

Reproduction in hydrothermal vent molluscs from Lau Basin

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Three mollusc species, *Bathymodiolus brevior*, *Alviniconcha hessleri* and *Ifremeria nautiliei* comprise the dominant megafauna of the active vent sites in the East Lau Spreading Center of the Lau back-arc basin. While many bivalve species have been found in relative abundance at hydrothermal vent sites worldwide, including several in the *Bathymodiolus* genera, gastropod biomass dominants are unusual and thus little is known about their natural history. In fact, reproductive biology, larval development, dispersal and recruitment remain elusive processes to researchers for many vent endemic species due in large part to the cost prohibitive nature of sampling in these environments as well as the difficulties inherent to laboratory culturing of chemosynthetic organisms. Many of these biological processes and strategies have only been inferred from related species living in shallow marine environments. In this study, we will examine the reproductive patterns of the molluscan dominants at a back-arc spreading center. It is through a combination of sclerochronology, isotope analysis and histology that we plan to obtain a clearer picture of the reproductive strategies employed by these three vent species. Mollusc shells contain internal microgrowth increments which provide an ontogenetic growth record and can be used to determine such life history traits as absolute age, age at sexual maturity, periodicity of spawning, and can even provide clues as to stressful environmental events experienced by a population or an individual. In addition, ambient chemistry and temperature as well as internal physiological changes throughout the lives of the molluscs can be determined by measuring stable isotope ratios of carbon and oxygen across the shells. Growth increment rates have been determined in *B. brevior* and at least one congener in previous studies (Schöne & Giere, 2005; Rhoads et al., 1981) and will provide a baseline for our analysis. We will also analyze histological sections of reproductive tissues to facilitate sclerochronology interpretations with complementary reproductive data. Descriptions of *I. nautiliei* collected on a 1998 cruise revealed a brood chamber located in the foot of a few female specimens (Anders Warén, pers. comm.), a structure not found in the original type material that was subsequently observed both empty and full in other collections. Our examination of the fully ripe 2006 specimens led to the discovery of embryos and larvae in varying stages of development within the brood chambers. These findings suggest continuous spawning in *I. nautiliei*, however further investigation is necessary. Interestingly, a similar reproductive structure was not found in *A. hessleri*, although both species share the same unusual positioning of the gonad within the pallial cavity (Warén & Bouchet, 1993) and both are consistently found occupying the same general areas. The ecological success of both species in similar habitats despite different reproductive strategies is an intriguing topic for further research.

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