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SINGAPORE MOLLUSCA: 4. THE FAMILY AMATHINIDAE (GASTROPODA: HETEROBRANCHIA: PYRAMIDELLOIDEA)

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ABSTRACT. — The family Amathinidae is reviewed in the 4th part of a group-by-group treatment of the molluscs of Singapore. *Amathina tricarinata*, a gastropod that parasitises other molluscs, is the only species recorded from Singapore in the Amathinidae.

KEY WORDS. — Mollusca, Amathinidae, *Amathina tricarinata*, Singapore, records

INTRODUCTION

The Amathinidae is a small gastropod family with some five or six included genera (Ponder, 1987). The biology of amathinids remains poorly understood. The animals are ectoparasites on other molluscs (Fig. 1), and based on anatomical features, the animals are assumed to feed on the body fluids of their hosts (Ponder, 1987).

In this part of a series of group-by-group treatments of the molluscs found in Singapore (see S. K. Tan & Low, 2013a, 2013b, 2013c), the family Amathinidae Ponder, 1987, is reviewed and *Amathina tricarinata* (Linnaeus, 1767), is the only member recorded to date.

MATERIAL AND METHODS

Relevant literature on the taxonomy of the family Amathinidae was reviewed. Records of the species of the family were compiled from the available literature, and relevant material in collections was examined. Primary synonyms and records mentioning Singapore are listed. The specimens examined for this study are deposited in the Zoological Reference Collection (ZRC) of the Raffles Museum of Biodiversity Research (RMBR), National University of Singapore (NUS). Measurements are given in the form of shell length (SL) × shell width (SW). Shell length is defined as the distance from the anterior edge to the posterior end of the shell, placed flat with the aperture facing down, while shell width refers to the widest point perpendicular to the shell length. All measurements are in millimetres (mm).

SYSTEMATIC PART

SUPERFAMILY PYRAMIDELLOIDEA J. E. GRAY, 1840

Pyramidellidae J. E. Gray, 1840: 117, 148 (type genus *Pyramidella* Lamarck, 1799).

FAMILY AMATHINIDAE PONDER 1987

Amathinidae Ponder, 1987: 29 (type genus *Amathina* J. E. Gray, 1842).

Genus *Amathina* J. E. Gray, 1842

Amathina J. E. Gray, 1842: 63 (type species *Patella tricarinata* Linnaeus, 1767, by subsequent monotypy by J. E. Gray, 1847: 157).

