

First finding of *Difalaba vitrea* (Sowerby III, 1915) (Gastropoda: Litiopidae) in Russian waters of the Sea of Japan (Peter the Great Bay)

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In September 2006, *Difalaba vitrea* (Sowerby III, 1915) juveniles with shells nearly 3 mm in height were collected in Vostok Bay (Peter the Great Bay, north-western Sea of Japan). A brief data on shell and body morphology of these specimens are presented. *D. vitrea* differs from known in the southern Russian Far East *Difalaba picta* (A. Adams, 1861) conchologically, particularly by more wide spire angle of adult shell. This is the first record of *D. vitrea* in Russian waters, previously known only from Japan.

Key words: Litiopidae, *Difalaba vitrea* (Sowerby III, 1915), juveniles, first record, Vostok Bay, Sea of Japan.

Первая находка молодежи *Difalaba vitrea* (Sowerby III, 1915) (Gastropoda: Litiopidae) в российских водах (залив Петра Великого Японского моря)

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В сентябре 2006 г. молодь *Difalaba vitrea* (Sowerby III, 1915) с раковинами высотой около 3 мм была собрана с искусственного субстрата (горизонтальные металлические пластины) в зал. Восток (зал. Петра Великого, северо-западный сектор Японского моря). Представлены краткие сведения по морфологии раковины и мягкого тела этих моллюсков. Данный вид отличается от известного на юге Дальнего Востока *Difalaba picta* (A. Adams, 1861) рядом конхологических признаков, в частности, большей шириной апикального угла взрослой раковины. Это единственный зарегистрированный случай нахождения в российской акватории *D. vitrea*, известного ранее только из Японии.

Ключевые слова: Litiopidae, *Difalaba vitrea* (Sowerby III, 1915), молодь, первая находка, зал. Восток, Японское море.

The gastropod family Litiopidae Gray, 1847 is of tropical origin, but its representatives are distributed in the Pacific Ocean northward to the southern Russian Far East. A rather diverse litiopid fauna is recorded in southern part of the Sea of Japan, in Japan [Higo et al., 1999; and others]. In Russian northern part of the Sea of Japan, the only litiopid species in the genus *Diffalaba* Iredale, 1936 was known until recently. The species was cited as *Diffalaba vladivostokensis* (Bartsch, 1929) [Golikov, Scarlato, 1967; Golikov, Kussakin, 1978; Volova et al., 1979] or as *D. picta* (A. Adams, 1861) [Kuroda et al., 1971; Golikov, Scarlato, 1985; Higo et al., 1999; Gulbin, 2004, 2006; Kantor, Sysoev, 2006]. Sometimes, this species was assigned to *Alaba* H. et A. Adams, 1860 [Golikov, Kussakin, 1978; Volova et al., 1979; Kulikova et al., 2000; Golikov et al., 2001]. Comparison of specimens from Japan, Korea and the southern Russian Far East confirms the opinion that *D. vladivostokensis* is a junior synonym of *D. picta* [Prozorova et al., 2011] inhabiting the coasts of China, Korea, Japan and the southern Russian Far East [Habe, 1968].

In Russia, *D. picta* (syn.: *Alaba vladivostokensis* Bartsch, 1929) inhabits north-western part of the Sea of Japan from Posset Bay to Vostok Bay (Peter the Great Bay) and probably southern Sakhalin and southern Nevelskoy Strait [Golikov et al., 2001]. This is a common species in shallow-water seagrass habitats of the southern Primorye. In September 2006, juveniles (shell height is nearly 3 mm) of an unidentified *Diffalaba* were found to be abundant on artificial substrate (horizontally oriented metal plates) exposed in Vostok Bay. Hydrological and other conditions at that time were as follows: salinity 25–35‰, depth 4 m, rocky bottom.

Collected microgastropods were assigned to Litiopidae based on the following characteristics: a long active foot, presence of propodial tentacles and podial mucous glands, an operculum with a narrow spiral ridge on the attached surface, and the shape of the rachidian tooth [Prozorova, Sitnikova, 2010; Prozorova et al., 2010]. Then, a pair of epipodial tentacles on the sides of the foot were recorded as well as propodial ones located on leading edge of propodium, one from each side [Prozorova et al., 2011]. All of these characteristics are structurally consistent features in Litiopidae [Houbrich, 1987; Luque et al., 1988].

To understand precise taxonomy of mentioned *Diffalaba* juveniles, a new morphological study was conducted. An overall examination of shell and animal morphology was made using a MBS-10 binocular microscope with scales. A detailed examination was also carried out using Philips 525 Scanning Electron Microscope.

Diffalaba vitrea (Sowerby III, 1915)

Figs. 1–3

Conchological diagnosis: protoconch comprising 2.0–2.5 whorls, smooth, glossy, transparent, light brown in contrast to dull teleoconch; teleoconch comprising 4 next whorls, thin, semitransparent when fresh, oval conical, with apical angle (measured for 4 upper teleoconch whorls) 50–55°, yellowish, sculptured by fine growth lines crossed by slight, strap-like spiral striae; last whorl is weakly angulated; aperture drop-like, without columellar tooth; umbilicus absent; operculum ovate, paucispiral, transparent, with eccentric nuclei and fine ridge-like attachment scar below the nuclei (Figs. 1; 2A).



Fig. 1. Protoconch of *D. vitrea* from Vostok Bay (Peter the Great Bay, Sea of Japan). Scale bar – 1 mm.

