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**Orientation: Integral Management of the Sea**  
**Specialization Area: Environmental Analysis and Evaluation**  
**Research Area: Line 3.6. Pollution and environmental impacts**

**PhD project: Cyanotoxins in marine environment: fast detection methods and bioaccumulation in marine organisms**

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**Summary:** Cyanobacteria are a diverse group of photosynthetic prokaryotes that can occur in freshwater and marine environments. Depending on several environmental variables, the cyanobacteria proliferation can result in toxins production as microcystins, cylindrospermopsins, anatoxin-a, saxitoxins, and others. Except for the regulated saxitoxins, there are few studies on monitoring cyanotoxins in the marine environment. Cyanotoxins produced in freshwater environments may, however, contaminate estuaries and accumulate in filter-feeding shellfish or in other organisms posing a potential risk for consumers. In this PhD project, the uptake, biotransformation and elimination of cyanotoxins occurring in the marine environment will be investigated through the exposure of selected organisms to these compounds. Highly sensitive and specific LC-MS/MS methods are commonly used for the detection and quantitation of cyanotoxins in marine organisms, however these methods involve the use of expensive instrumentation, which must be operated by highly skilled personnel. There is an interest in development of inexpensive and rapid methodologies for the detection and quantification of cyanotoxins that could be used both as a screening and alarm tools. This project aims to apply previously developed electrochemical biosensors to selected cyanotoxins. Bioelectronics tongue performance will be benchmarked against the validated analytical methods available for the determination of cyanotoxins.



Moreira, C., Campos, A., Martins, J. C., Vasconcelos, V., & Antunes, A. (2021). Review on Cyanobacterial Studies in Portugal: Current Impacts and Research Needs. Applied Sciences, 11(10), 4355.