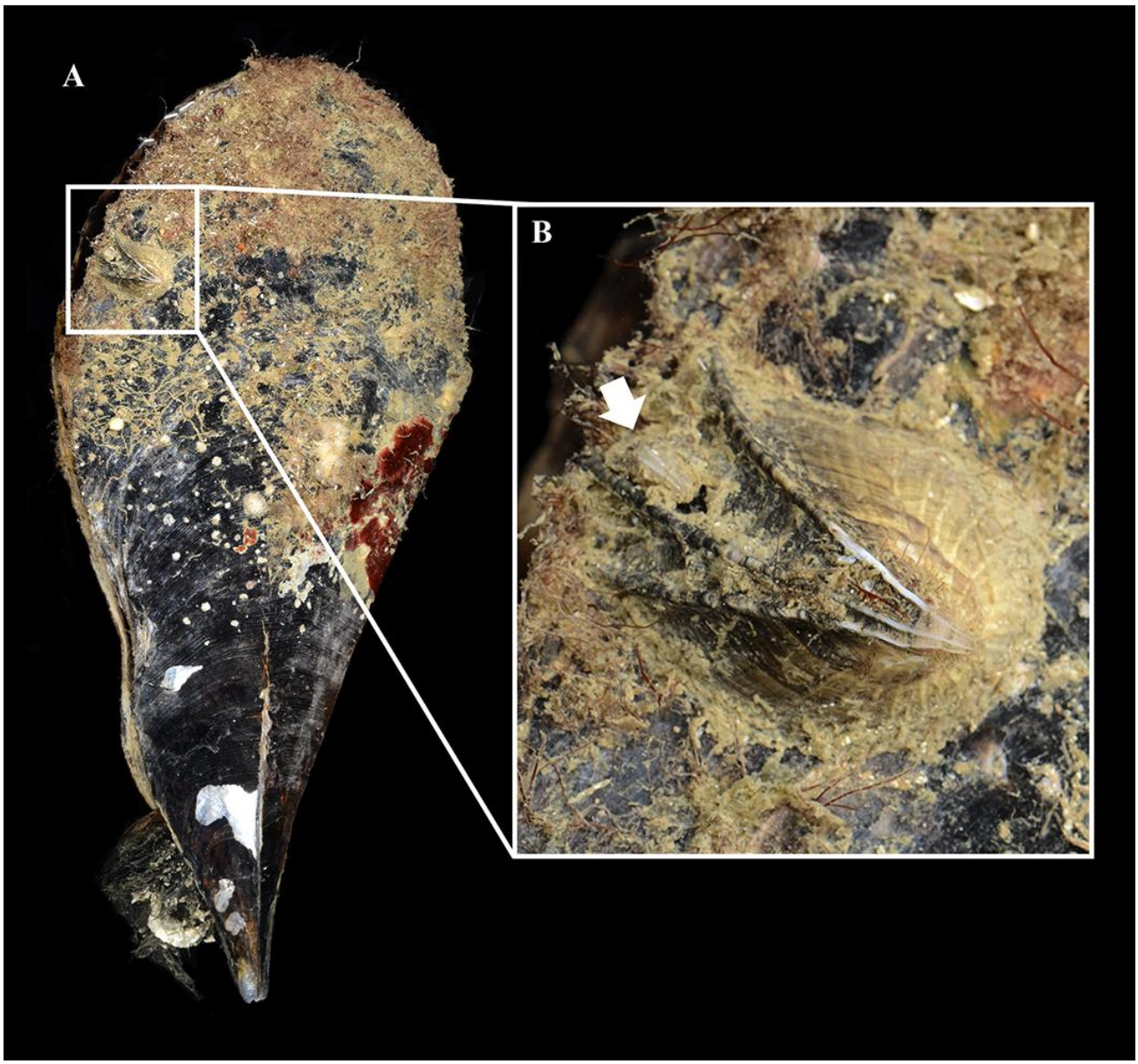

Fig. 1. Two live specimens of *Amathina tricarinata* (Linnaeus, 1767) (ZRC.MOL.5645 [CMBS SS-1148]) from Pulau Semakau attached on *Pinna atropurpurea* G. B. Sowerby I, 1825: A, the position of the animals on the host; B, a close up view of the animals with the smaller animal denoted by the arrow (see Fig. 3: A–C, G–I). (Photographs by: Rene Ong).

Amathina tricarinata (Linnaeus, 1767)

(Figs. 1–3)

Patella tricarinata Linnaeus, 1767: 1259 (type locality: none stated/traced [also see Ponder, 1987: 30]).
Patella tricostata Gmelin, 1791: 3698 (type locality: Indian Ocean) [after Ponder, 1987: 30].
Amathina angustata Souverbie in Souverbie & Montrouzier, 1875: 43 (type locality: New Caledonia) [after Ponder, 1987: 30].

Singapore record:
Amathina tricarinata – S. K. Tan & Woo, 2010: 52.

Material examined. — **Singapore.** Lazarus Island (ZRC.MOL.3246), 28 Aug.2011; Pulau Semakau (ZRC.MOL.5645 [CMBS SS-1148]; ZRC.MOL.5647 [CMBS SS-5595]), 23 May 2013; Pulau Tekukor (ZRC.MOL.5648 [CMBS SS-2974]), 27 May 2013.

