
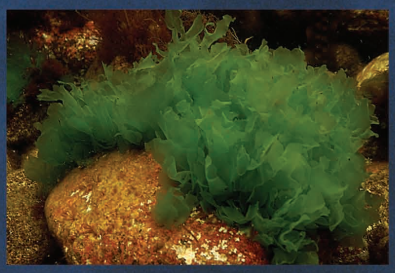


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The Proceedings of the Russia-China Bilateral Symposium *Marine Ecosystems under the Global Change in the Northwestern Pacific* held in the A.V. Zhirmunsky Institute of Marine Biology FEB RAS, Vladivostok, Russia, on October 8–9, 2012 contain extended abstracts and papers dealing with state of marine ecosystems, communities and biotic changes in the northwestern Pacific. The symposium is the third one jointly organized by the IMB FEB RAS and the Institute of Oceanology CAS (two previous meetings were held in Qingdao in 2007 and 2010).

Editor

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Distribution and ecological morphs of northwestern Pacific gastropod *Batillaria attramentaria* (G.B. Sowerby II, 1855) (Caenogastropoda: Batillariidae)

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Intertidal gastropods of the genus *Batillaria* Thiele, 1931 are widely distributed along the east coast of Asia. They inhabit intertidal marine to brackish water, ranging up to about mid-tide level and form a dominate group in the muddy tidal flats, bottom of estuaries and coastal lakes where they may occur in aggregations. Snails of *Batillaria* prefer the zone above mid-tide level to search for their food of organic detritus.

In northwestern Pacific, the most common *Batillaria* species is *B. attramentaria* (G.B. Sowerby II, 1855). Its junior synomyn *B. cumingi* (Crosse, 1862), or *B. cumingii* (erroneous spelling used after Sowerby (1866)) is more frequently used in Chinese, Japanese and Russian literature (Golikov, Scarlato, 1967; Habe, 1970; Volova et al., 1979; Higo et al., 1999; Hasegawa, 2000; Seashells of China, 2004; Kantor, Sysoev, 2006; and many others) and sometimes even with synonym of *B. attramentaria* (Miura et al., 2005; Torchin et al., 2005) in contradiction with International Code of Zoological Nomenclature (ICZN). *B. attramentaria* is distributed mainly in Sea of Japan, Yellow and East China seas. This subtropical-lowboreal species occurs in littoral zone to a depth of 3 m (Adrianov, Kussakin, 1998; Gulbin, 2004).

Batillaria attramentaria extends its native area from Taiwan (Golikov, Scarlato, 1967) and Hong Kong (Golikov, Kussakin, 1978) in the south to south Primorye, southern Sakhalin and South Kuriles in the north (Golikov, Scarlato, 1967, 1985; Golikov, Gulbin, 1978; Golikov et al., 2001; Gulbin, 2006; and others). More southern records of the species are misidentifications. For example, "*B. cumingii*" from north Vietnam (picture N 125 in Thach, 2005) is considered to be not *B. attramentaria* but instead belong to *B. sordida* (Gmelin, 1791). Additionally, *B. attramentaria* was introduced to the west coast of North America with shipment of Pacific oysters, imported from Japan for aquaculture production in the early part of the last century (Bonnot, 1935). First, it was recorded under name *B. multiformis* (Lischke, 1869). Now *B. attramentaria* has become naturalized from Boundary Bay, British Columbia to Elkhorn Slough, Monterey, California (Taylor, 1981; Byers, 1999; Torchin et al., 2005; Ozawa et al., 2009; and others). Latitudinal range of the species is from 50° N (British Columbia) to 20° N (Hong Kong).

Having a rather wide range and shell variable in color (Miura et al., 2007) and form, the species is sometimes misidentified with closely related *B. zonalis* (Brouguerre, 1972) and *B. flectosiphonata* Ozawa, 1996, especially in sympatric populations (Kojima et al., 2001). For example, species identified as *B. flectosiphonata*, endemic for Ryukyu Islands (Kojima et al., 2003), from Jeju Island in a Korean color atlas (Min et al., 2004) is considered to be *B. attramentaria* (T. Ozawa, personal communication).

Taxonomic confusions put obstacles in ecological, zoogeographical and phylogenetic studies. So, here we consider distribution and shell morphology of the *B. attramentaria* from different sites of northwestern Pacific based on published illustrations, specimens stored in Zoological Museum, Far East Federal University (ZMFU), Vladivostok and original material stored in Institute of Biology and Soil Science (IBSS), Far Eastern Branch, Russian Academy of Sciences.

