

Research Article

Singapore Mollusca: 10. The family Laevidentaliidae (Scaphopoda: Dentaliidae), including a note on the date of publication of *Dentalium incertum* Deshayes

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Abstract

The scaphopod family Laevidentaliidae is reviewed in the tenth part of a group-by-group treatment of the molluscs of Singapore. *Laevidentalium eburneum* (Linnaeus, 1767), is the only species recorded thus far.

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Introduction

The Laevidentaliidae C.P. Palmer, 1974, is a family of scaphopods comprising around twenty living species (Steiner & Kabat, 2001, 2004). At least 70 fossil species have been named, but the generic assignment of many of them remains uncertain (Steiner & Kabat, 2004). Laevidentaliid shells are typically glossy and white, and generally do not bear longitudinal sculpture (Lamprell & Healy, 1998). Like other scaphopods, members of the family prey mainly on foraminifera, which they capture with their captacula (i.e. thin tentacles with a bulbous tip) (Shimek, 1998; Reynolds, 2002; Glover *et al.*, 2003). The animals occur in silty, muddy to coarse sandy substrata and their foot is well adapted for digging into the sediment (Shimek & Steiner, 1997; Reynolds, 2002).

In this part of a series of group-by-group treatments of the molluscs found in Singapore (e.g., Tan & Low, 2013a, 2013b; Ng *et al.*, 2014; Lee *et al.*, 2015), the scaphopod family Laevidentaliidae C.P. Palmer, 1974, is reviewed. Only one species, namely *Laevidentalium eburneum* (Linnaeus, 1767), has been recorded to date. Notes of interest, including local historical records and distribution, and a mention on the publication date of *Dentalium incertum* Deshayes, 1826, are provided.

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Material and methods

Records were collated from the available literature, and geographically-relevant material in collections were examined. Primary synonyms and records mentioning Singapore are listed. Abbreviations of the collections from which specimens were examined in the course of this study are: ZRC = Zoological Reference Collection of the Lee Kong Chian Natural History Museum, National University of Singapore; TSK = collection of Tan Siong Kiat, the first author; CLN = Collection of Leo Nguang, the third author; and CSY = Collection of Chan Sow Yan. Measurements are given in the form of shell length (SL) × aperture diameter (AP). Shell length is defined as the distance from the apex to the edge of the shell aperture, and aperture diameter is the external diameter of the anterior end of the shell tube. All measurements are in millimetres (mm).

Systematic part

Family Laevidentaliidae C.P. Palmer, 1974

Laevidentaliidae C.P. Palmer, 1974: 120, 121 (type genus *Laevidentalium* Cossmann, 1888).

Laevidentalium Cossmann, 1888

Laevidentalium Cossmann, 1888: 7 (type species *Dentalium incertum* Deshayes, 1826 [see **Remarks** on date of publication], by original designation; gender neuter).

Remarks. The date of publication of *Dentalium incertum* is conventionally cited as 1825 (e.g., Steiner & Kabat,



Fig. 1. *Laevidentalium eburneum* (Linnaeus, 1767), from Singapore: A, ZRC.MOL.3231, dredged off Marina East, 5-15m depth; B, ZRC.MOL.5836, stn. DW4 (JS-0965), near Pulau Sekudu, 1°24.176'N 103°59.489'E, dredged 6.9-7.3 m, coarse sand; C, same data as A; D, ZRC.MOL.5839, stn. DW 117, off Changi, 1°23.619'N 103°59.441'E, beam trawl 5.3-9.9 m, muddy. Scale bar = 10.0 mm.

2001: 446; 2004: 601). The name *Dentalium incertum* was made available in a publication entitled “Anatomie et monographie du genre Dentale” in the second part of the second volume of the *Mémoires de la Société d’Histoire naturelle de Paris* which has the date “Avril 1826” on the title-page. Following Article 21.2 of the *International Code of Zoological Nomenclature* (ICZN, 1999: 22), the year of publication of *Dentalium incertum* is herein accepted as 1826.

