

# Aquatic Medicines

R. S. Rakhi Menon

**Abstract:** *The chemical and biological diversity of the marine environment is immeasurable and therefore is an extraordinary resource for the discovery of new drugs. Recent technological and methodological advances in structure elucidation, organic synthesis, and biological assay have resulted in the isolation and clinical evaluation of various novel agents. This review highlights several marine natural products and their synthetic derivatives that are currently undergoing clinical evaluation.*

**Keywords:** Aquatic Medicines

## 1. Introduction

With 79% of the earth's surface covered by water, research into the chemistry of marine organisms is relatively unexplored and represents a vast resource for new medicines to combat major diseases such as cancer, AIDS or malaria. Research typically focuses on sessile organisms or slow moving animals because of their inherent need for chemical defenses. Standard research involves an extraction of the organism in a suitable solvent followed by either an assay of this crude extract for a particular disease target or a rationally guided isolation of new chemical compounds using standard chromatography techniques. (9)

## 2. Marine Organism As Source

Over 70% of the earth's surface is covered by oceans which contain 95% of the earth's biosphere.<sup>[1]</sup> It was over 3500 million years ago that organisms first appeared in the sea. Over time, they have evolved many different mechanisms to survive the various harsh environments which include extreme temperatures, salinity, pressure, different levels of aeration and radiation, overcoming effects of mutation, and combating infection, fouling and overgrowth by other organisms.<sup>[1][2]</sup> As well, predators have evolved chemical weapons in order to paralyze or kill prey. *Conus magus* is an example of a cone snail that has a poisoned harpoon-like projectile which it uses to paralyze prey like small fish.<sup>[4]</sup> Some organisms, like the Viperfish, are believed to attract small fish or prey by using its photophore.<sup>[5]</sup>

## 3. Marine Environment

Marine environments are considered more biologically diverse than terrestrial environments. [4][7] Thirty-two different animal phyla are represented in the oceans of the 33 recognized phyla. Fifteen different phyla are represented only in marine environments, while only 1 is exclusively terrestrial. Marine phyla also contain functionally unique organisms such as filter feeders and sessile organisms which have no terrestrial counterpart. Also, marine autotrophs are more diverse than their terrestrial counterparts. Marine autotrophs are believed to stem from at least 8 ancient clades while terrestrial organisms mainly stem from one clade, Embryophyta. [7] Marine environments may contain over 80% of the world's plant and animal species. [6] The diversity

of coral reefs can be extraordinary with species diversity reaching 1000 species per meter squared. The greatest marine tropical biodiversity is reported to be in the Indo-Pacific Ocean. [8]

## 4. Anti Cancer Drug

Initial isolations of the bromotyrosine metabolite psammoplin A from various verongid sponges (e.g., *Psammoplysilla* sp.) were reported simultaneously by several research groups in 1987

In preclinical studies and as well as several other synthetic analogues showed potent *in vitro* antitumor activity. Cytarabine (Ara-C) are used to treat cancer. Eribulin Mesylate (E7389), Trabectedin (ET-743), Brentuximab Vedotin (SGN-35), Plitidepsin, Plinabulin (NPI 2358), Elisidepsin, Glematatumumab Vedotin (CDX-011), Marizomib (Salinosporamide A), Hemiasterlin (E7974), Bryostatin 1 are other anti cancer drugs.

The indole alkaloids are a class of marine natural products that show unique promise in the development of new cancer drug leads.

## 5. Other Drugs Obtained From Marine Organisms

Vidarabine (Ara-A) – antiviral

Ziconotide -analgesic

Pseudopterosins –wound healing

Omega-3-Fatty Acid Ethyl Esters –Hypertriglyceridemia

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