

***Hermania indistincta* comb. nov. (Gastropoda: Opisthobranchia: Cephalaspidea) from the Barents Sea – new species and genus for the fauna of the Russian Seas**

***Hermania indistincta* comb. nov. (Gastropoda: Opisthobranchia: Cephalaspidea) из Баренцева моря – новый вид и род для фауны морей России**

Е.М. ЧАБАН\*, И.О. НЕКХАЕВ & П.А. ЛУБИН

Е.М. ЧАБАН, И.О. НЕХАЕВ, П.А. ЛЮБИН

*E.M. Chaban, Zoological Institute, Russian Academy of Sciences, 1 Universitetskaya Emb., St Petersburg 199034, Russia. E-mail: echaban@zin.ru*

*I.O. Nekhaev, Murmansk Marine Biological Institute of Kola Scientific Centre, Russian Academy of Sciences, 17 Vladimirskaia St., Murmansk 183010, Russia. E-mail: inekhaev@gmail.com*

*P.A. Lubin, Research Institute for Problems of Ecology and Mineral Wealth Use of Tatarstan Academy of Sciences, 28 Daur'skaya St., Kazan 420087, Russia. E-mail: plubin@mail.ru*

*Hermania indistincta* (Ohnheiser et Malaquias, 2013) **comb. nov.** is recorded for the first time for the Barents Sea and the Russian marine fauna. Based on the morphology of the studied specimens the diagnosis of the genus *Hermania* Monterosato, 1884 is emended. The taxonomic significance of the spiral shell sculpture in the genus *Hermania* is discussed.

*Hermania indistincta* (Ohnheiser et Malaquias, 2013) **comb. nov.** впервые отмечается для Баренцева моря и фауны морей России. На основании морфологии изученных экземпляров уточнён диагноз рода *Hermania* Monterosato, 1884. Обсуждается таксономическое значение спиральной скульптуры раковин видов рода *Hermania*.

**Key words:** molluscs, new records, Barents Sea, morphology, taxonomy, Cephalaspidea, Philinidae, *Hermania indistincta*

**Ключевые слова:** моллюски, новые находки, Баренцево море, морфология, таксономия, Cephalaspidea, Philinidae, *Hermania indistincta*

## INTRODUCTION

During the expeditions of the Knipovich Polar Research Institute of Marine Fisheries and Oceanography (PINRO) and the Murmansk Marine Biological Institute (MMBI) to the Barents Sea several opisthobranch molluscs previously unknown for these waters were collected. These specimens were identified as *Hermania indistincta* (Ohnheiser et Malaquias, 2013) **comb. nov.** Ohnheiser & Malaquias (2013)

described this species from the Norwegian Sea as *Philine indistincta*. The taxon *Hermania* was introduced by Monterosato (1884) as a section of the genus *Philine* Ascanius, 1772 on the basis of a Scaphander-like shell with specific spiral sculpture of *Bulla scabra* Müller, 1776. Subsequently some malacologists interpreted the taxonomic rank and status of the name *Hermania* differently: as a valid genus (Habe, 1950, 1955; Hori, 2000; Poppe, 2010) or as a subgenus of *Philine* (Nordsieck, 1972; Martinell, 1981), but mostly as a junior synonym of *Philine* (G.O. Sars, 1878; Pilsbry, 1895; Pruvot-Fol,

\*Corresponding author.

1954; Valdés, 2008; Ohnheiser & Malaquias, 2013). Recently, Oskars et al. (2015) demonstrated the paraphyly of *Philine* sensu auct. This result returns us to the question of the validity of the taxa which are often listed as synonyms of *Philine*. *Hermania* is one of such taxa.

In the present paper a philinid species new to the Russian seas is described, its shell sculpture is characterised in greater detail, and the validity of the genus *Hermania* is discussed.

## MATERIAL AND METHODS

All the studied specimens were collected during the expeditions of PINRO and MMBI on R/V “Dalnie Zelentsy” and R/V “Pr. Boiko” in 2008 and 2009 in the Barents Sea (Fig. 1).

The specimens were fixed first with 4% formaldehyde and then transferred to 70° alcohol. The morphology of the shell and gizzard plates was studied with FEI SEM Quanta-250 scanning electron microscope (SEM), the digestive and male copulatory systems were studied with Opton (Zeiss) and Leica DME light microscopes. The studied specimens are kept in the collections of the Zoological Institute, Russian Academy of Sciences.