Smooth similar protoconch described for *D. picta* [Kulikova et al., 2000] indicates that studied litiopids belong to genus *Diffalaba*. This characteristic is probably structurally consistent features in *Diffalaba*, as well in *Styliferina* A. Adams, 1860 (see Fig. 8B – *Alaba goniochila* A. Adams, 1860 in Sasaki et al. [2008]). In opposite with that, representatives of *Alaba* and *Litiopa* Rang, 1829 – *Alaba incerta* (Orbigny, 1842) and *Litiopa melanostoma* Rang, 1829 are characterized by protoconchs sculptured with numerous axial riblets and subsutural plaits [Houbrick, 1987]. Studied microgastropods (Fig. 2A) are closely related to juvenile specimens of *D. picta* (Fig. 2B) except for shell color and shape of apical whorls. Spire angle of their shells is wider significantly than that of *D. picta* (Fig. 2).

Discussed juveniles were compared with the Internet obtained image [379 *Diffalaba picta vitrea*, 2011] of adult



Fig. 2. Juvenile shells (nearly 3 month old) of two *Diffalaba* species from Vostok Bay (Peter the Great Bay, Sea of Japan): **A** – *D. vitrea*; **B** – *D. picta*. Scale bar – 1 mm.

D. vitrea (Sowerby III, 1915) from Japan (Ise City, Mie Pref., Honshu) kept in shell collection of the Kyoto University Museum (Fig. 3A). Spire angle of four upper whorls of the Japanese *D. vitrea* shell is not less than 50°. Based on results of that comparison as well as on morphological study the species is identified as *D. vitrea* previously known only from Japan [Higo et al., 1999] (Fig. 3A).

This is the first record of *D. vitrea* in Russia which is probably introduced from Japan. Subtropical waters are known to penetrate into Peter the Great Bay from March to September [Nikitin, Dyakov, 1998]. Members of Litiopidae have long-living planktonic stage [Houbrick, 1987]. Larvae of *D. picta* are recorded in the plankton from the mid-July up to mid-September [Kulikova et al., 2000]. Planktonic larvae of *D. vitrea* probably spread in the period of June–July 2006 with water masses from Japan to the northwestern

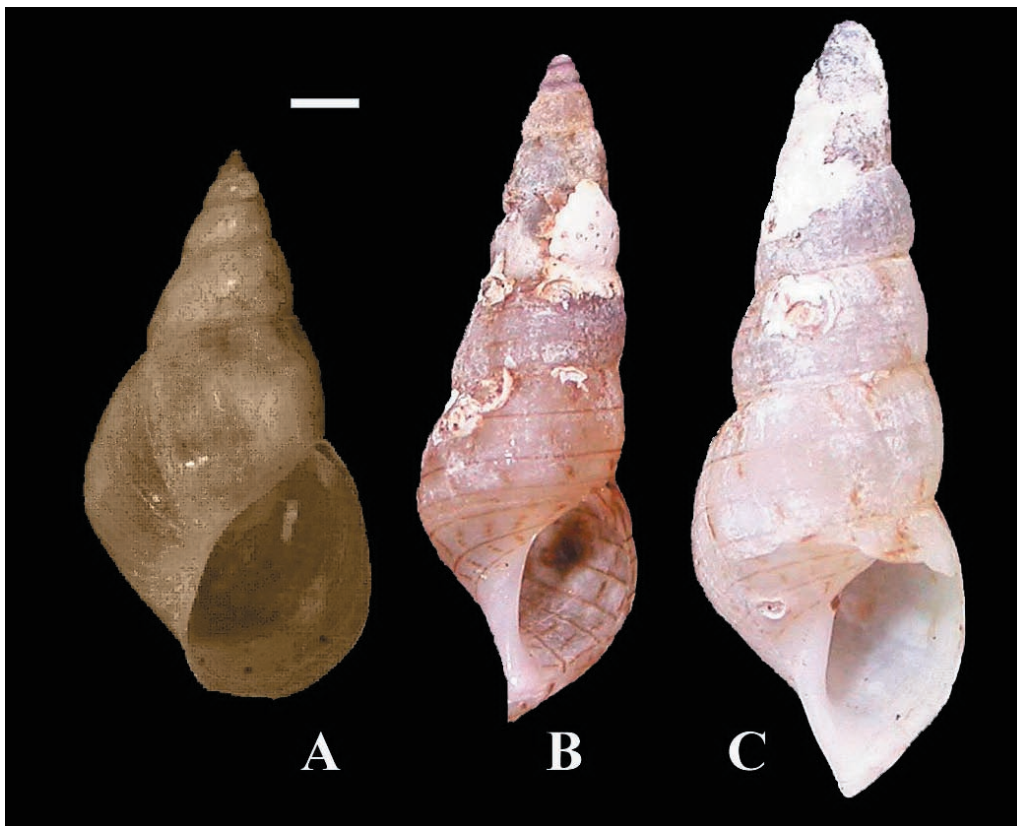


Fig. 3. Adult shells of two *Diffalaba* species: **A** – *D. vitrea* from Japan (Ise City, Mie Pref., Honshu, after 379 *Diffalaba picta vitrea*); **B, C** – *D. picta* from Vostok Bay (Peter the Great Bay, Sea of Japan). Scale bar – 1 mm.

Sea of Japan and Vostok Bay. The recorded attempt of introduction of the subtropical *D. vitrea* in Russia was not successful. Neither adult specimens, nor juveniles were found during further years of studies

and observations in Vostok Bay. The only species of the genus, *D. picta* (Figs. 2B; 3B, C) is recorded during observations in Vostok Bay coastal waters on eelgrass in September 2011.

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