

Chemistry Department

Marine bacteria: novel source of bioactive natural products

REQUIMTE/ Organic Chemistry



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Objectives

- Collecting marine sediments samples (sampling up to 2000 m depth) at unexplored ocean locations.
- Culture and isolation of Gram positive bacteria from the marine sediments, with special focus on new marine chemically prolific taxa.
- Microbial biodiversity studies.
- Bioactivity screening of secondary metabolites extracted from bacteria; anticancer (HCT-116 human carcinoma cell lines), antimicrobial (MRSA-Methicillin Resistant *Staphylococcus aureus* and VRE-Vancomycin Resistant *Enterococcus*) and antifungal (*Candida albicans*).
- Structural elucidation of novel bioactive natural products with potential pharmaceutical applications.

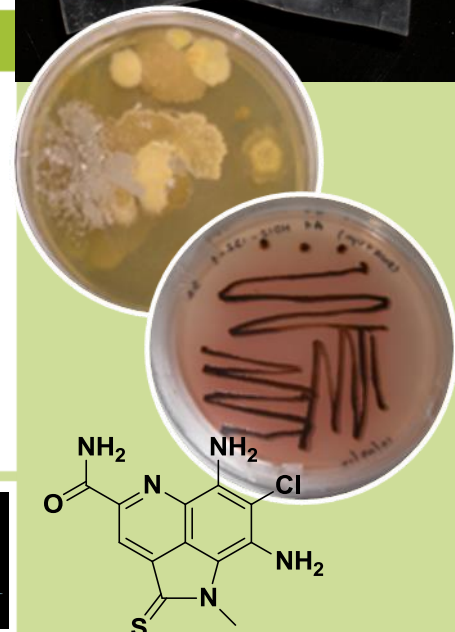
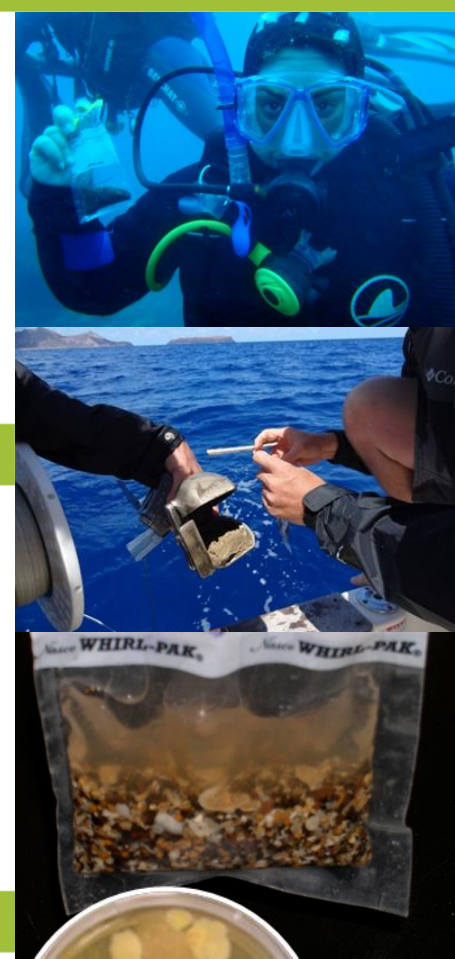
Methodology

- Use of new sampling technologies, which allow sampling at high depths without needing costly equipment and /or machinery.
- Isolation and culture of selected marine microorganisms with relatively simple techniques commonly used in microbiology.
- Bioassays: anti-cancer cells HCT-116 (human colon carcinoma), antimicrobial agents against human pathogens (MRSA and VRE), antifungal (*Candida albicans*).
- Biodiversity and taxonomy studies by DNA extraction, gene amplification using PCR techniques and sequencing.
- Structure elucidation of novel bioactive compounds using advanced spectroscopic methods after purification by flash column and HPLC chromatography.

Expected Results

The oceans are a major source for new natural products discovery, with potential industrial applications. Ocean sediments cover 72% Earth's surface, yet the microbiology of the bacteria residing in these sediments and the chemical entities produced by those microorganisms are one of the most significant, yet undeveloped areas of ocean science. With these in mind we expect starting to fill this knowledge gap and explore marine bacteria as a novel source of bioactive natural products:

- 662 sediment samples were collected at Madeira, Porto Santo and Desertas
- Inoculation of these samples in 1918 primary plates.
- Isolation of 774 unicelular bacteria and 600 actinomycetes for anticancer, antimicrobial and antifungal screening,
- genomics, taxonomy, biodiversity and novel bioactive natural products structure elucidation studies are being performed.



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