Sociedad Argentina de Microbiología General

XIX CONGRESO DE LA SOCIEDAD ARGENTINA DE MICROBIOLOGÍA GENERAL

22 al 25 de octubre del 2024
Centro cultural y Pabellón Argentina de la Universidad Nacional de Córdoba, Córdoba, ARGENTINA.

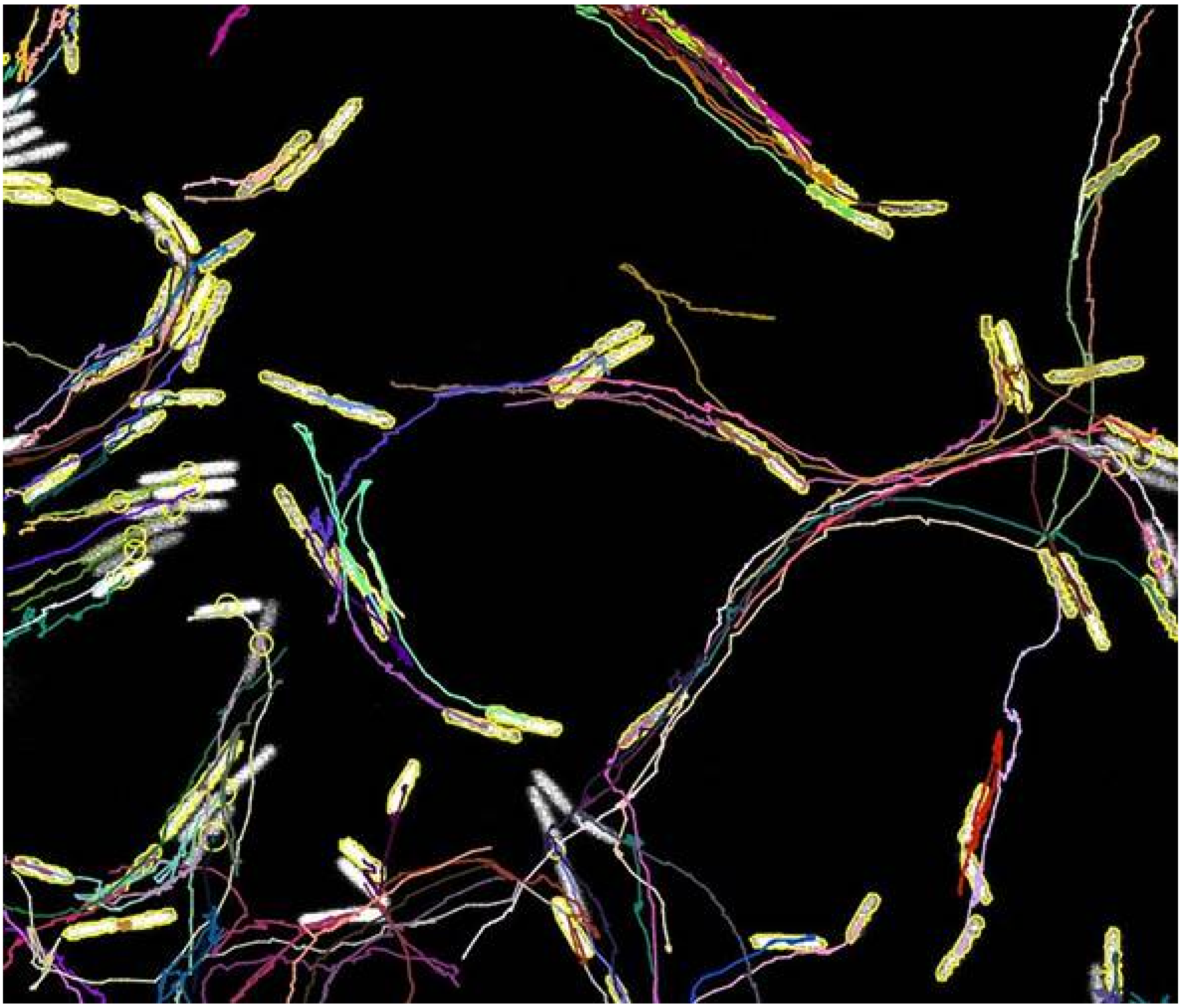

Foto: Se hace camino al andar. Celeste Dea. 1er puesto. Concurso fotográfico SAMIGE 20 años.

CHARACTERIZATION OF POLYHYDROXYBUTYRATE PRODUCTION FROM MICROORGANISMS ISOLATED FROM ANTARCTIC LAKES

Crucianelli, Agustina [1,2] - Filippini, Edith [2] - Casaux, Josefina [1,2] -Domig, Natalia [1,2] - García, María Gabriela [3] - Mlewski, Estela Cecilia [1,2]

1) Instituto Multidisciplinario de Biología Vegetal (IMBIV-CONICET-UNC) - Córdoba Capital - Córdoba - Argentina
2) Centro de Ecología y Recursos Naturales Renovables “Dr. Ricardo Luti”- UNC - Córdoba Capital - Córdoba - Argentina
3) Centro de Investigaciones en Ciencias de la Tierra - (CICTERRA-CONICET-Ciencias Exactas Físicas y Naturales-UNC) - Córdoba Capital - Córdoba - Argentina
Contacto: agustina.crucianelli@mi.unc.edu.ar

Conventional plastics are almost entirely derived from fossil fuels, prompting significant efforts to develop biopolymers. In this context, poly-?-hydroxybutyrate (PHB) is a widely distributed intracellular storage compound found in prokaryotic organisms. The properties of PHB suggest it could serve as an attractive alternative to traditional plastics. When nutrients are limited, some microorganisms, such as *Synechococcus* and *Chlorella*, produce intracellular storage products like PHB, which can be extracted and converted into biofuels or biopolymers. It is hypothesized that PHB functions as an additional carbon and energy storage mechanism, helping microorganisms survive environmental stress. However, its exact physiological role remains unclear. In cyanobacteria, PHB metabolism is most notably observed during nitrogen deprivation, which triggers a process called chlorosis. When nitrogen deficiency persists, cells degrade most cellular proteins and the photosynthetic apparatus until reaching a final chlorotic stage. At this point, cells maintain a residual level of photosynthesis, allowing them to remain viable for at least six months. Leveraging the extreme conditions of Antarctica, this study aimed to evaluate the formation, characterization, and quantification of PHB under various stress conditions, including nitrogen and phosphorus deficiency and light exposure. Seven cyanobacterial strains and two green algae were isolated from microbial mats in Antarctica. For this experiment, we selected one green alga (*Chlorella*-like) and one cyanobacterium (*Phormidium lumbricale*-like). Using various microscopic techniques and dye staining, we observed a significant production of PHB granules under conditions of nitrogen and phosphorus starvation with no light, compared to other treatments. Additionally, cyanobacteria were the primary producers of PHB compared to green algae. Understanding the formation and production of PHB is crucial for advancing the development of new, sustainable, and carbon-negative technologies.

Palabras clave: Cyanobacteria, green algae, Bioplastic, PHA, microbial mats