***Laevidentalium eburneum* (Linnaeus, 1767)**

(Figs. 1–3)

Dentalium eburneum Linnaeus, 1767: 1264, sp. 789 (type locality: India [“Habitat in India”]).

Dentalium annulare G.B. Sowerby I, 1828: 199 (type locality: “East Indies”).

Dentalium indicum Chenu, 1843: pl. 3, fig. 11, caption to pl. (type locality: Indian Ocean [see Chenu, 1850: 4; Steiner & Kabat, 2004: 602]).

Dentalium philippinarum G.B. Sowerby II, 1860: 98, 99, pl. 225, fig. 54 (type locality: Samar Island, the Philippines).

Dentalium subrectum Jeffreys, 1883: 661 (type locality: the Philippines).

Dentalium bisinuatatum André, 1896: 397, pl. 17, fig. 9 (type locality: Ambon, Indonesia [“Amboine”]).

Singapore records:

Dentalium eburneum – Carpenter, 1864: 648 [first record]. — Carpenter, 1865: 59. — Carpenter, 1872: 648 [p. 134 of reprint pagination] (after Carpenter, 1864). — Anonymous, 1878: 97. — Pilsbry & Sharp, 1897: 116. — Bossevain, 1906: 53. — Porter, 1911: 460. — K.V.W. Palmer, 1958: 119 (after Carpenter, 1864, 1865).

Dentalium (Laevidentalium) eburneum – Tesch, 1920: 85. — Oostingh, 1923: 157.

Dentalium (Rhabdus) eburneum – Ludbrook, 1954: 94.

Episiphon subrectum – Oliver, 1984. — Tan & Woo, 2010: 22 (after ANSP).

Laevidentalium eburneum – Tan & Woo, 2010: 22. — Wang *et al.*, 2011: 495.

Material examined. Singapore: > 100 ex. (not measured [mostly broken and incomplete tube sections]) (CLN), East Coast Park, amongst beach debris and sand, coll. Leo Nguang, 1991–1994; 4 ex. (not measured) (CSY 581.1.1.1), West Coast Park, coll. S. Y. Chan, 11 Mar.1994; 1 ex. (SL 53.6 × AP 4.3 mm) (ZRC.MOL.5833), dredged off Bedok Jetty, coll. 8 Aug.1994; 1 ex. (SL 40.2 × AP 3.5 mm) (ZRC.MOL.5831 [ex TSK]), National Service Resort and Country Club, amongst shell grit, coll. S. K. Tan, 14 Nov.2004; 2 ex. (larger SL 57.9 × AP 4.0 mm) (ZRC.MOL.3232), near Pulau Tekong, Van Veen grab 16.5m depth on sandy bottom, coll. Ang Hwee Peng & Charles Wong, 24 Jan 2005; 4 ex. (largest SL 53.7 × AP 3.9 mm) (ZRC.MOL.3231), dredged off Marina East, 5–15m depth, coll. Sin Tsai Min, Ang Hwee Peng, Larry Lim & Michelle Lee, 23 Mar. 2006; 8 ex. (SL 23.2 × AP 2.7 mm–SL 59.6 ×

