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REASSIGNMENT OF *BATILLARIA SORDIDA* (GMELIN) FROM THE CERITHIIDAE TO THE POTAMIDIDAE (GASTROPODA: PROSOBRANCHIA)

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Abstract.—*Batillaria sordida*, formerly known as *Cerithium carbonarium*, *C. bornii* or *C. tourannense*, is shown to be a potamidid snail that is convergent in shell characters with some *Cerithium* and *Clypeomorus* species. A synonymy and redescription are presented and the geographic range is given.

While revising the Indo-Pacific Cerithiidae, I examined several lots of a little-known potamidid species from the continental coasts of China and Vietnam that has often been considered a cerithid in older monographic papers and known as *Cerithium carbonarium* Philippi, 1848 or *Cerithium bornii* Sowerby, 1855. It is not frequently mentioned in the modern literature, and most museums have only a few lots of poorly preserved or badly eroded specimens. Shells of this species are stocky, proportionately heavy, have a distinctive sculpture of two spiral rows of black nodes on each whorl, and short but distinct anterior canals (Fig. 1a, b, e). Although previously placed in the genus *Cerithium* Bruguière, 1789 by most authors, I regard this species as a member of the family Potamididae H. and A. Adams, 1854 in the genus *Batillaria* Benson, 1842. I will refer to it as *Batillaria sordida* (Gmelin, 1791), employing the earliest available name. The reasons for this taxonomic reassignment are herein discussed and a synonymy and redescription presented.

Family Potamididae H. and A. Adams, 1854
Batillaria Benson, 1842
Batillaria sordida (Gmelin, 1791)
Fig. 1

Strombus tuberculatus Born, 1778:284 (no locality given; refers to Martini, Conch. Cab., 4, pl. 157, fig. 1490; *non* Linnaeus, 1767).—Born, 1780:284, pl. 10, figs. 16–17.

Murex sordidus Gmelin, 1791:3561 (no locality given; refers to Martini, Conch. Cab., 4, pl. 157, fig. 1490, herein selected to represent lectotype).

Cerithium morus Bruguière, 1792:500–501 [in part], ("mer Méditerranée"; refers to figures of Lister, Synopsis Method. Conch., tab. 1024, fig. 89; Seba, Locup. rerum naturo . . . etc., pl. 55, fig. 21; Born, Test. Mus. Caes. Vindo.; pl. 10, figs. 16–17; Martini, Conch. Cab., pl. 157, fig. 1490; *non* Lamarck, 1822).

Murex varicosus Röding, 1798:99, no. 1278 (no locality given; refers to Martini, Conch. Cab., 4, pl. 157, fig. 1490).

Cerithium carbonarium Philippi, 1848:142–143 (China; no figure; type not found; *non* Reeve, 1865).—Watson, 1886:531 (*in* Thompson and Murray, 1886).—Tryon, 1887:133, pl. 24, fig. 24 (not fig. 34).—Kobelt, 1898: 276–277, pl. 47, figs. 3–4 (*in* Martini-Chemnitz, 1898).—Adal, 1958:126.—Dance, 1974:66.

Cerithium tourannense Souleyet, 1852:601, pl. 39, figs. 3–5 (*in* Vaillant, 1852; Touranne [= DaNang, Vietnam]; lectotype, MHNP, no reg. no., here selected and figured.)

Cerithium bornii Sowerby, 1855:869–870, pl. 182, fig. 175 (Seychelles; type not found).—Reeve, 1865: no. 26, pl. 4, fig. 26.

Batillaria bornii (Sowerby). Kuroda, 1941:89, pl. 15, fig. 5.—Chen, 1960:4.

Description.—Adult shell turrited, stocky consisting of 7–9 inflated whorls and having an apical angle of 40 degrees. Shell ranges in length from 34.2–16.5 mm and 17.0–8.0 mm in width. Each whorl sculptured with 2 prominent spiral cords and numerous fine spiral striae. Spiral cords each with 9–12 black, laterally expanded nodes per whorl. Body whorl greatly inflated and with 5 spiral rows of black nodes. Penultimate and body whorls with distinct sutural ramp. Protoconch unknown and early whorls usually badly eroded. Suture moderately incised. Aperture circular-ovate, a little less than ⅓ length of shell. Columella deeply concave and with weak callous. Outer lip thick, slightly crenulate, extending posteriorly ½ length of penultimate whorl. Anal canal deeply incised and with prominent flattened anal callous. Anterior siphonal canal well-developed, but short and sharply curved to left. Shell color gray with spiral rows of dark brown to black nodes. Operculum thin, corneous, tan, circular and multispiral with central nucleus.