In Russian mainland, distribution of *B. attramentaria* extends from Sivuchja Inlet (Fig. 1D) and Possjet Bays (collection of ZMFU) (Fig. 1C) through the Peter the Great Bay to Vostok Bay (Fig. 1I). Snails are often found in high densities (more than 300 individuals per square metre) grazing on surface microalgae and detritus. Their populations are known in inner parts of Amursky Bay (Fig. 1E–H) in bays of Russky Island, in Popov Island and some other localities (ZMFU and IBSS collections). Continental coastal distribution of *B. attramentaria* is not restricted by the Peter the Great Bay in southern Primorye and it is recorded northward in Kievka Bay (Fig. 1G) and Olga Bay (Fig. 1K) in central Primorye.

Southern Kuril Islands, Kunashir (Fig. 1A) and Shikotan (Fig. 1B) are inhabited by *B. attramentaria* as well (Prozorova et al., 2010; original data from the collection of IBSS). In southern Sakhalin, *B. attramentaria* is recorded in Bousse Lagoon (Kantor, Sysoev, 2006; original data from the collection of IBSS). The latter site is the northernmost edge of native distributional area of the species.

Shells of *B. attramentaria* from both continental and insular Russian sites have a tall, 30 mm and more, spire composed more than 10 slightly-rounded whorls and an acute apex. Russian specimens of *B. attramentaria* quite resemble those from northeastern coast of the Korean Peninsula, where Liman Current flows down (North Korea and Gangwon Province in South Korea), as well as snails of Hokkaido, northwestern Tohoku Region of the Sea of Japan (T. Ozawa, personal communication). This ecological form of the *B. attramentaria* is named *attramentaria*-like morph because of similarity with types of *Lampania attramentaria* Sowerby G.B. II, 1855 (Fig. 1L) from unknown locality (Sowerby G.B., 1855, 1866), stored in the Natural History Museum, London (BMNH). Originally they are syntypes as G.B. Sowerby (l.c.) did not designate any types of *L. attramentaria* in his publications.

The rest of more southern distributional area of the *B. attramentaria* is inhabited by a less tall and elongate (nearly 20 mm in high and 8–10 whorls) *cumingi*-like ecological form, described as *Lampania cumingi* Crosse, 1862. The types are not located, but specimens from the type locality are available from the ZMFU collection (Fig. 2). Type specimens were collected in "sinu Talienwhanensi" (Crosse, 1862; Lischke, 1869), that is, nowadays, Dalian Bay, Liaodong Peninsula, northeastern China. Other records of *Batillaria cumingi* (Grosse) are Tschi-fu (now Cape Chantong), northern China; Korean coast of Yellow Sea; Pehio River, Bohai Bay, Yellow Sea, northern China (Lischke, 1869), South Korea with Jeju Island excluding Gangwon Province (Min at al., 2004; Min-Ho Son, Sung-Yun Hong, 2005; T. Ozawa, personal communication; original data), Taiwan (The Taiwan Malacofauna Database, 2012), central and southern Japan (Habe, 1968; Ozawa, 1996; Adachi, Wada, 1998; Higo et al., 1999; Hasegawa, 2000; and many others), China from Liaoning to Fujian (Seashells of China, 2004; Checklist of Marine Biota of China Seas, 2008; Zhang Suping, 2008).