AP 4.8mm) (CLN), Changi Ferry Terminal, coll. Leo Nguang, Aug.2006; 1 ex. (SL 71.9 × AP 5.2 mm) (CLN), Changi East Bay (Red Cliff Shoal), coll. Leo Nguang, 5 Nov.2006; 3 ex. (largest SL 39.2 × AP 3.2 mm) (ZRC.MOL.5832), off southeast Pulau Ubin (Chek Jawa), dredged 5–6 m depth on sandy mud, coll. R. von Cosel & S. K. Tan, 21 Nov.2008; 1 ex. (SL 34.6 × AP 3.2 mm) (ZRC.MOL.5841), stn. CMBS-D06, between Pulau Ubin and Pulau Tekong, dredged, muddy sand, coll. CMBS, 6 Mar.2012; 3 ex. (largest SL 54.2 × AP 4.0 mm) (ZRC.MOL.5853), stn. CMBS-D15, Malang Papan beacon south of Pulau Sekudu, 01°24.068’N 103°59.420’E, dredged, coll. CMBS, 7 Mar.2012; 2 ex. (larger SL 65.9 × AP 4.5 mm) (ZRC.MOL.5835), stn. D22, off Pulau Serangoon, 1°24.433’N 103°55.958’E, dredged, coll. CMBS, 8 Mar.2012; 1 ex. (SL 41.2 × AP 3.1 mm) (ZRC.MOL.5851), stn. CMBS D23, off NW Pulau Ubin, 01°25.712’N 103°55.588’E, dredged 5.2–5.5 m, mud, coll. CMBS, 8 Mar.2012; 2 ex. (larger SL 39.0 × AP 2.9 mm) (ZRC.MOL.5836), stn. DW4 (JS-0965), near Pulau Sekudu, 1°24.176’N 103°59.489’E, dredged 6.9–7.3 m, coarse sand, coll. CMBS, 16 Oct.2012; 2 ex. (larger SL 46.8 × AP 4.1 mm) (ZRC.MOL.5838), stn. DW27, off Chek Jawa, 1°24.927’N 103°59.980’E, beam trawl 19.1–9.9 m, muddy, coll. CMBS, 18 Oct.2012; 4 ex. (largest SL 54.1 × AP 4.1 mm) (ZRC.MOL.5834), stn. DW29, off Chek Jawa, 1°24.954’N 103°59.906’E, beam trawl 13.4–24.7 m, sandy and muddy bottom, coll. CMBS, 18 Oct.2012; 1 ex. (SL 37.0 × AP 4.4 mm) (ZRC.MOL.5837), stn. DW39, off Ubin Jetty, beam trawl 15 m, 1°23.608’N 103°58.355’E, coll. CMBS, 19 Oct.2012; 1 ex. (SL 69.7 × AP 4.3 mm) (ZRC.MOL.5839), stn. DW 117, off Changi, beam trawl 5.3–9.9 m, muddy, 1°23.619’N 103°59.441’E, coll. CMBS, 29 Oct.2012; 1 ex. (SL 51.7 × AP 4.0 mm) (ZRC.MOL.5852), stn. 5114DR1, near Pulau Seringat, 01°14.017’N 103°51.535’E, dredged 14.7–14.8 m, muddy bottom, coll. CMBS, 4 Jan.2013; 2 ex. (larger SL 31.4 × AP 2.5 mm) (ZRC.MOL.5843), stn. 5316-DR2, outside Tanjong Rhu, 01°16.899’N 103°53.825’E, dredged 19.5–20.7 m, coll. CMBS, 14 Jan.2013; 3 ex. (largest SL 61.6 × AP 4.5 mm) (ZRC.MOL.5840), East Coast (off PA campsite), 01°18.289’N 103°57.068’E, dredged 10.9–9.1 m on mud, coll. CMBS, 24 Jan.2013; 1 ex. (not measured [apex broken]) (ZRC.MOL.5841), stn. 5215DR1 (56), ~500 m off Marina Bay Sands, 01°15.263’N 103°52.161’E, dredged 9–7 m, muddy bottom, coll. CMBS, 21 Mar.2013.

Distribution in Singapore. See Fig. 2.

Habitat. In sandy to silty mud substrata. Live specimens collected in relatively shallow depths of less than 30 m deep in Singapore (this study) and 6–33 m in New Caledonia (Scarabino, 2008), but found in deeper depths to some 200 m in Indonesia and the Philippines (Scarabino, 1995).

Diagnosis. Shell rather thin, long and slender, to more than 70 mm in shell length, attenuated posteriorly, moderately arcuate; shell colour white, smooth and shiny, with numerous irregularly positioned swollen rings along the length; aperture sub-circularly ovate,

