

Primary Research Paper

## Factors regulating the breeding and foraging activity of a tropical opisthobranch

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Received 15 September 2005; in revised form 4 April 2006; accepted 26 April 2006; published online 29 July 2006

**Key words:** *Hydatina*, copulation, spawning, settlement, reproduction

### Abstract

This study investigated the influence of environmental factors on the foraging cycle, breeding activity, settlement and growth of the opisthobranch *Hydatina physis* using laboratory trials and field observations. Results showed that *H. physis* follows a nocturnal circadian rhythm mediated by photic intensity and modulated by food availability. The adults foraged between 1900 and 0530 h, with an activity peak between 2000 and 2200 h, and remained inactive and burrowed in the sand during the day. This pattern was clearly influenced by cloud cover, rain and laboratory manipulated light:dark cycle. The reproduction of *H. physis* was primarily influenced by the lunar cycle. For 4 consecutive months, hermaphroditic reciprocal copulation, preceded by pre-copulatory courtship behaviour, occurred at night 5–7 d before the full moon. Spawning occurred 3–5 d later for up to 5 consecutive nights, the egg mass gradually decreasing in size with each spawning. An overcast sky or rain prevented or delayed both copulation and egg release. Settlement of veligers was largely influenced by the nature of the substrate. In multiple-choice experiments, settlement occurred predominantly on sand containing cirratulid polychaetes. The juveniles reached ca. 3.9 mm in shell length after 5.5 months growth.

### Introduction

The green-lined paper-bubble *Hydatina physis* Linnaeus, 1758 is an opisthobranch gastropod that occurs circum-globally in shallow tropical waters of the Atlantic and Indo-Pacific (Rudman, 1972; Kilburn & Rippey, 1982; Wirtz, 1999; Abbott & Dance, 2000). Even though *H. physis* is widely distributed and is attractive to aquarists and shell collectors (Kilburn & Rippey, 1982), data on its biology remain scarce and mostly anecdotal. According to Beeman (1977), opisthobranch populations tend to be sporadically explosive, which can partially account for the rarity of published data on their reproductive habits.

Although comparative and taxonomical work on *H. physis* dates back to the early 1900s (reviewed by Marcus & Marcus, 1967), the detailed anatomy of the species was only described fairly recently by Rudman (1972). It feeds on worms, mainly cirratulid polychaetes (Rudman, 1972; Kilburn & Rippey, 1982). Allan (1959) and Kilburn & Rippey (1982) mentioned that members of the family Hydatinidae usually burrow superficially in sand or mud and that *H. physis* is found in protected bays and estuaries among seagrass beds. The species also occurs on rocky shores and coral reefs in Australia (Allan, 1959). To our knowledge, the reproductive biology of the whole Hydatinidae family has yet to be thoroughly