## RESULTS

Order **CEPHALASPIDEA** Fischer, 1883

Family **PHILINIDAE** Gray, 1850 (1815)

Genus *Hermania* Monterosato, 1884

Type species: *Bulla scabra* Müller, 1784, by original designation

**Diagnosis.** Shell scroll-like conical, apex blunted; spiral sculpture consists of transverse flat ribs divided with chains of deep pits; chains of shallow pits on the ribs; elongate gizzard plates equal in size and shape, with two longitudinal slits on outer surface; gizzard wall covered with thick sheath of circular muscles, partly reduced at plate ends; male copulatory system consists of

elongate penial sheath and short convoluted prostate, incurrent duct and ejaculatory duct represented by common duct; penial papilla developed.

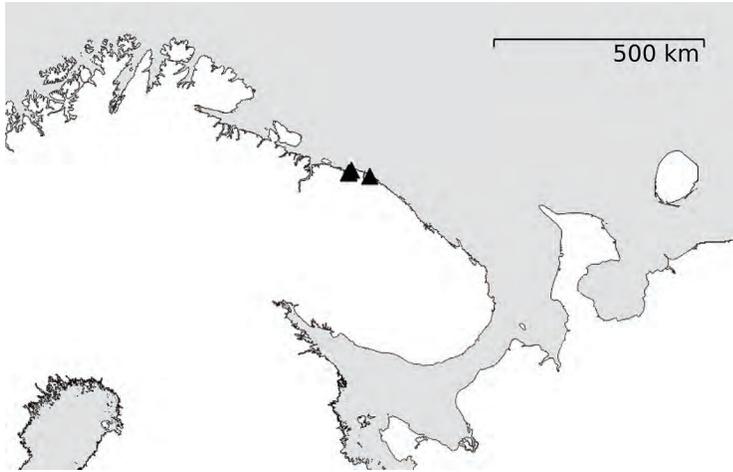
***Hermania indistincta*** (Ohnheiser et Malaquias, 2013) **comb. nov.**  
(Figs 1–2)

*Philine indistincta* Ohnheiser et Malaquias, 2013: 290, 293, figs 10A–H, 11 A–E, 12 A–F.

**Material examined.** **Russia:** R/V “Dalnie Zelentsy”, station 5, Yarnishnaya Bay, 69.130033°N, 36.035233°E, sand, mud, shell rock, 80.5 m depth, 6 specimens, 3 June 2009; R/V “Professor Boiko”, station TS1, 69.1744°N, 35.1509°E, 44.67 m depth, sand, mud, 3 specimens, 3 June 2008, coll. P.A. Lubin; R/V “Professor Boiko”, station TS2, 69.183°N, 35.1437°E, 74 m depth, sand, mud, 1 specimen, 3 June 2008, coll. P.A. Lubin.

**Description.** Shell white, 1.1–3.2 mm high, 0.6–1.6 mm wide, oval-cylindrical, narrowed to apex, apex slightly prominent. Aperture with acute angle in upper part, greatly expanded below, with squarish base; aperture height slightly less than shell height; inner lip forming broad thin callus on parietal wall. Spiral sculpture consists of rows of large oval and/or circular deep pits connected to one another by small channels (Figs 2C, D, F, K); rows of wide pits alternate sometimes with rows of narrow pits (Fig. 2K); interspaces between rows look like ribs, they carry small and shallow pits connected to one another, forming second-order chains. Thin layer of mantle covers shell; spiral sculpture visible through mantle. Foot wide, with small parapodial lobes; cephalic shield without any extensions; body uncolored.

Gizzard elongate cylindrical, surrounded by circular muscle fibers (Fig. 2L). It contains three elongate gizzard plates of equal size and shape, with transparent margins. Inner surface of plates smooth (Fig. 2H); outer surface of each plate with two longitudinal slits (Fig. 2G) and microsculpture formed by irregular polygons (Fig. 2I).



**Fig. 1.** The findings of *Hermania indistincta* in the Barents Sea.

Male copulatory system consists of elongate penial sheath and thick convoluted prostate (Fig. 2J). Penial sheath contains penial papilla and elongated extension (bulb). Narrow ejaculatory duct connects prostate and penial sheath.

