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TITLE: Trade-offs in a high CO₂ habitat on a subsea volcano: condition and reproductive features of a bathymodioline mussel

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ABSTRACT:

MEPS Marine Ecology Progress Series Contact the journal Facebook Twitter RSS Mailing List Subscribe to our mailing list via Mailchimp HomeLatest VolumeAbout the JournalEditorsTheme Sections MEPS 574:49-64 (2017) - DOI: <https://doi.org/10.3354/meps12196> Trade-offs in a high CO₂ habitat on a subsea volcano: condition and reproductive features of a bathymodioline mussel Giulia S. Rossi^{1,3,*}, Verena Tunnicliffe^{1,2} ¹Department of Biology, University of Victoria, Victoria, BC V8W 2Y2, Canada ²School of Earth & Ocean Sciences, University of Victoria, Victoria, BC V8W 2Y2, Canada ³Present address: Department of Integrative Biology, University of Guelph, Guelph, ON N1G 2W1, Canada *Corresponding author: grossinetwork@gmail.com ABSTRACT: Northwest Eifuku submarine volcano (Mariana Volcanic Arc) emits very high concentrations of CO₂ at a vent where the mussel *Bathymodiolus septemdierum* experiences pH as low as 5.2. We examined how this natural setting of high pCO₂ influences shell, body, and reproductive condition. Calcification is highly compromised: at a given shell volume, shells from NW Eifuku weigh about half those from reference sites in the south Pacific, and dissolution of the inner shell is evident. However, the condition indices of some NW Eifuku mussels were equal to or higher than those from Lau back-arc basin and the New Hebrides Island Arc. NW Eifuku mussels in pH 5.2 fluids had the highest symbiont abundances in gill bacteriocytes, probably due to greater dissolved sulphide access. Excess energy demands imposed by high pCO₂ conditions appears moderated by adequate food availability through symbiont chemosynthesis. In the sample with the lowest body condition, gametogenesis was lagging, although all mussels in high pCO₂ had developing gonads and the complete gametogenic cycle was present in our samples. Gamete development is synchronous between sexes and is possibly periodic. While mussels are functionally dioecious, protogynous hermaphroditism can occur? a first record for the genus? which may be an adaptation to resource availability. *B. septemdierum* likely makes energy allocation trade-offs among calcification, body mass maintenance, reproduction and other processes to maximize fitness. We suggest that flexibility to divert energy from shell formation, combined with good food supply, can mitigate the manifestation of high CO₂ stress on *B. septemdierum*. KEY WORDS: High pCO₂ · Hydrothermal vent · Calcification · Condition · Gametogenesis · Protogyny · Acidification Full text in pdf format Supplementary material PreviousNextCite this article as: Rossi GS, Tunnicliffe V (2017) Trade-offs in a high CO₂ habitat on a subsea volcano: condition and reproductive features of a bathymodioline mussel. Mar Ecol Prog Ser 574:49-64. <https://doi.org/10.3354/meps12196> Export citation RSS - Facebook - Tweet - linkedIn Cited by Published in MEPS Vol. 574. Online publication date: July 04, 2017 Print ISSN: 0171-8630; Online ISSN: 1616-1599 Copyright © 2017 Inter-Research.

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