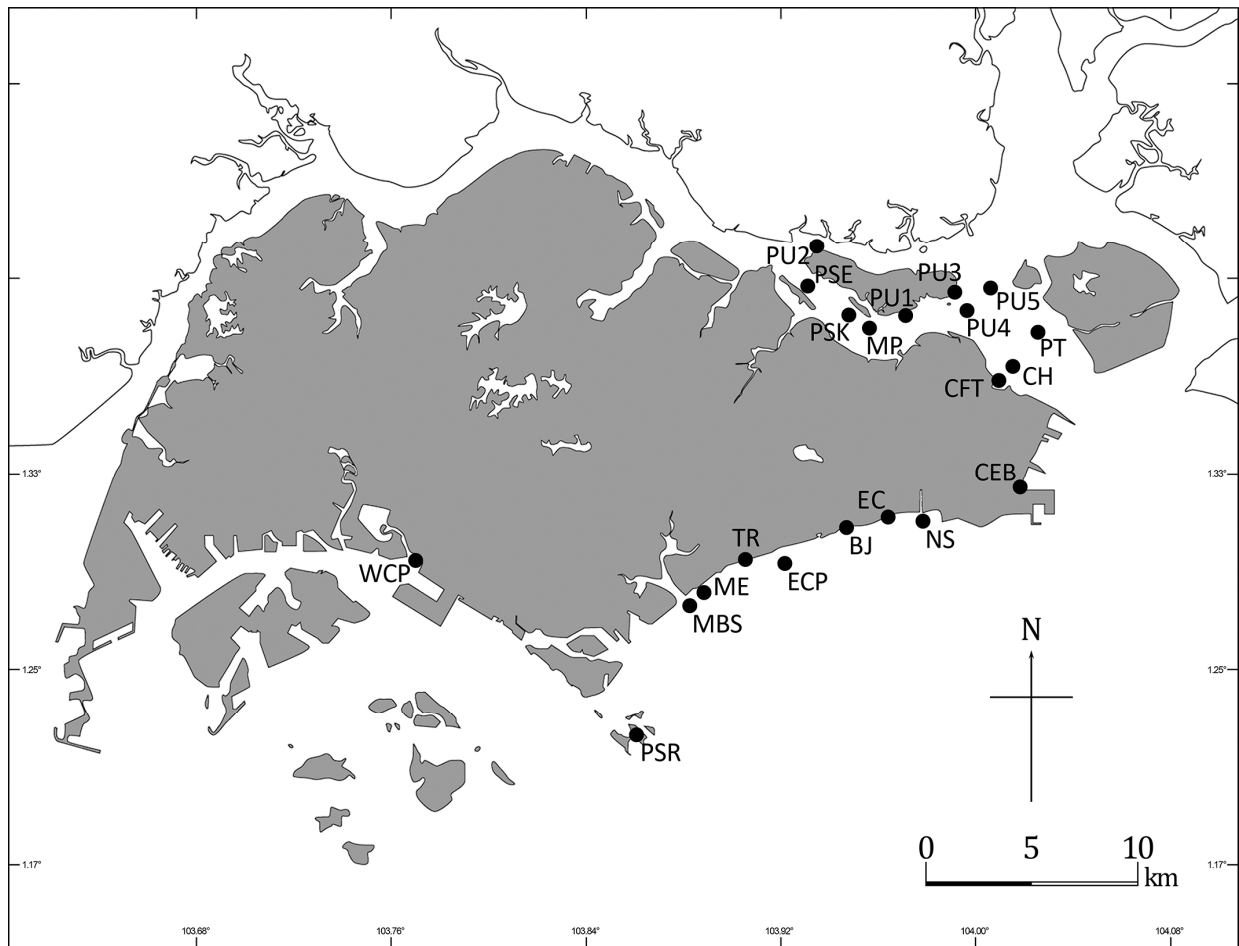


Fig. 2. Distribution of *Laevidentalium eburneum* (Linnaeus, 1767), in Singapore: BJ, off Bedok Jetty; CEB, Changi East Bay (Red Cliff Shoal); CFT, Changi Ferry Terminal; CH, off Changi; EC, East Coast (off PA campsite); ECP, East Coast Park; ME, off Marina East; MP, Malang Papan beacon south of Pulau Sekudu; MSB, off Marina Bay Sands; NS, National Service Resort and Country Club; PSE, off Pulau Serangoon; PSK, near Pulau Sekudu; PSR, Pulau Seringat; PT, near Pulau Tekong; PU1, off Ubin Jetty; PU2, NW Pulau Ubin; PU3, Chek Jawa; PU4, off Chek Jawa; PU5, between Pulau Ubin and Pulau Tekong; TR, outside Tanjong Rhu; WCP, West Coast Park. All localities based on material examined.

narrower at the dorsal (concave) side; peristome thin; apical orifice small, with or without a slight notch (or two).