Distribution in Singapore. — See Fig. 2.

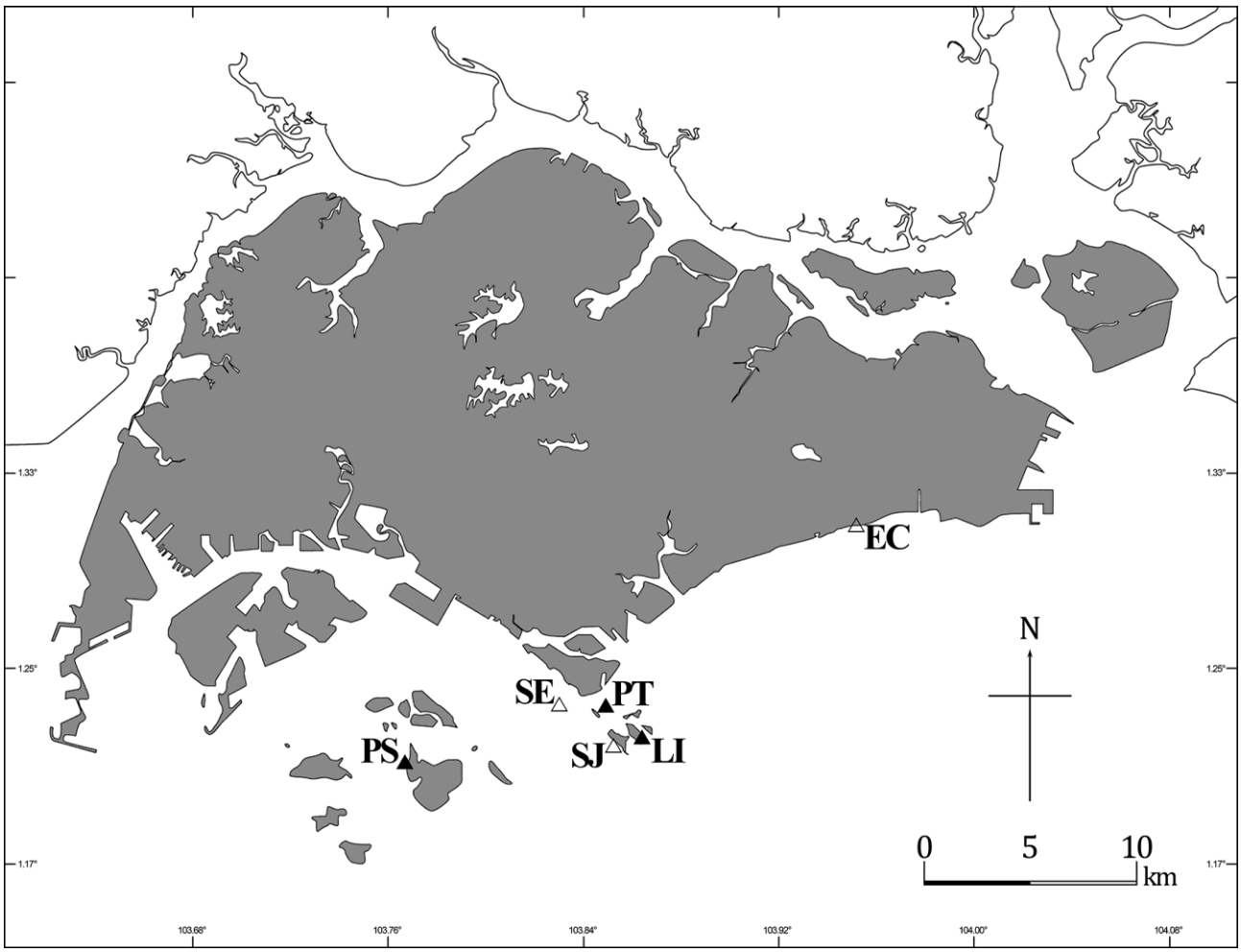

Fig. 2. Distribution of *Amathina tricarinata* (Linnaeus, 1767) (Amathinidae) in Singapore: ▲, records based on material examined; △, records from both published literature and unpublished data. Abbreviations used: EC, East Coast Park (near Sungei Bedok); LI, Lazarus Island (Pulau Sakijang Pelepah); SJ, St. John's Island (Pulau Sakijang Bendera); PS, Pulau Semakau; SE, off Sentosa Island (approximately 1 mile [1.6 km] west-south-west); PT, Pulau Tekukor.

