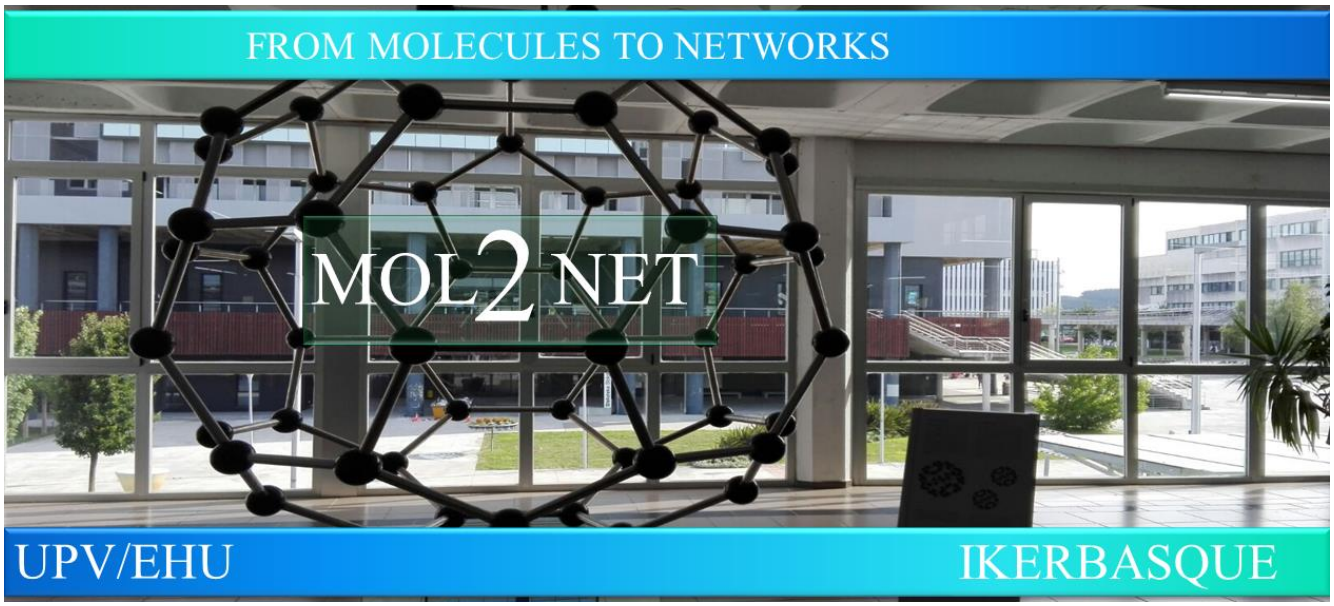
MDPI sciforum

MOL2NET'21, Conference on Molecular, Biomedical & Computational Sciences and Engineering, 7th ed.



Bioremediation potential of glyphosate-degrading microorganisms in eutrophicated Ecuadorian water bodies

Fernanda Hernández [a,c], Gabriela Oñate [c], María Isabel Ballesteros [b], Pablo Castillejo [a,c].

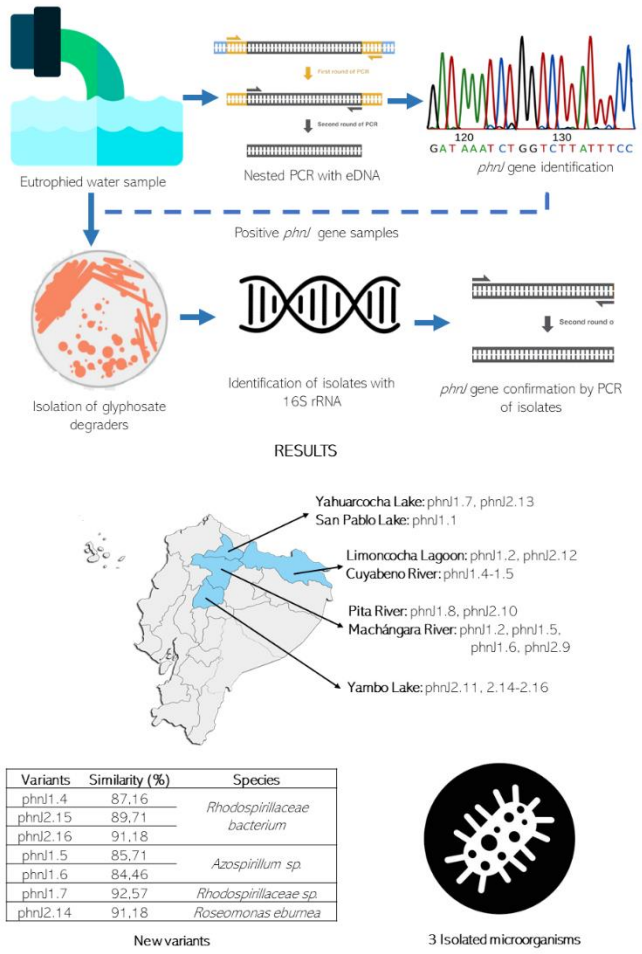
[a] Grupo de Investigación en Biodiversidad, Medio Ambiente y Salud (BIOMAS), Universidad de las Américas, Quito, Ecuador

[b] Departamento de Genética, Fisiología y Microbiología, Facultad de Biología, Universidad Complutense de Madrid, 28040 Madrid, Spain

[c] Universidad de las Américas, Facultad de Ingenierías y Ciencias Aplicadas, Quito, Ecuador

.
.
.

Graphical Abstract	**Abstract**
	Phosphonate compounds are the basis of many xenobiotic pollutants, such as Glyphosate (N-(phosphonomethyl-glycine). Only procaryotic microorganisms and the lower eukaryotes are capable of phosphonate biodegradation through C–P lyase pathways. Thus, the aim of this study was to determine the presence of C–P lyase



genes in Ecuadorian freshwater systems as a first step towards assessing the presence of putative glyphosate degraders. To that end, two Nested PCR assays were designed to target the gene that codifies for the subunit J (*phnJ*), which breaks the C-P bond that is critical for glyphosate mineralization. The assays designed in this study led to the detection of *phnJ* genes in 7 out of 8 tested water bodies. The amplified fragments presented 85–100% sequence similarity with *phnJ* genes that belong to glyphosate-degrading microorganisms. Nine sequences were not reported previously in the GenBank. The presence of phosphonate degraders was confirmed by isolating three strains able to grow using glyphosate as a unique carbon source. According to the 16S sequence, these strains belong to the *Pantoea*, *Pseudomonas*, and *Klebsiella* genera. Performing a Nested PCR amplification of *phnJ* genes isolated from eutrophicated water bodies, prior to isolation, may be a cost-effective strategy for the bioprospection of new species and/or genes that might have new properties for biotech industries, laying the groundwork for additional research.

References

- Hernández-Alomia, F., Ballesteros, I., & Castillejo, P. (2021). Bioremediation potential of glyphosate-degrading microorganisms in eutrophicated Ecuadorian water bodies. Saudi Journal of Biological Sciences. https://doi.org/10.1016/j.sjbs.2021.11.013