Remarks. This species is easily recognised by its smooth shell with irregular swollen rings (Fig. 1), which also makes it unlikely to be confused with most other dentaliids thus far recorded from Singapore (see Tan & Woo, 2010). Small juvenile *Laevidentalium eburneum* may possibly be confused with *Episiphon subtorquatum* (Fischer, 1871) because of the similarly smooth shell without distinct sculpture. However *Episiphon subtorquatum* is a much smaller species, around 15 mm or less in shell length, and can be distinguished from juvenile *Laevidentalium eburneum* by the presence of closely set annulations from the apex to around the middle of the shell (see Scarabino, 1995: fig. 95c, 2008: fig. 1t; Lamprell & Healy: 104–105, fig. 109 [as *Omniglypta anulosum*]).

Steiner & Kabat (2004: 569) recognised *Dentalium bisinuatum* André, 1896, as a distinct and valid species of *Laevidentalium* Cossmann, 1888, but discussed that it

could be conspecific with *Dentalium eburneum* Linnaeus, 1767. More recently, Scarabino (2008: 242) formally synonymised *Dentalium bisinuatum* André, 1896, with *Dentalium eburneum* Linnaeus, 1767.

Steiner & Kabat (2004: 651) discussed that *Dentalium subrectum* Jeffreys, 1883, and by extension, *Dentalium (Episiphon) virgula* Hedley, 1903, could be synonymous with *Laevidentalium eburneum* (Linnaeus, 1767). The matter has been resolved by Scarabino (2008: 242), who formally synonymised *Dentalium subrectum* Jeffreys, 1883, with *Laevidentalium eburneum* (Linnaeus, 1767) after examining the holotype (figured by Scarabino, 2008, as fig. 1r), and *Episiphon virgula* (Hedley, 1903), is revalidated. Consequently, and unless there is future evidence to show otherwise, previous records of *Episiphon subrectum* (Jeffreys, 1883), in Singapore (e.g., Tan & Woo: 2010: 22), should be regarded as *Laevidentalium eburneum* (Linnaeus, 1767).

The date of publication of the paper by G.B. Sowerby I in the *Zoological Journal* in which *Dentalium annulare* was