Radular ribbon taenioglossate, about ⅛ the length of shell and consisting of 70 rows of teeth. Face (basal plate) of rachidian tooth rectangular, slightly concave at top. Upper part with large, central pointed cusp flanked by 2 smaller denticles on each side. Base of rachidian with 2 pairs of mid-basal cusps, short, slight central bulge, and thin, elongate lateral extensions. Rachidian formula 2–1–2/2–2. Lateral tooth rhomboidal, serrated at top with 2 small entocones, a large wide mesocone and 2–3 small ectocones, respectively. Base of lateral tooth with wide, deeply extending central process and long, twisted lateral extension. Marginal teeth long, spatulate, serrated at tips with 4 smooth inner cusps. Internal anatomy, eggs and larvae unknown.

Synonymic History

A survey of the monographic literature reveals an interesting and complex synonymic history. *Batillaria sordida* (Gmelin) was first described by Born

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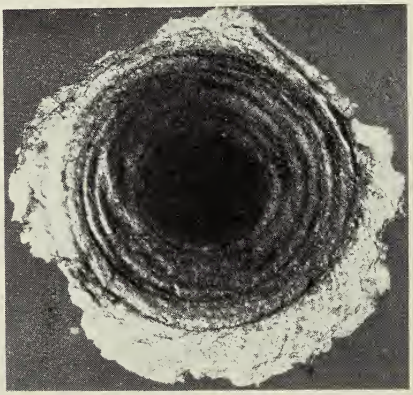

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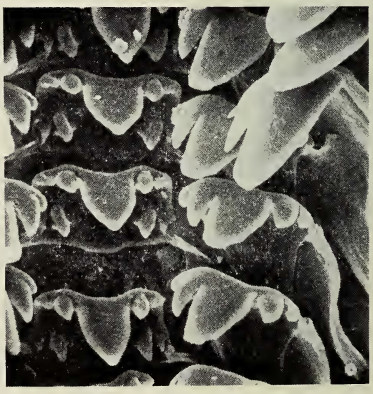

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(1778) as *Strombus tuberculatus*, but this name is preoccupied by that of Linnaeus, 1767. Although Born (1778) initially referred to a figure in Martini (1780, pl. 157, fig. 1490), he later illustrated this species in 1780 (pl. 10, figs. 16–17). Both the Martini and Born figures are excellent representations of *Batillaria sordida* and not easily confused with other similar species. Martini (1780) correctly cited "Chinese waters" as the locality for this species but Born's (1780) citation, "Mari Mediterraneano" should be considered erroneous. Sowerby (1855:865–866), noting that *tuberculatus* was preoccupied, proposed the name *bornii* for this species, but an earlier available name is *Murex sordidus* Gmelin, 1791. It is interesting to note that Gmelin (1791:3561) considered *sordidus* to be a variety of *tuberculatus* Born. Although Gmelin gave no locality, he referred to Martini's (1780) figure (pl. 157, fig. 1490). Röding (1798) named this species *Murex varicosus*, citing *Murex sordidus* Gmelin in the synonymy, and referred to the same Martini figure as did Born (1780). *Cerithium morus* Bruguière, 1792, is undoubtedly a synonym of *sordida*, at least in part. Bruguière (1792) cited four figure references considering the best to be those of Born (1780, pl. 10, figs. 16–17) and Seba (1758, pl. 50, fig. 21, upper right hand corner). With the exception of fig. 89 of Lister (1770), all of Bruguière's figure references for *C. morus* clearly represent *sordida*. Lister's (1770) figure, although poor and not clearly attributable to any species, is definitely not *sordida*. *Batillaria sordida* has also been confused with *Strombus tuberculatus* Linnaeus, 1767. The latter species has a complex synonymic history (see Dodge, 1956) and is considered a *nomen dubium*. Since all of the above authors cited the identical Martini figure (see Fig. 1c, this paper) and Gmelin's type-material has not been found, I herein designate the figure in Martini (1780, Conch. Cab., 4, pl. 157, fig. 1490) to represent the lectotype of *Murex sordidus* Gmelin, 1791 (see Fig. 1c). Philippi (1848), who called this species *Cerithium carbonarium*, did not illustrate it, but in his description noted the two distinctive spiral rows of black nodes on each whorl and cited China as the type-locality. *Cerithium carbonarium* Philippi was synonymized by Sowerby (1855:870) and Reeve (1865, pl. 4, fig. 21, a,b) with *Cerithium tuberculatum* Linneaus, 1767. Both Sowerby and Reeve confused Philippi's

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Fig. 1. *Batillaria sordida* a, b, Specimens from Shanghai, China showing distinctive spiral rows of black nodes and apertural characters (a, 32 mm long; b, 35.5 mm long); c, Figure of Martini (1780: pl. 157, fig. 1490), herein selected to represent lectotype of *Murex sordidus* Gmelin, 1791; d, Operculum of specimen from Long Hai, Vietnam (6.0 mm diameter); e, Lectotype of *Cerithium tourannense* Souleyet, 1852, from DaNang, Vietnam (28.7 mm long); f, Scanning electron micrograph of radula of *Batillaria sordida* from Long Hai, Vietnam (125×); g, Details of rachidian and lateral teeth (500×).

