



## Environment drives physiological variability in the cold seep mussel *Bathymodiolus childressi*

Bergquist, Derk C., Clint Fleckenstein, Emily B. Szalai, Julie Knisel, Charles R. Fisher

Limnol. Oceanogr., 49(3), 2004, 706-715 | DOI: 10.4319/lo.2004.49.3.0706

**ABSTRACT:** The ability of an organism to respond to changes in its environment depends upon its short-term physiological plasticity and the constraints of its genetic makeup. At hydrothermal vents and cold seeps, the spatially variable physiological characteristics of symbiont-bearing animals are often assumed to reflect short-term physiological adjustments to a patchy and dynamic chemical environment. However, the extent to which these spatially variable responses represent fixed characteristics unique to animals inhabiting the different environments (such as might arise from genetic differentiation) has not been tested. The seep mussel *Bathymodiolus childressi* depends upon methanotrophic bacteria for the bulk of its nutrition and inhabits a range of environments where it displays varying growth and body condition. In this study, we first investigated the multiscale environmental and physiological variability of *B. childressi* by measuring dissolved gas concentrations and mussel body condition in 12 mussel beds at four geographically distinct sites. Brine-dominated seeps tended to have higher methane and sulfide concentrations and host mussels of better body condition than petroleum-dominated sites. Then, using two transplant experiments, we evaluated whether local environmental conditions or stock effects determined the observed differences in growth and body condition of *B. childressi*. In all cases, mussels transplanted to new sites acquired or nearly acquired the characteristics of their host population, illustrating the primary role of the environment in determining the physiological characteristics of resident mussels. However, mussels from different sites sometimes responded differently to the same environment, suggesting stock-related effects also play a role in the spatial variation observed in the physiology of chemosynthetic fauna.

### Article Links

[Download Full-text PDF](#)

[Return to Table of Contents](#)

### Please Note

Articles in L&O appear in PDF format. Open access articles may be freely downloaded by anyone. Other articles are available for download to subscribers only, or may be purchased for \$10 per