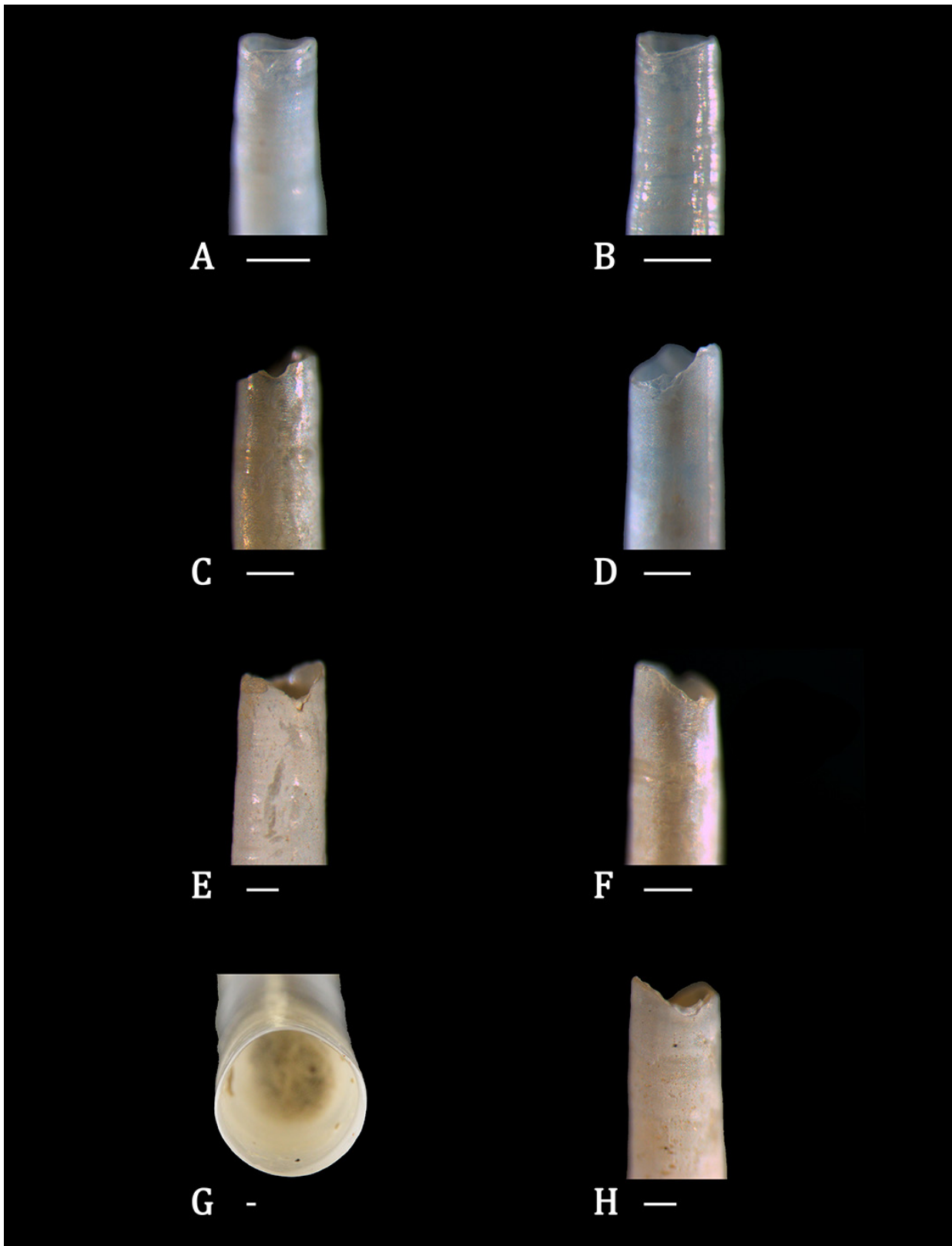


Fig. 3. Specimens of *Laevidentalium eburneum* (Linnaeus, 1767), from Singapore: apical sections: A–B, ZRC.MOL.3231; C, ZRC.MOL.5836; D, ZRC.MOL.3231; E, ZRC.MOL.5839; F, ZRC.MOL.5836; H, ZRC.MOL.5839 dorsal. G, ZRC.MOL.5839, anterior view showing the sub-circularly ovate aperture that is usually narrower at the dorsal (concave) side typical. Scale bars = 0.25 mm.

described is conventionally cited as 1829, following the date on the title-page of the fourth volume of the journal (e.g., Steiner & Kabat, 2004: 562). However, the relevant part of the journal in which the article was published appeared in October 1828 (see Petit, 2009: 61).

Discussion

The Malacology Collection of the Academy of Natural Sciences of Drexel University holds five lots of this species from Singapore (ANSP 319405: coll. R.D. Purchon, Bedok; ANSP 35558, and ANSP 35559: coll. Archer; ANSP 35557, and ANSP 35561), which have not been hitherto reported on. These specimens were not examined for this study, but we nevertheless consider misidentification unlikely.

Interestingly *Laevidentalium eburneum* appears to be exceedingly rare in the western part of Singapore. Nearly all of the specimens examined for this study, except one lot (CSY 581.1.1.1), were collected from locations around the eastern part (see Fig. 2, and **Material examined**). No fresh material was recovered in recent sampling efforts in the western side. The reasons behind this phenomenon remain unclear. Biases in sampling locations and methods appear unlikely because the recently collected material examined was obtained from the samplings made by the Comprehensive Marine Biodiversity Survey (CMBS) of Singapore which covered numerous locations in the western side of the territorial waters of Singapore. Studies of the substrate types and composition and currents may possibly offer answers, but is beyond the scope of the present study.

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