Habitat. — Subtidal, parasitic on large bivalves, usually near the mantle edge around the exhalant siphon (Ponder, 1987), but also reported to live under stones (Swennen et al., 2001). This species appears to be absent in the estuarine conditions of the Johore Straits.

***Diagnosis*.** — The following diagnosis is based on specimens from Singapore and Ponder (1987). Shell thin but solid, cap-shaped, to about 25 mm in shell length; apex incurved, shell whorl rapidly expanding, slightly dextrally orientated; exterior ornamented with three prominent raised spiral ribs that may extend beyond the anterior edge as claw-like processes; posterior end with numerous inconspicuous ribs radiating from the apex. Shell white, covered with straw to brown periostracum in living and freshly dead specimens; periostracum often absent on ribs leaving them white.

***Remarks*.** — The shell of this species is quite unmistakable (see Fig. 3), but the animal in situ may be easily overlooked (see Fig. 1).

This species was first reported from Singapore by S. K. Tan & Woo (2010: 52) and appears to be uncommon. The dearth of information and specimens locally could also be due to a general lack of sampling efforts targeting the subtidal regions. Interestingly, the Malacology Collection of the Academy of Natural Sciences of Drexel University holds two lots of this species from Singapore (ANSP 307866, coll. F. B. Steiner, 1 mile [1.6 km] west-south-west of Pulau Blakang Mati [Sentosa Island], 5 ex.; ANSP 38728, coll. S. Archer, 4 ex.), although these specimens have not been hitherto reported on. These specimens however, have not been examined for this study.

In Singapore, *Amathina tricarinata* has only been found on *Pinna atropurpurea* G. B. Sowerby I, 1825 (Fig. 1A). Other known hosts include the following bivalves: *Anadara* species (Arcidae), *Chama pacifica* (Chamidae), *Ostrea denselamellosa* (Ostreidae), *Atrina pectinata*, *Atrina vexillum*, *Pinna atropurpurea* and *Pinna bicolor* (Pinnidae), *Pinctada radiata* and *Pteria penguin* (Pteriidae), and *Spondylus spinosus* (Spondylidae) (Ponder, 1987; Hori, 2000;

