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Review

Species Diversity and Secondary Metabolites of *Sarcophyton*-Associated Marine Fungi

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Abstract: Soft corals are widely distributed across the globe, especially in the Indo-Pacific region, with *Sarcophyton* being one of the most abundant genera. To date, there have been 50 species of identified *Sarcophyton*. These soft corals host a diverse range of marine fungi, which produce chemically diverse, bioactive secondary metabolites as part of their symbiotic nature with the soft coral hosts. The most prolific groups of compounds are terpenoids and indole alkaloids. Annually, there are more bio-active compounds being isolated and characterised. Thus, the importance of the metabolite compilation is very much important for future reference. This paper compiles the diversity of *Sarcophyton* species and metabolites produced by their associated marine fungi, as well as the bioactivity of these identified compounds. A total of 88 metabolites of structural diversity are highlighted, indicating the huge potential these symbiotic relationships hold for future research.

Keywords: octocoral; marine fungi; holobiont; secondary metabolites; diversity

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1. Soft Corals

Soft corals, also known as octocorals, are Anthozoans (Ehrenberg, 1834) classified under the subclass Octocorallia (Haeckel, 1866). They belong to the Phylum Cnidaria, making them closely related to the sea anemones, hard corals and jellyfishes. Unlike hard corals that are the building blocks of the coral reef, soft corals act as shelter for juvenile fishes and food to some marine organisms. As the name octocoral is derived from Latin "octo", which means eight, soft coral species comprise of eight-tentacle polyps and eight mesenteries, with minimal variance within the clade. The polyp in octocorals is an individual zooid, and they together play important roles in the essential functions of a colony, including growth, food capture, transport of nutrients, defence, irrigation of seawater and reproduction [1]. As suspension feeders, soft coral food intake relies on environmental conditions, especially water currents [2]. For small organic particles (<20 mm), octocoral polyps can filter them from the water column, whereas larger particles (such as zooplankton and larvae) could be captured or intercepted by the tentacles. Since octocorals have simple stinging cells (nematocysts), their food is restricted to weakly-swimming, small plankton [3].

Octocorals are widely distributed, with their presence recorded from the intertidal zone to depths up to 6400 m and from tropical to polar regions [4]. Their distribution is heavily influenced by several environmental factors, for example, distance from the coast, suspended organic matter and the presence of strong currents [5]. For instance, the distribution of cold-water species is closely related to salinity, temperature, productivity, oxygen, the broad scale of the highest diversity of soft corals in the world, of which are mostly endemic [6,7]. However, the greatest diversity of octocorals is recorded in