

Poster 48

Metal selective pressure in the modulation of the microbial community in sediments from transitional ecosystems

E. Almeida^{1,2,*}, **R. Torre**^{2,3,4}, **O. Godinho**^{1,2}, **M. Noyer**⁵, **C. Cravo-Laureau**⁵, **R. Duran**⁵,
S. C. Antunes^{1,2}, **J. Catita**^{3,6} and **O. M. Lage**^{1,2}

¹ Departamento de Biologia, Faculdade de Ciências da Universidade do Porto, Rua do Campo Alegre 1021/1055, 4169-007 Porto, Portugal

² Centro Interdisciplinar de Investigação Marinha e Ambiental (CIIMAR/CIMAR), Terminal de Cruzeiros do Porto de Leixões, Avenida General Norton de Matos s/n, 4450-208 Matosinhos, Portugal

³ Paralab, SA, R. Dr. Joaquim Manuel Costa 946 B, 4420-43, Valbom, Portugal

⁴ ICBAS - Instituto de Ciências Biomédicas Abel Salazar, Universidade do Porto, Rua Jorge de Viterbo Ferreira 228, 4050-313 Porto, Portugal

⁵ Université de Pau et des Pays de l'Adour, E2S UPPA, CNRS, IPREM, Bât. IBEAS, BP1155, 64013 PAU cedex, France

⁶ FP-I3ID, FP-ENAS/CEBIMED, and Faculty of Health Sciences - UFP, Praça de 9 de Abril 349, 4249-004 Porto, Portugal

* Correspondence: eduardamarqalmeida@gmail.com

Abstract

Background: Microorganisms in sediments of estuarine ecosystems play key roles in the biogeochemical cycles [1]. These communities, essential for maintaining the ecosystems quality, are affected by natural and anthropogenic factors, such as metals, affecting the ecosystems health [2]. **Objectives:** This work aims to understand the effect/impact of metals on brackish sediment microbial community in a mesocosm experiment. **Methods:** Corers with sediment samples were collected from the Reserva Natural Local do Estuário do Douro. These sediments, already characterized with low levels of metals, were incubated in tanks with water collected from the same site (sediments control), and another set of sediments were incubated in higher levels of copper, lead, zinc and arsenic. The sediments in the tanks were incubated under natural conditions (light and temperature), with aeration and monitored for 30 days. **Results:** At time 0 of the experiment, the sediment bacterial and the archaeal communities were similar in both control and metal sediments samples. After 30 days, a significant decrease of alpha-diversity of the bacterial community ($F = 9.24$; $p < 0.01$) was observed for the sediments exposed to higher levels of metals which was not observed for the archaeal community. However, an increase the relative abundance of Amplicon Sequence Variant (ASV) was observed for the Archaea phyla Asgardarchaeota, Micrarchaeota, Nanoarchaeota, Thermoplasmata, and the Bacteria phyla Bacillota, Desulfobacterota, Calditrichota, Bacteroidota, Pseudomonadota in the sediments exposed to higher levels of metals. **Conclusions:** This mesocosm experiment evidences the pressure exerted by metals in the microbial prokaryotic community of estuarine sediments, changing the dynamics of these organisms in the ecological quality of these ecosystems.

Keywords: heavy metal; Archaea; Bacteria; estuarine ecosystems; metabarcoding

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References

1. Falkowski, P.G.; Fenchel, T.; Delong, E.F. The microbial engines that drive Earth's biogeochemical cycles. *Science* **2008**, *320*(5879):1034-9.
2. Gupta, A.; Gupta, R.; Singh, R.L. *Microbes and Environment. Principles and Applications of Environmental Biotechnology for a Sustainable Future*. 2016, 15:43–84.



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