

Farming Nitrifiers: Main factors and parameters for maintaining a healthy cultures

Mayte Tamés-Espinosa¹, Eduardo Bru¹, Leopoldo O'Shanahan², May Gómez¹, Ted Packard¹

¹*Plankton Ecophysiology Group, Instituto de Oceanografía y Cambio Global. Universidad de Las Palmas de Gran Canaria 35017, Spain*

²*Instituto Canario de Ciencias Marinas. Gobierno de Canarias. Spain*

Abstract

CO₂ in the ocean is rising due to the increase of atmospheric CO₂ levels. Its greenhouse effect is partially mitigated by terrestrial (plants) and marine (algae, phytoplankton) photosynthetic organisms, but also by the less-known chemosynthetic bacteria.

Within this group, nitrifiers have a direct and indirect impact in carbon fixation because, on one hand, they are autotrophs fixing CO₂ with the enzyme RUBISCO, while on the other hand, they release nitrogen oxides that support the growth of photoautotrophs.

A new assay which simplifies the quantification of this unique process would improve our knowledge about the CO₂-sequestering capacity of the ocean. Knowing the way to cultivate them from marine water samples provides an excellent base for the development of this new technique.

During six months, we have researched the isolation process of this microbial community from Canary urban-coastal-marine waters. We discovered a way to attain high abundances and high biomasses of nitrifiers which, in turn, fostered the development of new metabolic assays that we are using to improve our knowledge of this special microbial nitrifying community. Now, these cultures are useful as the experimental base for new laboratory investigations focused on understanding the nitrifier's role in the shifting metabolic state of the ocean. We have identified the main factors that affect these nitrifying cultures, and which parameters are the best indicators of the microbes' health.

References

Bollmann, A., French, E., & Laanbroek, H. J. (2011): "Isolation, cultivation, and characterization of ammonia-oxidizing bacteria and archaea adapted to low ammonium concentrations." *Methods in Enzymology*, 486, 55.