



In situ feeding and metabolism of glass sponges (Hexactinellida, Porifera) studied in a deep temperate fjord with a remotely operated submersible

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ABSTRACT: Glass sponges are conspicuous inhabitants of benthic communities in the cool waters of the Antarctic and north Pacific continental shelf. We used an ROV outfitted with a new device for simultaneous sampling of water inhaled and exhaled by the sponges to provide the first data on the nutritional ecology and metabolism of two glass sponge species in their natural deep-water habitat (120-160 m). *Aphrocallistes vastus* and *Rhabdocalyptus dawsoni* were found to be mostly bacteriovores, removing up to 95% of the bacteria (median removal was 79% for both species) and heterotrophic protists (<10 μm) from the water they filter. The relatively scarce microbial cells were efficiently selected from a [soup] of suspended clay and detritus particles (microorganisms accounted for ~1% of the total ambient suspended solids). Removal of planktonic microorganisms ($2.2 \pm 1.3 \mu\text{mol carbon [C] C L}^{-1}$ and $0.37 \pm 0.17 \mu\text{mol nitrogen [N] L}^{-1}$) accounted for the entire total organic C uptake and ammonium excretion by both species, with no evidence for dissolved organic uptake. Similar results were obtained in laboratory experiments in which dissolved organic C was directly measured. Despite the massive siliceous sponge skeleton, silica uptake was below detection levels ($0.28 \mu\text{mol L}^{-1}$), supporting previous suggestions of low growth rates in Hexactinellida. Reported mean sponge abundances of >1 individual m^{-2} indicate that the sponge filtering activity may significantly affect the deep microbial community and benthic-pelagic mass exchange in some north-east Pacific fjords.

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