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Topic: Marine biology and ecology

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ABSTRACT Subject :

The Antarctic sponge Haliclona sp. and its associated bacterial community as pollution indicators in the remote Antarctic region

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Global industrialization releases a huge amount of pollutants into the Earth's atmosphere and the accumulation of pollutants is observed in the most remote regions of the planet. Emissions and long-range transport of pollutants, such as metals and metalloids and, persistent organic pollutants (POPs), threaten ecosystems, especially when these pollutants reach remote and pristine areas. Several studies carried out in the Ross Sea, particularly on water and sediment samples, showed that two classes of POPs (polychlorobiphenyls, PCBs, and polycyclic aromatic hydrocarbons, PAHs) were the most abundant in this area. Similarly, results regarding heavy metals highlighted that Fe, Al, Mn, Pb, Tl, and as are generally retrieved in relevant quantities. Sponges are extremely efficient filter feeders. This ability makes them an excellent accumulation system and an important sentinel for pollution in remote areas. In fact, some studies conducted on Ross Sea sponges underlined that the contribution of metals (Cd, Pb, and Cu) to sponges tissues was around 85%. Sponges also represent important habitats for a community of associated (micro)organisms, and few investigations have been performed on Antarctic sponge-associated bacteria. In this context, our work aims at investigating pollutant (POPs and heavy metals) concentration in the sponge Haliclona sp. compared to that retrieved in water and sediment samples, to explore the possibility to use this sponge species as a sentinel of pollution. Furthermore, sponge bacterial-associated community composition and activity, and its relationships with pollutant concentration were evaluated. Three specimens of Haliclona sp. were collected from two different sites at Thetys Bay (Terra Nova Bay, Ross Sea,) together with sediment and water samples. Results showed that these sponge specimens represent an incredible sentinel for environmental pollution, with some metals (e.g., Hg, Ni, Zn and Cd), almost all tested PAHs and, PCB congeners that were more concentrated in the sponge tissues than in sediment. The associated bacterial community was dominated by bacteria frequently found in marine environments of polar regions, but the diversity indices evidenced a higher alpha diversity compared with previous studies. The microbial community associated was differentiated by sites and some interesting differences were also underlined among water, sediment, and sponge samples. Our results evidenced that Antarctic sponges could be an excellent sentinel of environmental pollution and that differences within the bacterial communities may be site-driven and dependent on specific ecological interactions between bacteria and their benthic hosts. Funding: this research was financially supported by the Programma Nazionale di

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