

MASTER'S THESIS

Aspects of the ecology of *Musculista senhousia* (Benson in Cantor, 1842) and its biological role on intertidal beaches in Hong Kong

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Aspects of the Ecology of *Musculista senhousia* (Benson in
Cantor, 1842) and its Biological Role on Intertidal Beaches
in Hong Kong

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Abstract

This study investigated aspects of the biology of the thin-shelled mussel *Musculista senhousia* (Bivalvia: Mytilidae) (Benson in Cantor, 1842) and its ecological role on a sandy beach habitat of Hong Kong.

The study involved an initial investigation of four sandy beach habitats with differences in aspect, exposure conditions, faunal composition and substrate characteristics within a single bay in an undisturbed marine protected area to elucidate factors that may influence the distribution and occurrence of *M. senhousia*. The relationship between faunal composition and beach geomorphology also provided an indication of the biodiversity of the sandy beaches within an undisturbed marine protected area.

In most studies, nest building behavior and byssal mats of *M. senhousia* have a destructive effect on the diversity of faunal communities of sheltered sandy beaches. However, this study has shown that the presence of a byssal mat has a constructive effect on dynamic sandy beaches, primarily, by stabilizing the substrate for epifauna and increasing the diversity in such habitats. Seasonal variations in hydrological conditions enhance the diversity of this habitat.

A comparative study of population characteristics, growth and reproductive biology of *M. senhousia* was carried out at three areas (Hoi Ha Wan, Tai Tam Bay and Tung Chung Bay). These stations represent a range of hydrographic, exposure conditions, substrate type and degree of human

activity. The study of population dynamics was undertaken from November, 1996 to June, 1998 in Hoi Ha Wan; and from August 1997 to August 1998 in Tai Tam Bay and Tung Chung Bay. A comparative study of the reproductive biology of the mussel was undertaken at Hoi Ha Wan, located in north-east of Hong Kong, and Tung Chung Bay, located in the western part of Hong Kong during the same period.

M. senhousia can establish a byssal mat community on both muddy and sandy substrates. The density of *M. senhousia* in the byssal mats varied from 32,500 mussels m^{-2} (in Hoi Ha) immediately after settlement, and would gradually decrease to about 2,100 mussels m^{-2} in a stable community (in Tung Chung). Populations of the bivalve tend to have a unimodal size frequency distribution. The maximum size of mussels collected was 32mm in Tung Chung; and 16mm and 17mm in Hoi Ha and Tai Tam, respectively. The growth rate of the species was $8.13 \text{ mm}\cdot\text{yr}^{-1}$ in Hoi Ha, $6.86 \text{ mm}\cdot\text{yr}^{-1}$ in Tai Tam and $5.27 \text{ mm}\cdot\text{yr}^{-1}$ in Tung Chung. Mortality ranged from 32.8% in a sheltered habitat (Tung Chung) to 86.9% in an dynamic habitat (Hoi Ha). The estimated life span of *M. senhousia* was less than two years. However, the observed life span in Hoi Ha was less than one year owing to recurring catastrophic mortality at approximately one year intervals, due to heavy sedimentation of the sandflats during typhoons or periods of heavy rainfall.

Reproductive studies show that *M. senhousia* is dioecious, with a sex ratio of 1:1. The species is precocious with sexual maturity attained between 2-4 mm shell length, equal to an age of about two months after settlement. *M. senhousia* has a continuous reproductive cycle. Gametogenesis and the spawning period are asynchronous

between individuals. Spawning activity is continuous throughout the year, with maximum occurrence from July to November. Recruitment was recorded from June to February with maximum recruitment settlement occurring after catastrophic mortality in Hoi Ha Beach in June 1997 and July 1998.

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