

UNIVERSITY OF CALIFORNIA
Santa Barbara

**The aperture of marine gastropods:
Factors precluding settlement of fouling organisms**

A Dissertation submitted in partial satisfaction
of the requirements for the degree of

Doctor of Philosophy

in

Ecology, Evolution and Marine Biology

by

Carolynn S. Culver

Committee in charge:

Professor Armand M. Kuris, Chairperson

Professor Daniel E. Morse

Professor Steven D. Gaines

December 1999

ABSTRACT

The aperture of marine gastropods: Factors precluding settlement of fouling organisms

by

Carolynn S. Culver

The shells of living marine gastropods are often colonized by other organisms. However, host and site specificity varies among epibionts. Notably, only one species, the newly discovered sabellid worm *Terebrasabella heterouncinata*, settles in the aperture of gastropods. I examined intrinsic susceptibility of 15 California marine gastropods to this apertural fouling organism by exposing them to conditions highly favorable to sabellid infestations (Chapter 1). Intrinsic susceptibility was significantly different among species, being partially associated with phylogeny, but not habitat. This suggested that species-specific characteristics may influence sabellid settlement. As *T. heterouncinata* is native to South Africa, identification of adaptive mechanisms of naïve California hosts would illustrate general, not co-evolved, adaptations that preclude apertural fouling by all other epibionts.

Because many marine invertebrate larvae settle in association with certain substrates and/or locations on the substrate, I tested whether variable sabellid settlement was due to differential host and site locating abilities of this epibiont (Chapter 2). The ability of *T. heterouncinata* to locate a suitable host was not

enhanced by excretory or secretory products of a highly susceptible host.

However, *T. heterouncinata* apparently used physical and/or chemical cues to locate its unique settlement site. Thus, preferences of other epibionts for cues not associated with the aperture may explain, in part, the lack of epibiotic colonization of this region of living gastropods.

I also examined whether host defenses (physical, mechanical, or chemical) prohibited settlement of *T. heterouncinata* (Chapter 3). Sabellid settlement was apparently not affected by active mechanical or chemical defenses. However, several passive defenses, restricted to certain species, seemingly affected settlement of *T. heterouncinata*. Thus, I did not detect any defensive mechanisms that might broadly explain the scarcity of settlement of fouling organisms in the aperture of living gastropods.

Finally, I identified patterns of susceptibility among 15 South African marine gastropod species to determine whether patterns of susceptibility to *T. heterouncinata* are broadly applicable among hosts from South Africa (where the sabellid is native) and from California (where the sabellid was introduced) (Chapter 4). While general patterns of host susceptibility were similar for the two geographic regions, most Californian hosts were significantly more susceptible to *T. heterouncinata* than were their South African counterparts. These differences in susceptibility suggest that co-evolved adaptations likely exist in these native hosts, while they are lacking in naïve California hosts.