

# **Bioactive Secondary Metabolites from Marine and Under Explored Habitats**

By

**Mostafa Ezzat M. Rateb**

**PhD Thesis Abstract**

**Aug 2011**

This thesis presents results obtained from the investigation of secondary metabolites through screening of marine organisms, marine-derived microbes, and microbes from under-explored habitats. It has been divided into seven chapters including the introduction, material and methods, in addition to five chapters which are divided into two main parts;

The first part includes the isolation of eight cytotoxic diterpene derivatives of which four were new from the organic extract of the sponge *Spongionella* sp. obtained from the U.S. National Cancer Institute's Open Repository Program, the isolation of three new antibacterial dibenzofuran derivatives and a known butyrolactone from ascomycete Super1F1-09 isolated from the Indo-Pacific sponge *Acanthella cavernosa*. An attempt to synthesize these compounds was conducted. This part also includes the isolation of five known pyrroloiminoquinone alkaloids, from the Fijian sponge *Zyzya* sp., which showed potent antiprotozoal activity.

The second part comprises the use of OSMAC approach for the isolation of four new ansamycin-type polyketides, three new macrolactones and one known siderophore from *Streptomyces* strain C34 isolated from Atacama Desert, Chile. These compounds showed good antibacterial activity with one of the ansamycins showed pronounced antibacterial activity against a panel of clinical isolates of methicillin-sensitive as well as methicillin-resistant *S. aureus* (MRSA). This part also contains the use of microbial co-culture for the induction of secondary metabolites. It comprises the isolation of ten antiprotozoal fungal metabolites, of which one was new, from *Aspergillus fumigatus* when co-cultured with the novel strain *Streptomyces* C2 isolated from Atacama Desert.

In conclusion, natural products from diverse sources proved to be the major resource of drug discovery. This thesis describes the isolation and structural characterisation of 35 compounds, 15 of which were new, from two marine sponges, one sponge-derived ascomycete, one actinomycete from hyper-arid soil, and a fungal/bacterial interaction. The structures of these metabolites were elucidated using accurate mass analysis, different spectroscopic methods, and in some instances X-ray crystallographic analysis. Extremophiles proved to be a good source for new secondary metabolites.