

**Letters of Intent: EPR**  
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**Reproductive biology of invertebrates in hydrothermal-vent mussel beds at the 9°50 N bulls-eye on the East Pacific Rise: Time-series study of reproductive condition and recruitment**

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Reproductive analysis is a perennial issue in studies of deep-sea invertebrates. Traditional methods used by shallow-water scientists (repeated sampling of natural populations over short time intervals and experiments with live animals) are difficult to undertake in the deep sea due to expense and logistical constraints. There are few time-series analyses of reproduction in invertebrates from the deep sea and those that do exist are often compiled from sampling over several years and integration onto a single annual axis (Tyler and Young, 1999). Vent communities, which are ephemeral and occupy geographically discrete sites in linear arrays along mid-ocean ridges (reviewed in Van Dover 2000), are especially intriguing in terms of the reproductive strategies. Dense communities of invertebrates may colonize deep-sea hydrothermal vents for years to decades or longer, but there is little understanding of how these local vent populations are maintained. Tyler and Young (1999) lay out the case succinctly: „Owing to the lack of repetitive or seasonal samples, gametogenic synchrony has been one of the most intractable aspects of understanding the reproductive biology of vent organisms.‰ And, further on in their review of reproduction in vent invertebrates, Tyler and Young suggest that „An understanding of dispersal and recruitment from and to current and new hydrothermal vents is the holy grail of reproductive biology at vents and seeps.‰ To begin to rectify this situation, a program of weekly and biweekly sampling during a 3-to-4 month period is proposed here to address the timing of gametogenesis and of recruitment for the top 5 numerically dominant macrofaunal invertebrate species associated with established vent mussel beds on the East Pacific Rise at 9°50,N. These 5 focus species are the mussel *Bathymodiolus thermophilus*, the limpet *Lepetodrilus elevatus*, the polychaetes *Amphisamytha galapagensis* and *Ophryotrocha akessoni*, and the amphipod *Ventiella sulfuris*. In addition to being ecologically important members of the mussel-bed community, these 5 species represent 3 dispersal strategies (planktotrophic, lecithotrophic, direct development), with egg size and fecundity ranging from a few large oocytes to a large number of small oocytes, and with either broadcast spawning or sperm transfer. Observations of gametogenic and recruitment patterns will be placed within the context of hydrographic data gathered by other RIDGE-2000-sponsored 9°50,N observatory teams and from temperature records within mussel beds obtained as part of this study.