

## **A first glimpse into the physiology and metabolism of Indian Ocean vent gastropod holobionts**

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Physiological traits are the foundation of an organism's success in a dynamic environment; the ability to metabolize oxygen can determine an animal species' fitness, spatial distribution, and its capacity to adapt to changing conditions. We measured routine metabolism (oxygen uptake) in two hydrothermal vent gastropods, *Alviniconcha marisindica* and the Scaly-foot Gastropod *Chrysomallon squamiferum*, from Kairei and Edmond vent fields on the Central Indian Ridge (23-25° S). Both host chemosymbiotic endosymbionts; chemoautotrophy is very demanding of oxygen and we predict that these holobionts would have high oxygen demand. A previous study reported a measurement of oxygen demand in *Alviniconcha hessleri*, from the Mariana Back-arc Basin, indicating that *Alviniconcha* has a very high metabolism and one of the most efficient symbioses among hydrothermal vent endemic metazoans. No previous studies have measured routine metabolism in any Indian Ocean vent animals. Our previous research on the anatomy of *Chrysomallon* indicated it has very enlarged respiratory and circulatory systems, which we interpreted as adaptations to provide oxygen to the endosymbionts in its esophageal gland. Thus we predicted that the routine metabolism and oxygen demand of *Chrysomallon* may be even higher than that of *Alviniconcha*. Oxygen demand of *Alviniconcha* from the two vent fields did not differ in laboratory experiments. Surprisingly, oxygen consumption of *Chrysomallon* was not higher than in *Alviniconcha* per unit tissue mass; however, *Chrysomallon* maintained a steady metabolic demand in experiments over a wide thermal range. While these two large gastropod species co-occur at Kairei, differences in their oxygen consumption may reflect the separate niches they occupy in the vent ecosystem.