

Marine organisms: Potential source for drug discovery

Life has originated from the oceans that cover over 70% of the earth's surface and contain highly ecological, chemical and biological diversity starting from microorganisms to vertebrates. This diversity has been the source of unique chemical compounds, which hold tremendous pharmaceutical potential. New trends in drug discovery from natural sources emphasize on investigation of the marine ecosystem to explore numerous complex and novel chemical entities. These entities are the sources of new leads for treatment of many diseases such as cancer, AIDS, inflammatory conditions, and a large variety of viral, bacterial and fungal diseases¹. Because of the highly chemical and physical harsh conditions in marine environment, the organisms produce a variety of molecules with unique structural features and exhibit various types of biological activities. Majority of the marine natural products have been isolated from sponges, coelenterates (sea whips, sea fans and soft corals), tunicates, opisthobranch molluscs (nudibranchs, sea hares, etc.), echinoderms (starfish, sea cucumbers, etc.) and bryozoans (moss animals) and a wide variety of marine microorganisms in their tissues².

Sponges, the most primitive multicellular invertebrates, considered as a gold mine during the past 50 years, have fascinated scientists for isolation of promising bioactive compounds for human welfare. Published literature, patents and other scientific records on the genotoxicity and anticancer potentials of marine compounds revealed that few compounds have gone through preclinical evaluations. Interestingly, cytarabine (Cytostar-U) also known as Ara-C, a compound isolated from the Caribbean sponge *Cryptotheca crypta* currently being used with other

anticancer drugs in the treatment of acute myelocytic leukaemia (AML) and lymphomas is one of the very few marine anticancer drugs studied in long-term clinical study³. Acyclovir, which was synthetically known as Ara-A, was modelled based on sponge-derived spongothymidine or spongouridine. Ara-A is the first sponge-derived antiviral compound in the market. Polyketide Calyculin A (a selective inhibitor of protein phosphatase 1, isolated from sponge *Discodermia calyx*), Manoalide (a potent anti-inflammatory marine natural product and a direct inactivator of venom phospholipase A2), Okadaic acid, a potent inhibitor of protein phosphatases, especially protein phosphatases 1 and 2 respectively isolated from *Luffariella variabilis* and *Halichondria okadai* has reached the market undergoing from basic research to long phases of clinical study^{4,5}.

Sacli-like filter feeder tunicates have been reported to be an important source in drug discovery. Tetrahydroisoquinolone alkaloid 'Ecteinascidin 743' from *Ecteinascidia turbinata*, cyclic depsipeptides 'Dehydrodidemnin B and Didemnin B' from *Trididemnum solidum*, cyclic peptide 'Vitilevuamide' from *Didemnin cucliferum* and 'Diazonamide' from *Diazona angulata* are a few tunicate compounds in anticancer preclinical or clinical trials. Synthadotin and Soblidotin are two synthetic analogues of Dolastatin isolated from molluscan sp. *Dolabella auricularia* in trials. Alkylamino alcohol 'ES-285' (Spisulosine) isolated from *Mactromeris polynyma* is another compound in preclinical trial; molecular target of this molluscan compound is Rho (GTP-bp). Macrocyclic lactone 'Bryostatins 1' from bryozoan sp. *Bugula neritina*, and soft coral compounds; diterpene glycoside 'Eleutherobin' and Pyrrole al-

kaloid 'Lamellarin D' anticancer⁶ while, anti-inflammatory compound 'OAS-100' which is semisynthetic derivative of pseudopterisone A are the hope of new effective therapeutic agents.

Study of marine organisms is a discipline, which endeavours to identify and decipher the troubles regarding not only sustainable exploitation of marine life for human health and welfare but also for marine ecology. Study of marine organisms for their bioactive potential, being an important part of marine ecosystem, has picked up the rhythm in recent years with the growing recognition of their importance in human life. This interdisciplinary study of the life in the oceans ensures an exciting new frontier of scientific discovery and economic opportunity.

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Professional associations and proactive scientists

Scientists could be proactive¹ by institutionalizing their roles through professional associations (PAs) or societies. PAs broadly refer to a formal organization of professionals who are practitioners of a given profession uniting together by mutual consent to deliberate, determine and act jointly for a purpose. This is the case

whether the PA is that of dentists, cardiologists, pharmacologists, soil scientists, plant breeders, lawyers, economists or other professions. PAs have largely emerged through voluntary action, largely with a view to establishing the identity of increasingly specialized groups to promote the subject/discipline in which these

groups have a common interest. PAs are largely self-supported and carry out their activities with funds raised through subscription/membership fee, voluntary contribution of time by office bearers, etc. They are also often eligible to receive small grants from the State or Central Government, which enables them to or-