REPRODUCTIVE STRATEGIES OF THE DOMINANT GASTROPODS OF THE LAU BASIN HYDROTHERMAL VENT SYSTEM: *ALVINICONCHA HESSLERI* AND *IFREMERIA NAUTILEI*

A Thesis

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in

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by Kyle C. Reynolds

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The Undersigned Faculty Committee Approves the

Thesis of Kyle C. Reynolds:

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ABSTRACT

Reproductive strategies of the dominant gastropods of the Lau Basin hydrothermal vent system: *Alviniconcha hessleri* and *Ifremeria nautilei*

by
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Master of Science in Marine Science
Moss Landing Marine Laboratories,
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Reproductive biology and larval development remain elusive processes to researchers for many vent endemic species due to the cost prohibitive nature of sampling in these environments, as well as the difficulties inherent to laboratory culturing of chemosynthetic organisms. Thus, many of these biological processes and strategies have only been inferred from related species living in shallow marine environments, resulting in a paradigm that broadly attributes phylogenetic constraint to any life-history variation found at vents. *Alviniconcha hessleri* and *Ifremeria nautilei* comprise the majority of the dominant megafauna found in the Lau Basin hydrothermal vent system. While they share a number of unique anatomical modifications, overlapping distributions, and a recent common ancestry, they employ disparate reproductive strategies. A planktotrophic mode of larval development has been inferred for *A. hessleri* from its shell morphology, while *I. nautilei* has been found to protect its young throughout early development in a brood pouch within its foot. Previous studies of these species involved sexually immature specimens, leaving the most pertinent questions unanswered regarding their reproductive biology. In this thesis, I have examined the reproductive anatomy of both species at both organismal and cellular levels. Evidence of iteroparity and a simultaneously periodic reproductive effort was revealed for both species across vent sites. In addition, the following apomorphic characters were discovered in *I. nautilei*: a novel brood pouch; a unique embryo transport mechanism; and a new larval form, which we have named Warén's larva. These findings provide some of the first substantial evidence of evolution of developmental traits in a hydrothermal vent organism.