow in an inorganic one.

Patricia Guiamet, independent investigator from CONICET who works at the Institute of Theoretical and Applied Physicochemical Investigations (INIFTA, UNLP-CONICET), is working with a multidisciplinary team with the objective of preventing these microbial agents from continuing with the degradation of the monuments.

"The Microalgae intervention is destroying the rock and modifying the appearance of the sculpture. Restorers need to be very careful when selecting the cleaning product because it can alter the material with which the work was made and alter the message of the artist. That is the reason why the researcher and experts from different areas are working on this study" Guiamet explains.

Although the sculptures of Rufina Cambaceres and José Camilo Paz are made of the same material, white marble, the exhibition space of the sculptures should be taken into consideration. This is what Miguel Crespo, a restorer from the Conservation and Restoration Programme of the Monuments and Works of Art at the Recoleta Cemetery (DGPelH – GCBA), states.

"The percentages of microorganisms' proliferation that attack the sculptures vary according to the place where the monuments are placed. One is located near an Araucaria grove, and the other is exposed to direct sunlight", Crespo informs.

For the restoration of the sculptures, restorers used an inorganic chemical product called Benzalkonium Chloride which is harmless for the material used in these kinds of monuments, if used in controlled solutions.

In the study published by the scientific magazine *Colloids and Surfaces B: Biointerfaces*, investigators affirm that it is very difficult to eradicate complex microbial communities. Thus, it turns even more complex if the outdoor exposure is considered. However, from the application of the product, the biologic activity decreased.

For Crespo, the main difficulty of working with outdoor monuments is that the proliferation of microorganisms is constant “and that is the reason why a multidisciplinary team works with subsequent and cyclic monitoring”.

The bacteria that attack the sculptures and produce a sort of biofilm are microscopic and only become visible when other macro organisms such as lichen, mosses and fungus intervene. Nevertheless, Guiamet explains that the beginning of the damage to the sculpture begins with the bacterial activity.

## Acerca del CONICET

### **Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET)**

Con 55 años de existencia, el CONICET trabaja junto al Ministerio de Ciencia, Tecnología e Innovación Productiva de la Nación en la transferencia de conocimientos y de tecnología a los diferentes actores que componen la sociedad y que se expresan en ella.

Su presencia nacional se materializa en:

**Presupuesto:** con un crecimiento de 12 veces para el período 2003 - 2013, pasó de \$236.000.000 a \$2.889.000.000.

**Obras:** el Plan de Obras para la Ciencia y la Tecnología contempla la construcción de 90 mil m<sup>2</sup> en nuevos institutos, laboratorios y la modernización de instalaciones en diferentes puntos del país.

**Crecimiento:** en poco más de 5 años se duplicó el número de investigadores y cuadruplicó el de becarios, con una marcada mejoría de los estipendios de las becas y los niveles salariales del personal científico y técnico, en sus diferentes categorías.

**Carrera de Investigador:** actualmente cuenta con 7.485 investigadores, donde el 49% son mujeres y el 51% hombres. Este crecimiento favoreció el retorno de científicos argentinos radicados en el exterior.

**Becas:** se pasó de 2.378 becarios, en 2003, a 9.076 en 2012. El 80% del Programa de Formación se destina a financiar becas de postgrado para la obtención de doctorados en todas las disciplinas. El 20% restante a fortalecer la capacidad de investigación de jóvenes doctores con becas post-doctorales, que experimentó un crecimiento del 500% en la última década.

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