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Relationship between metal levels in the vent mussel Bathymodiolus azoricus and local microhabitat chemical characteristics of Eiffel Tower (Lucky Strike)

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The turbulent mixing of hydrothermal hot fluid with cold seawater creates large chemical gradients in a small-spatial scale that may induce variable physiological and biochemical adaptations within the vent fauna. The adaptation to such fluctuating and unpredictable environment by the vent mussel Bathymodiolus azoricus relies on a dual symbiosis hosted in the gills, and digestion of particulate organic matter. The surrounding environment not only provides the necessary energy sources and suspended organic particles for the vent mussel nutrition, but also potentially toxic compounds such as metals. Our main goal was to see if there is a relation between metal accumulation in mussel organs and the chemical characteristics of their close environment. Mussels were collected at six locations in a cold part of the Eiffel Tower fluid-seawater mixing zone, characterized by distinct chemical compositions. Metals (Cd, Cu, Fe and Zn) and metallothioneins were quantified in the gills and digestive gland. The physiological condition of the sampled mussels was also evaluated using tissues and gill indices. Our study indicates that the accumulation of metals in B. azoricus is related to their spatial distribution and linked to fine scale environmental conditions that influence the physiological status of the organism.