



# HEAVY METALS CONTAMINATION IN TWO BIOLUMINESCENT BAYS OF PUERTO RICO

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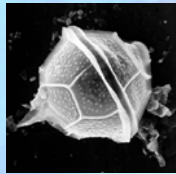
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Recent studies show that two important bioluminescent Bays in Puerto Rico, La Parguera Bioluminescence Bay in Lajas and Puerto Mosquito Bay in Vieques have differences in the characteristic of bioluminescent. The presence of arsenic, copper, iron, lead and mercury can affect *Pyrodinium bahamense*, which lives in these bays with certain characteristics. The main purpose of this research was to evaluate the presence of heavy metals in these bays. Samples were collected from four different environments in the selected bays, which were: sediments close to the mangroves, mangroves leaves, sediments from the bottom and water column. The samples were analyzed using the inductively coupled plasma (ICP) method. The primary objective of ICP is to measure elements that emit specific wavelengths. ICP has the capacity to identify and quantify all elements with the exception of argon. The concentration of iron and copper in the two bioluminescent bays was high with respect to arsenic, and lead and mercury in most of the cases were below detection limits (BDL). This study shows concentrations of heavy metals in the selected bays were present in the following order: Fe>Cu>As>Pb>Hg. Iron and copper are an important part of *Pyrodinium bahamense's* growth because they are essential micronutrients for the formation of microorganism *phytoplankton* that the dinoflagellates consume. For future research, it is suggested to carry out daily studies in the selected bays and study other metals that probably affect the bays.

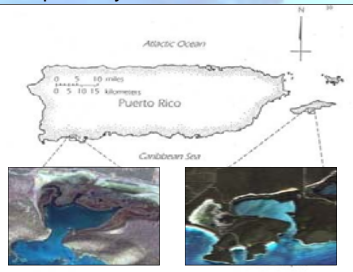
## INTRODUCTION

- The Bioluminescence is the emission of light by living organism.
- Is mainly produced by the microscopic organisms called *Pyrodinium bahamense* (Pyrrophyta-Dinoflagellata)
- Conditions aiding the accumulation of these organisms are: shallow basin with low tidal and narrow mouth, surrounded by mangroves.



*Pyrodinium bahamense* under an electron microscope. (Provided by Dr. Fernando Gilbes)

- The intensity of bioluminescence in bays has been used an indicator of the organisms health.
- La Parguera Bioluminescent Bay has shown a decrease in its bioluminescence by approximately 80% during recent years compared with Puerto Mosquito Bay.



Study Area

## OBJECTIVES

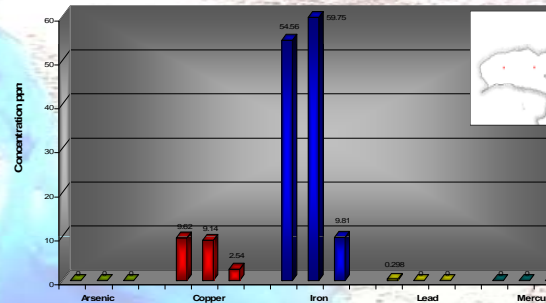
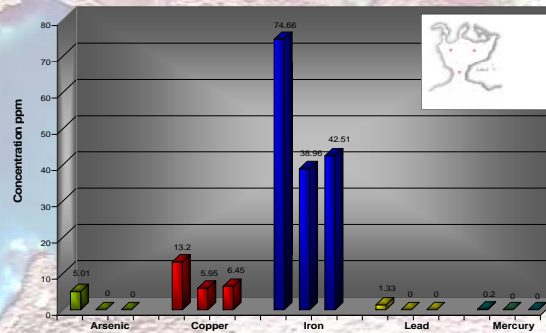
- Evaluate the presence of heavy metals in the water column and bottom sediments.
- Determine levels of heavy metals in the mangroves habitants around selected bays.
- Identify the possible sources of heavy metals and their relationship with the bioluminescence intensity in both bays.

## METHODOLOGY

- Field Work and GPS Position
- Four environments: the water column, bottom sediments, mangrove leaves, surrounding ground.
- Environmental Quality Laboratories, Inc. (EQ lab) in Bayamón, PR. - EPA protocols. Inductively Coupled Plasma (ICP) method.
- Heavy Metals: mercury (Hg), lead (Pb), iron (Fe), copper (Cu), and arsenic (As).



## RESULT



The concentrations of Heavy Metals in the selected bays were present in the following order: Fe>Cu>As>Pb>Hg.

## DISCUSSION

- Iron is an essential part in the reaction of photosynthesis.
- Copper complexes serve are essentials in biochemical cycles.
- Therefore the interaction between these metals (micronutrients) and the dinoflagellates is important to determine the bioluminescence.
- This metals concentration can be attributed to run-off and organic matter decomposition.

## CONCLUSION

- The concentration of trace elements used by dinoflagellates depends on their uptake capacity.
- Each environments don't have the same metals concentrations.
- The station inside the bay are different to the outside station.
- The geology area is related with the impute of the metals.
- For future work we suggest daily studies in the selected bay and search for more metals that probable affect the dinoflagellates.

## ACKNOWLEDGEMENT

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