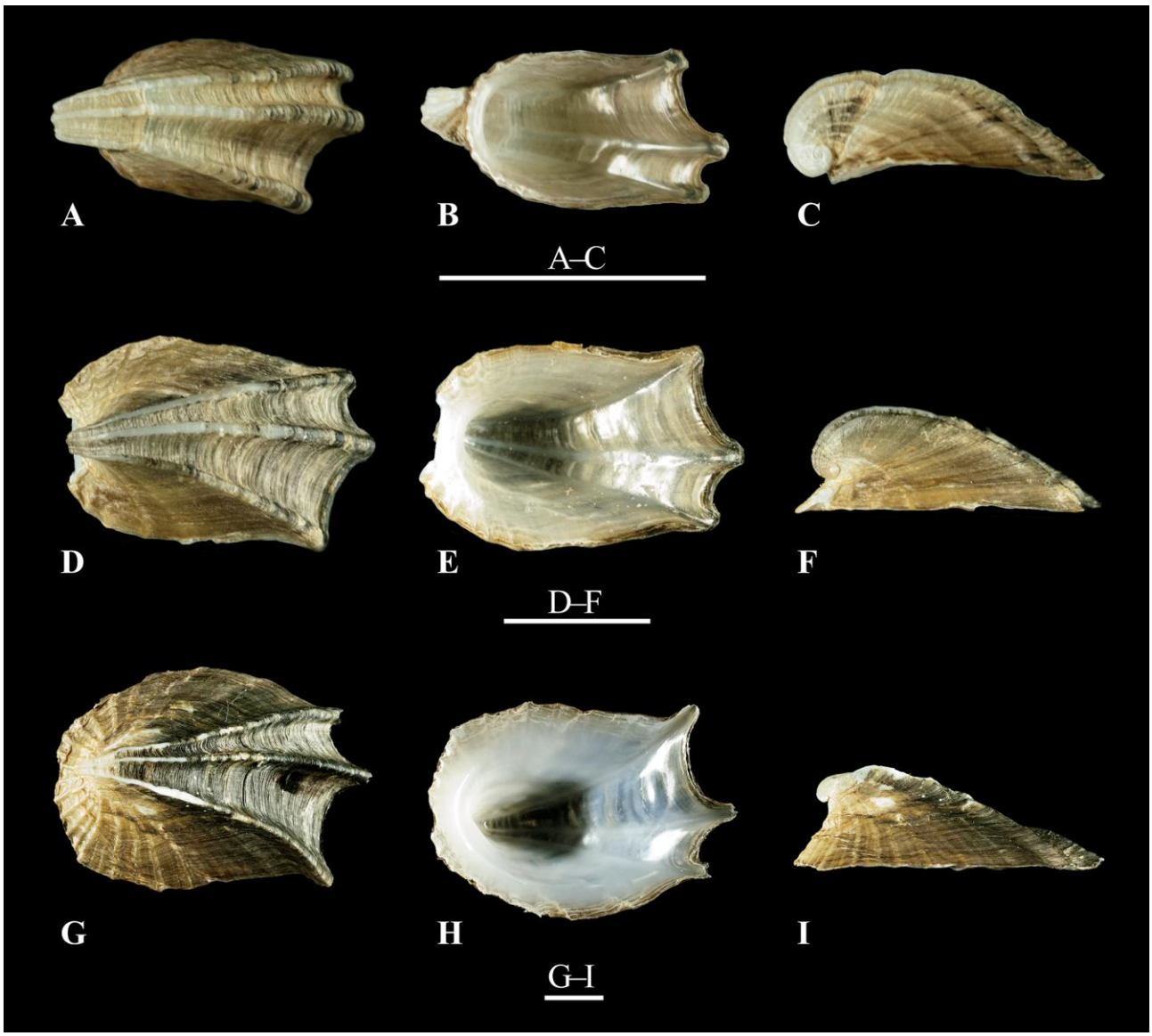

Fig. 3. *Amathina tricarinata* (Linnaeus, 1767), from Singapore showing variations in shell form at different sizes: A–C, SL 5.9 × SW 3.3 mm (ZRC.MOL.5645 [CMBS SS-1148]), Pulau Semakau; D–F, SL 11.0 × SW 7.4 mm [note broken posterior edge] (ZRC.MOL.3246), Lazarus Island; G–I, SL 26.5 × SW 18.6 mm (ZRC.MOL.5645 [CMBS SS-1148]), Pulau Semakau. Scale bars = 5 mm. (Photographs by: S. K. Tan).

Çeviker & Albayrak, 2006; Mienis, 2006). It is likely that *Amathina tricarinata* is found on other host species in Singapore.

Amathina tricarinata has been introduced into the Mediterranean, where it is apparently well established (Çeviker & Albayrak, 2006; Mienis, 2006). The known distribution of this species is from the Red Sea in the west to Japan and Australia in the east (Thiele, 1925; Hori, 2000; Mienis, 2006). Anatomical details of *Amathina tricarinata*, and notes on its biology and systematics were provided by Ponder (1987).

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