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Opinion Article

Potential of coupled microorganisms with dictyoceratida sponges as natural products

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DESCRIPTION

One of the least studied habitats in the world is the maritime environment. Marine sponges exhibit greater taxonomic diversity in response to specific environmental factors. They have been thought of as fascinating sources for bioactive substances. The ive groups of Dictyoceratida sponges are widely dispersed and are accustomed to a variety of microorganisms. The production of some secondary metabolites, however, is likely not the responsibility of the sponges themselves, but rather of the accompanying microorganisms.

It is generally known that sponges serve as hosts for a variety of microorganisms, which account for a sizeable portion of the biomass of the sponge host. The biosynthesis of chemicals taken from sponges has been carried out by microorganisms associated with sponges. The environmental factors that affect sponges, microbial organisms, and their functional genes have a significant impact on the creation of these secondary metabolites. The microbial associated microorganisms can impede the metabolic processes of their hosts, such as photosynthetic carbon fixation, nitrification, anaerobic metabolism, and the generation of secondary metabolites. Primary production by symbiotic microorganisms can therefore have significant ecological effects on the host.

The structural variety and uniqueness of the microbial natural products received the most attention. Additionally, they displayed a variety of biological actions, including antibacterial, anti-inflammatory, anti-tumor, and anti-cancer ones. A few marine sponge-associated organisms are also thought to be a source of enzymes, surfactants, and biomarkers.

Secondary metabolites from dictyoceratida associated micro-organisms

Different secondary metabolites produced by microorganisms connected to Thorectidae sponges were shown in reported literature. Thirty percent of all reported substances are these secondary metabolites. The marine sponge *Hyrtios altum* contained the Vibrio sp. bacterium. The non-cytotoxic photo-protective polymer melanin was shown to be secreted by various isolates connected to darkly pigmented sponges like *Fasciospongia cavernosa* and *Spongia officinalis*, according to published research.

Secondary metabolites from micro-organisms associated with sponges of family Dysideidae

35% of the secondary metabolites in this review have been documented to be produced by microorganisms related to Dysideidae sponges. A number of bacterial strains were identiied and allowed to develop in 1991 from the sponge Dysidea sp. The polychlorinated substance 13-demethylisodysidenin that was recovered from the entire sponge tissue was confined in the symbiont *O. spongeliae* and limited to the cyanobacterial filaments, as this investigation showed and confirmed.

Due to the wide variety of bioactive chemicals that have been extracted from varied environmental and geographic settings, marine sponges have been regarded as a targeted source for drug discovery.

When secondary metabolites from microorganisms connected to Dictyoceratida sponges were examined using published data, it became clear that some of the secondary metabolites were connected to the microorganisms. Secondary metabolite percentages from microorganisms connected to Thorectidae and Dysideidae sponges were greater and approximately equal (35 and 30%, respectively). Microorganisms linked with Irciniidae were found to have the lowest percentage of secondary metabolites (12%). The ability of these microorganisms to produce varying secondary metabolites with various chemical properties was also

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demonstrated by the results. Alkaloids, peptides, and other nitrogenous substances made up 60% of the chemical classes that were reported. Macrolides (20%), halogenated compounds (8%), enzymes (2%) and other compounds (10%) were the other chemical classes that were mentioned.

These microorganisms' bioactive chemicals were found to have a variety of biological effects, including cytotoxic activity (68%), antibacterial activity (25%) and other effects like antioxidant and antiangiogenic properties. These findings should motivate scientists to continue studying Dictyoceratida sponges and to investigate how habituating microbes contribute to the creation of novel bioactive compounds that influence and are affected by the metabolism of the host. Additionally, additional research into isolated inactive chemicals' effects on various biological functions is required. Future drug development efforts involving marine microbial natural compounds may greatly benefit from all of this.