species, *carbonarium*, which has only two rows of spiral nodules, with *tuberculatus* Linneaus, which has three spiral rows. This error was first pointed out by E. A. Smith (1884:65) and later noted by Tryon (1887:133), Watson (1886:531), and Kobelt (1898:276–277), who correctly identified *carbonarium* Philippi with *tuberculatum* Born (*non* Linnaeus, 1767) and *Cerithium bornii* Sowerby. *Cerithium tourannense* Souleyet, 1852 is also a synonym of *Batillaria sordida*. The figures of *tourannense* (Souleyet, 1852, pl. 39, figs. 3–5) are excellent and depict the operculum as multi-spiral and round, an indication that this species is not a cerithid.

The earliest available name for this species is *sordidus* Gmelin, 1791. The use of this name eliminates the nomenclatural confusion surrounding the two more frequently used names for this species, *carbonarium* Philippi and *bornii* Sowerby.

Remarks

Although nearly all authors have referred this species to the genus *Cerithium* Bruguière 1789, I questioned this when I first noticed the potamidid operculum depicted by Souleyet (1852, pl. 39, fig. 5). Several specimens from Long Hai, Vietnam had dried soft parts from which I was able to extract opercula and radulae. The operculum (Fig. 1d) is round, multispiral and has a centrally-placed nucleus that is typical of animals in the family Potamididae; to my knowledge, there are no species in the family Cerithiidae with such an operculum. A radula 4.2 mm long consisting of 75 rows of teeth was dissected from a specimen with a shell length 31 mm long and 13.8 mm wide. The radula (Fig. 1f, g) is typically taenioglossate (2 + 1 + 1 + 1 + 2). The face (basal plate) of the rachidian tooth (Fig. 1g) is rectangular and has 2 cusps arising from each side of its mid-lateral surface. The rachidian formula is 2–1–2/2–2. This pattern is not seen in the rachidian tooth of *Cerithium* species, which lack the mid-basal cusps. No other anatomical observations were made due to poor preservation of the animals.

Both Kuroda (1941) and Chen (1960) correctly referred this snail to the genus *Batillaria* but did not give any reasons for the generic reassignment. I also consider this species to be a member of the genus *Batillaria*. The leftward directed anterior canal, ovate aperture with strongly concave columella and the adjacent, flattened anal callous are typical of *Batillaria* as are the opercular and radular characters. *Batillaria sordida* resembles some cerithids in the genera *Clypeomorus* Jousseaume, 1888, and *Cerithium* Bruguière. Its shell is convergent with those of *Clypeomorus* and *Cerithium* species that occur in high intertidal or high energy environments. Convergence of shell characters is not an uncommon phenomenon between members of the Potamididae and Cerithiidae [e.g. *Cerithium lutosum*

Menke, 1828 and *Batillaria minima* (Gmelin, 1791); *Cerithium coralium* Kiener, 1842, and *Velacumanthus australis* (Quoy and Gaimard, 1834)].

Batillaria sordida lives on rocks in the lower intertidal but may also extend to the midlittoral region (Yen, 1933; Adal, 1958). Although there is no other ecological information available, I suspect that it is primarily an estuarine species, as are most potamidids.

The known geographical distribution of *Batillaria sordida* is limited to the continental coastline of eastern Asia from Chekiang Province, China (Ping, Chi and Teng-Chien Yen, 1932) to Vietnam and to the island of Taiwan. I have examined museum specimens from these localities. In the earlier literature this species was incorrectly recorded from the Seychelles (Sowerby, 1855; Reeve, 1865; Tryon, 1887) and although Kobelt (1898) questioned this locality he cited China and Japan. I believe Japan is an erroneous locality. There is also a questionable record from the Philippines (Watson, 1886).

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APPENDIX

Specimens Examined

China.—Shanghai (MCZ). Bay N of Ngaam Kok, Port Shelter, Hong Kong (ANSP). Hong Kong Harbor (AMNH: ANSP). Cape D'Aquilar, Hong Kong (NMNH). Nan-ta-wu, Amoy (NMNH).

Taiwan.—Kao Hsiung (ANSP). Tanshui Beach (AMNH: ANSP). NW coast of Tam-Sui (NMNH).

Pescadores.—Tung Lian Beach, Makung Id. (AMNH).

Vietnam.—Long Hai, near Vung Tan (AMNH). Chu Lai Bay (NMNH). Touranne (DaNang) (MHNP).

Abbreviations

AMNH American Museum of Natural History. ANSP Academy of Natural Sciences, Philadelphia. NMNH National Museum of Natural History, Smithsonian Institution. MCZ Museum of Comparative Zoology, Harvard. MHNP Museum d'Histoire Naturelle, Paris.