



New and little-known shell-bearing heterobranch mollusks (Heterobranchia: Aplustridae and Cephalaspidea) from the bathyal zone of the northwestern part of the Sea of Japan

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ABSTRACT

Seven species of the shell-bearing heterobranch gastropods collected during Cruise 51 of R/V Akademik M.A. Lavrentyev in the northern part of the Sea of Japan represent the new data on the fauna of Heterobranchia in the bathyal zone from this area. Taxonomic descriptions of two new species, *Parvaplustrum japonicum* sp. nov., and *Retusa lata* sp. nov., are presented herein with remarks on morphology and distribution. The finding of *Toledonia* cf. *limnaeoides* (Odhner, 1913) is the first record of the genus *Toledonia* for the northern Pacific. The present records for *Diaphana hiemalis* (2693–2725 m) and *Cylichna toyamaensis* (1001–2555 m) are the deepest.

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1. Introduction

Though the deep-water opisthobranch fauna of the northwestern Pacific has been studied in research conducted by Minichev (1966, 1967, 1969), information concerning bathyal cephalaspideans from the northwestern part of the Sea of Japan remains very limited. Four ‘cephalaspid’ species, *Cylichna alba* (Brown, 1827), *D. hiemalis* (Couthouy, 1839), *Retusa toyamaensis* (Habe, 1955), and *Philine* sp. (listed as *Philine argentata* Gould, 1859), were documented in total for the entire continental slope of the northwestern part of the Sea of Japan (Derjugin, 1939; Chaban, 1996; Golikov et al., 2001; Gulbin and Chaban, 2009). The newly collected materials, comprising altogether eight species of shell-bearing heterobranch gastropods (mostly cephalaspidean), obtained during Cruise 51 of R/V Akademik M.A. Lavrentyev in the northern part of the Sea of Japan represent new data on the heterobranch fauna for the bathyal zone from this area.

Herewith, we present taxonomic descriptions for two new and two little-known species of heterobranch mollusks, accompanied with remarks on their morphology and geographic distribution. *C. toyamaensis* and *Cylichna* sp. will be described in the next paper. We regard *C. alba* and *C. toyamaensis* as

separate species, because they differ in the radula formula and shell morphology.

2. Materials and methods

The material for this study was collected in the summer of 2010 on the continental slope and in the deep-sea basin of the Sea of Japan during the Russian–German expedition SoJaBio (*Sea of Japan Biodiversity studies*) on board R/V Akademik M.A. Lavrentyev (for a list of stations see Maluytina and Brandt (2013)). For sampling of macrofauna, the newly modified camera-epibenthic sledge (C-EBS, see Brandt et al., 2013) was used. The samples were sieved using 300 µm mesh size and immediately afterwards fixed in 96% ethanol or 4% neutral formalin. The radulae and jaws were extracted from the buccal mass and cleaned with 1% sodium hypochlorite or 10% KOH. Then, they were washed in distilled water and finally treated with 70° and 95° ethanol to study them with the Scanning Electron Microscope (SEM) Hitachi-S 570N and Zeiss EVO 40. For SEM, fixed specimens dehydrated in ethanol followed by an acetone series were critical point dried and then sputter coated with platinum–palladium alloy. Male copulatory organs and radulae of some specimens were mounted in glycerol and examined under the light microscopes Leica DMLS-2 and Leica DM4500B.

The material examined here is deposited in the Zoological Institute (St.-Petersburg) (ZISP), Museum of A.V. Zhirmunsky Institute of Marine Biology (Vladivostok) (MIMB), and the Zoological Museum of Hamburg (ZMH).

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3. Results

3.1. Systematics

Clade Heterobranchia

'Lower Heterobranchia'

Superfamily Acteonoidea d'Orbigny, 1843

Family Aplustridae Gray, 1847

Genus *Parvaplustrum* Powell, 1951

Parvaplustrum japonicum sp. nov.

(Figs. 1A–K and 2A–D)

Material examined: *Holotype*, MIMB 27389, 14.08.2010, north-western Sea of Japan, 44°56.9197'N, 137°11.8947'E–44°57.0966'N, 137°12.0732'E, depth 455–465 m, R/V Akademik M.A. Lavrentyev, station A2-10. *Paratypes*: 16 specimens, ZISP 61521–61525, same data as holotype; 78 specimens, ZMN 79380 and MIMB

27390, 25.08.2010, north-western Sea of Japan, 43°13.4578'N, 135°04.3295'E–43°13.5809'N, 135°04.1939'E, depth 470–528 m, R/V Akademik M.A. Lavrentyev, station B7-7.