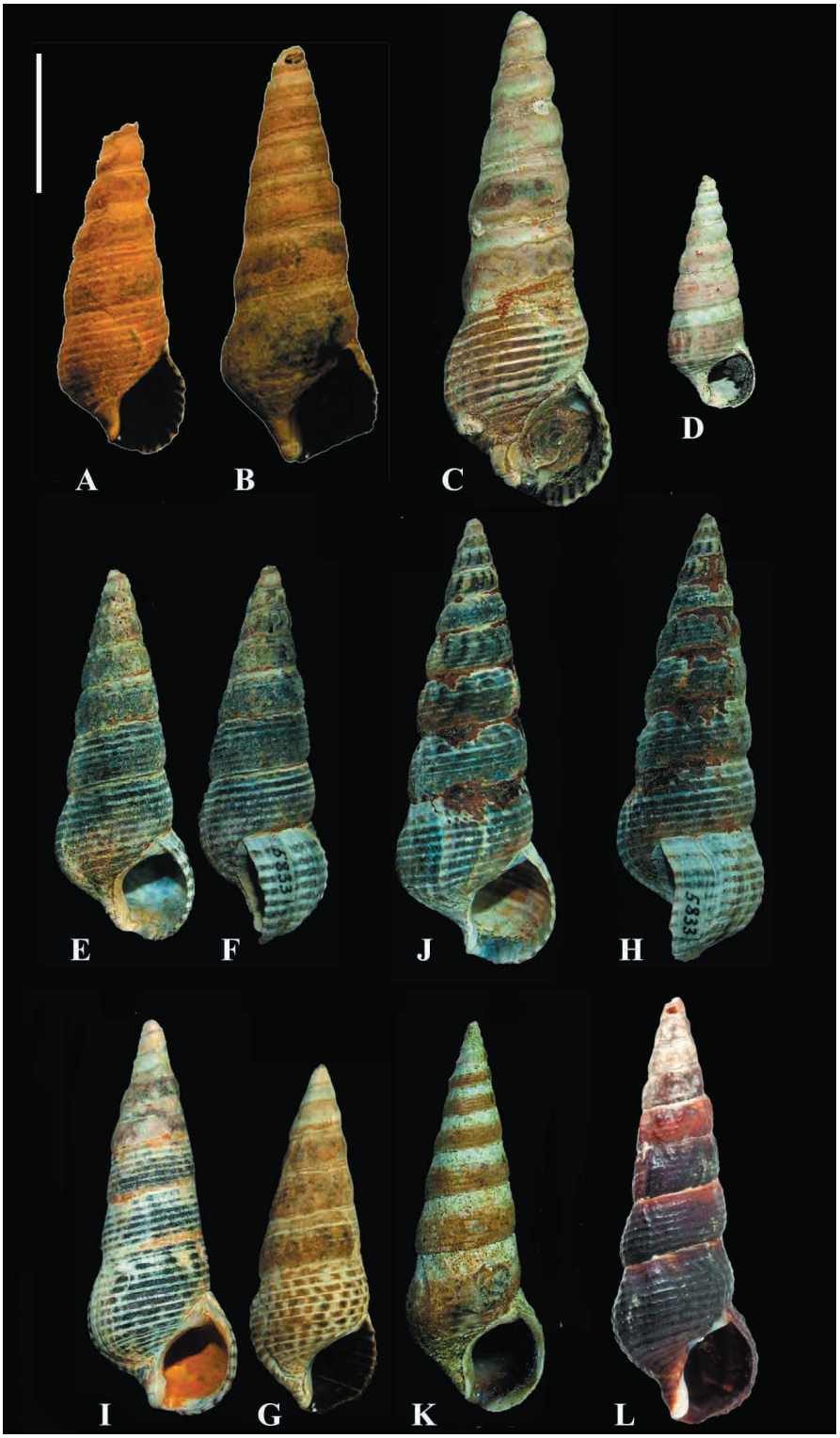

Fig. 1. *Batillaria attramentaria* (G.B. Sowerby, 1855), shells of *attramentaria*-like morph: **A** – Kunashir Island, Southern Kuriles; **B** – Shikotan, Southern Kuriles; **C** – Possjet Bay, Peter the Great Bay; **D** – Sivuchja Inlet, Peter the Great Bay; **E–H** – Amursky Bay, Peter the Great Bay; **I** – Vostok Bay, Peter the Great Bay; **G** – Kievka Bay, central Primorye; **K** – Olga Bay, central Primorye; **L** – syntype of *Lampania attramentaria* (= *Cerithium attramentarium*) from the BMNH no.1991021. Scale bar: 1 cm.

