

## Marine Natural Products Chemistry

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Most of the currently used therapeutic agents like antibiotics, anticancer, agents for immunosuppressive disorders were derived from plants, animals or microorganisms. For the past 3 decades over 70% of drugs entering clinical trials have been derived mainly from microbial source. Genome scanning reveals that only a small fraction of the molecules that microbes are capable of producing have so far been isolated. Marine natural products discovery combines genomics, metabolomics, and bioassay-guided compound isolation in-tandem with software development to enable automation of data combination, thus adding a valuable tool for long term bioactive compound discovery.

The following steps are involved in natural products discovery from marine microbes

- **Microbial Collection and Characterisation:** This involves collection of either soil sample, water sample, sea sediments or marine sponges from a given geographical location; cultivating the microbes from these samples on agar plates and streaking to enable the isolation of individual colonies. Microbes that show interesting phenotypes will be further cultivated and subjected to 16s sequencing.
- **Strain Sequencing and Metabolomic Network Analysis:** Strains that is shown to be promising in terms of their 16s sequence, and initial bioassay will be selected for large scale fermentation and metabolomics analysis, identifying unique natural products using GNPS analysis.
- **Cosmid Library Generation and Promoter Engineering for the Sequenced Strains:** This involves identifying novel biosynthetic gene clusters, encoding previously undiscovered natural products. This will be explored through engineering promoters to upregulate their expression and the production of the natural products that they encode. Cosmid libraries will be made for strains that have numerous genes of interest and selected for the heterologous expression.

- **Fermentative Growth:** This involves subjecting selected strains to large scale fermentation using different media, to produce the extract that will be purified for natural products purification, isolation and characterisation using spectroscopic methods.
- **Biological Assay:** This involves screening the isolated compounds for various activities using different protocols. Compounds with striking activity will be subject to R & D testing to ascertain if it could serve as 'leads' compound for drug development.

**Volume 3 Issue 9 September 2019****© All rights are reserved by Matthias O Agbo and Rebecca JM Goss.**