Description. *Shell morphology*: holotype 2.2 mm high and 1.6 mm wide; paratypes from 0.8 to 2.5 mm high (sizes of 9 paratypes—2.3 mm × 1.6 mm, 2.2 mm × 1.5 mm, 2.1 mm × 1.5 mm, 2.0 mm × 1.5 mm, 1.9 mm × 1.4 mm, 1.7 mm × 1.2 mm, 1.4 mm × 1.0 mm, 1.1 mm × 0.7 mm, 0.8 mm × 0.6 mm); juvenile specimens about 0.4–0.6 mm high. Shell very thin, translucent, fragile, ovate-globose, with involuted spire and convex body whorl. Apex umbilicated, preceding whorls not visible in the apical umbilicus. Aperture lip forms a rounded wing conspicuously rising above apex and partly covers apical umbilicus so it looks semicircular. Aperture extremely wide, with convex outer lip, rounded anterior end of shell and thin parietal callus. Columella simple and thin, with no folds, with wide reflection in upper part forming deep columellar umbilicus. Sculpture consists of irregularly distributed pits 5–10 μm in diameter; some pits anastomose with each other. Operculum absent.

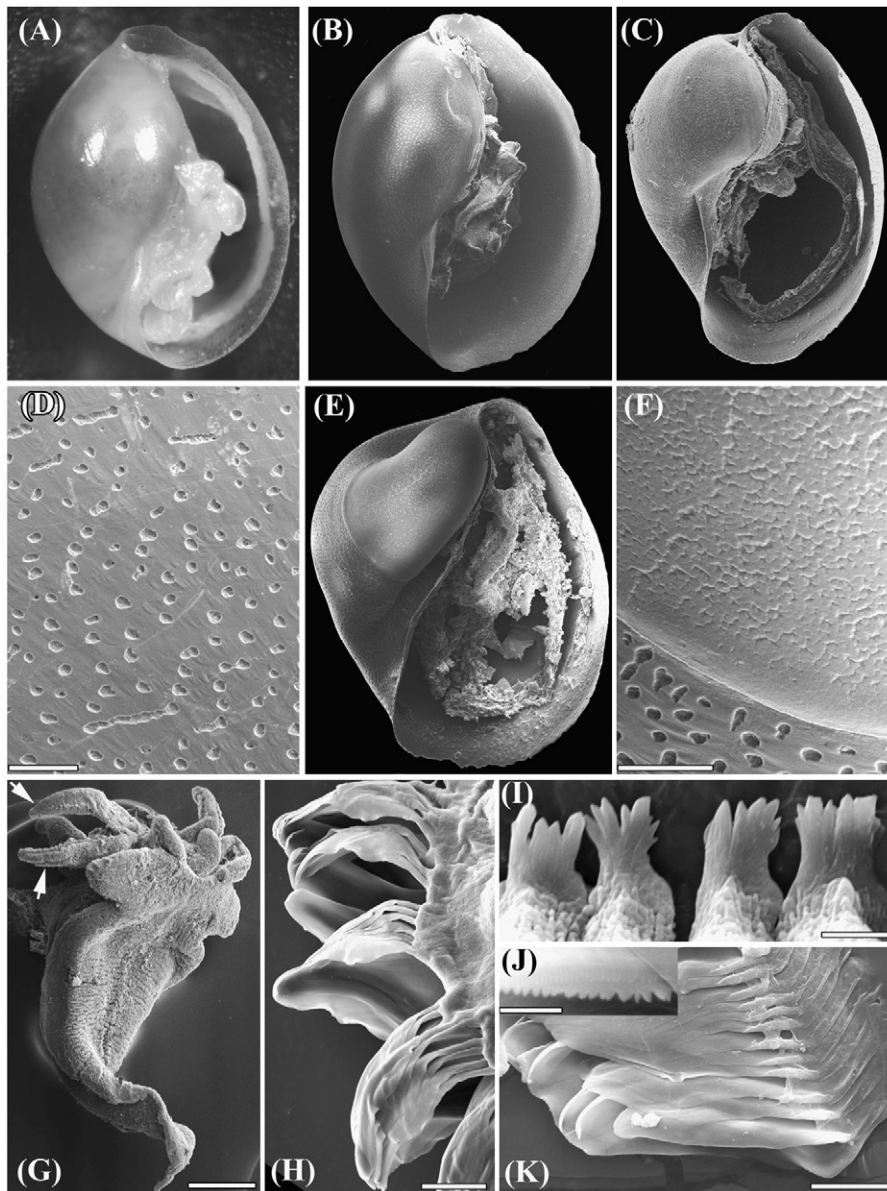


Fig. 1. *Parvaplustrum japonicum* sp. nov.: (A) holotype (MIMB 27389), 2.1 mm high; (B, C) paratypes (MIMB 27390 and ZISP 61521), 2.2 mm and 1.4 mm high; (D) shell sculpture; (E) juvenile specimen, 0.75 mm high; (F) protoconch sculpture; (G) soft body, ventral view (cephalic appendages indicated by arrows); (H, K) radula, lateral view; (I) jaw elements; (J) edge of lateral tooth; (A—light microscope; B–K—SEM). Scales: (D, F), 50 μm; (G), 0.2 mm; (I), 5 μm; (J), 1 μm.

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