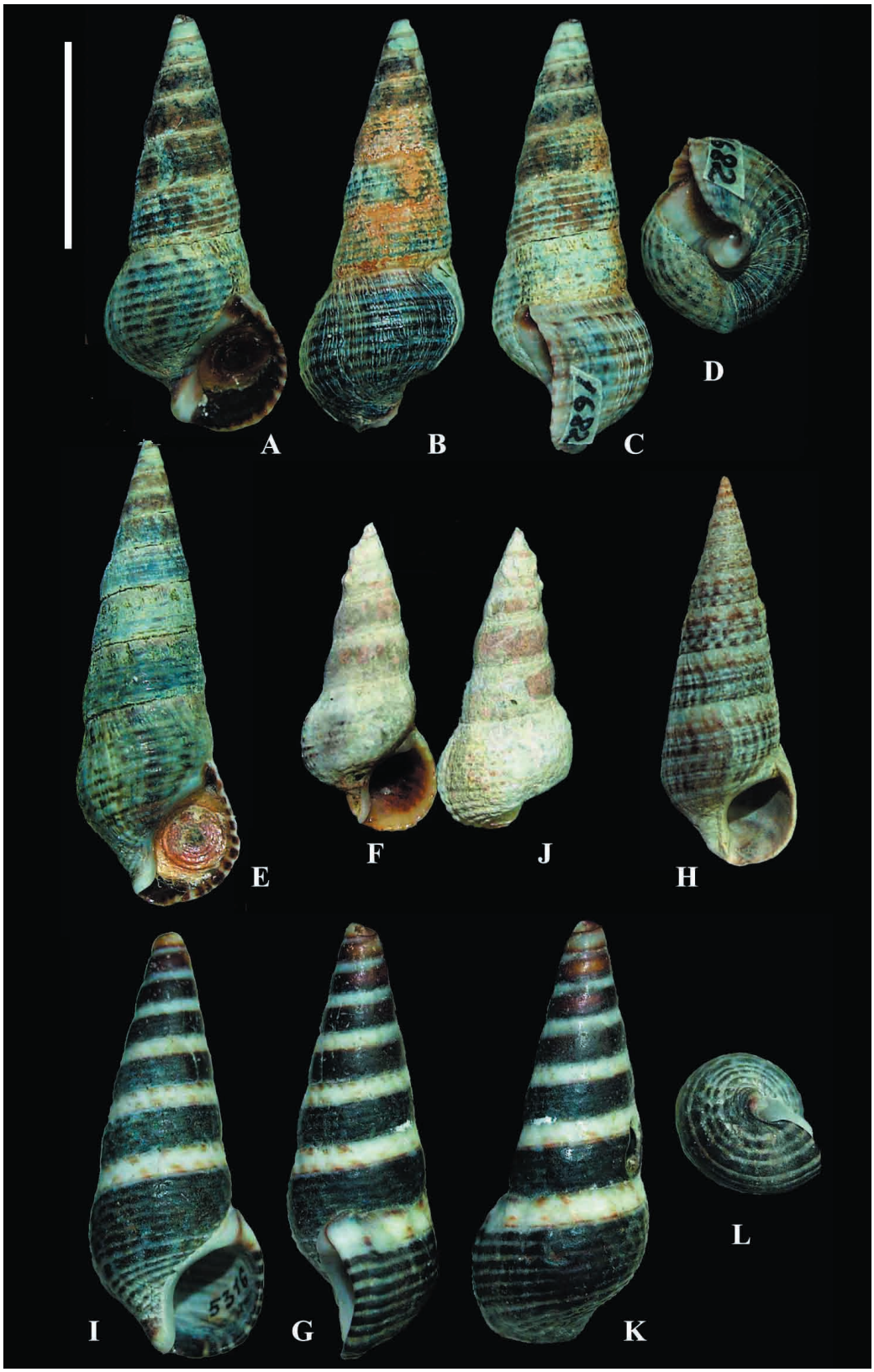

Fig. 2. *Batillaria attramentaria* (G.B. Sowerby, 1855), shells of *cumingi*-like morph: **A–E** Dalian Bay, north China (type locality); **F**, **J** – Qingdao, China; **H–L** – Jeju Island, South Korea. Scale bar: 1 cm.

Batillaria attramentaria with *cumingi*-like shells is similar to *B. flectosiphonata,* originally described from Ryukyu (Ozawa, 1996) and endemic for this island group (Kojima et al., 2003). Specimens with *cumingi*-like shells occur in area with warm temperate water in Korea, China, central and southern Japan. Morphological form with *attramentaria*-like shells extends its distribution northwards in rather cold water areas of Western Pacific – Primorye, southern Sakhalin, and Southern Kuril Islands in Russia, Hokkaido and northwestern Honshu in Japan, and also eastern coast of the Korean Peninsula where Liman Current comes down (T. Ozawa, personal communication and original data). Mitochondrial DNA analyses revealed that these different morphs distributed from Hokkaido to Kyushu are conspecific (Kojima et al., 2004). The oldest valid name for this species is *B. attramentaria* (G.B. Sowerby II, 1855) (syn. *B. cumingi* (Crosse, 1862)).

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