**Distribution.** North and Norwegian Seas, 18–20 m, and Southern Barents Sea, 44–80 m.

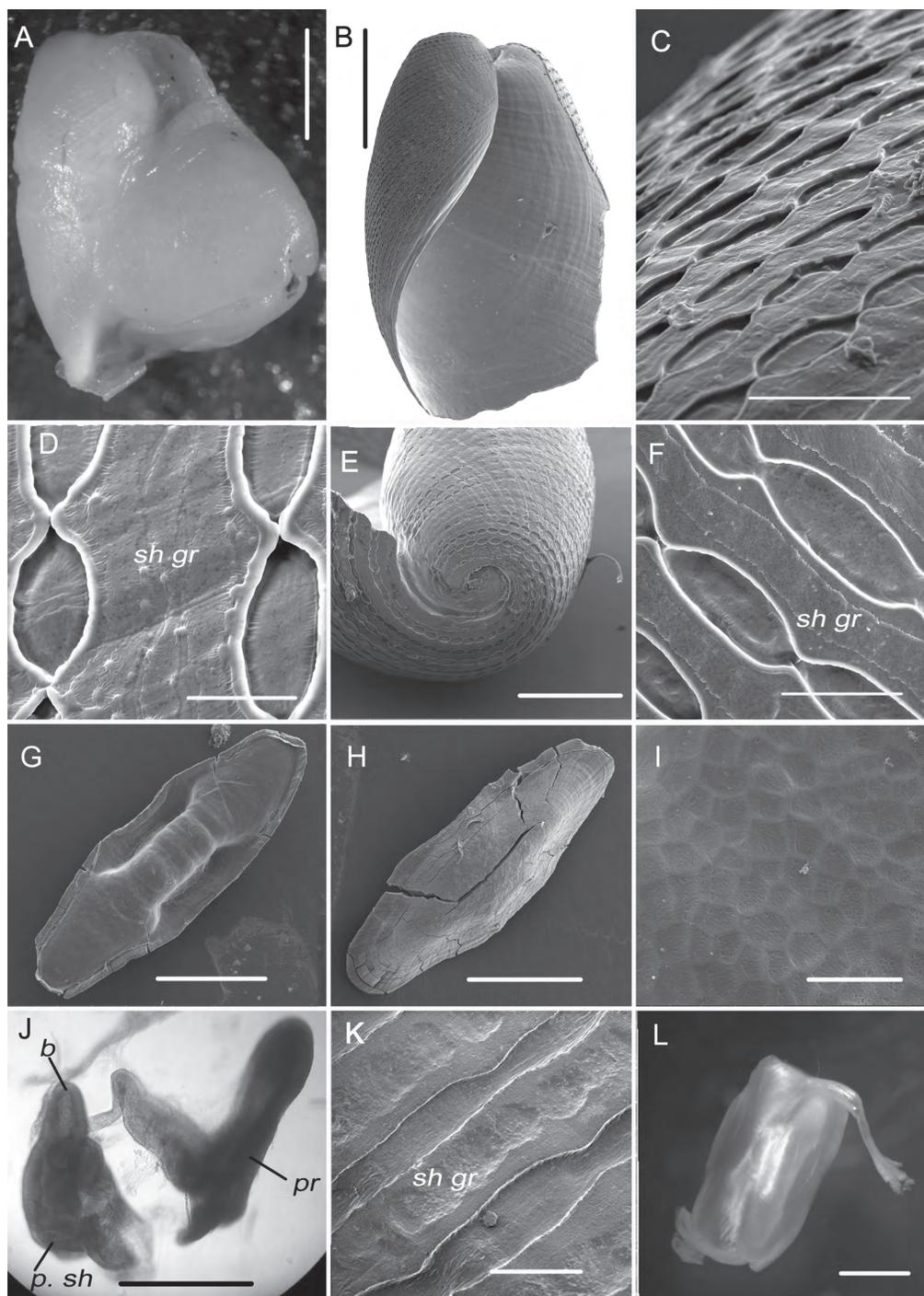
## DISCUSSION

This is the first record of *Hermania indistincta* in Russian waters, and the easternmost record of the species.

Our research allows us to clarify the characteristics of the spiral shell sculpture for species of the genus *Hermania*. *Hermania indistincta* has external morphology indistinguishable from that of *H. scabra*, the type of *Hermania* (see Ohnheiser & Malaquias, 2013). Ohnheiser & Malaquias described the spiral sculpture in both *Hermania indistincta* (as *Philine*) and *Hermania scabra* (as *Philine*) as “consisting of transverse lines of rounded or oval pits connected to form chains” (Ohnheiser & Malaquias, 2013: 290). This description is not sufficient, as it fits many other species, such as *Laona quadrata* (S.V. Wood, 1839) (Chaban, 2000: 153, as *Ossiania* Monterosato, 1884; Ohnheiser & Malaquias, 2013: Fig. 20G, as *Philine*) or *Yokoyamaia ornatissima* (Yokoyama, 1927) (Chaban & Chernyshev,

2014: 51). Thompson described the shell sculpture of *Hermania scabra* as “consisting of spiral rows (approximately 12 per mm) of tiny oval dots; each dot consists of a raised oval platform, surrounded by a depressed “moat”. Where one “moat” joins the next, a tiny kidney-shaped structure is placed, and the whole effect is very chain-like.” (Thompson, 1976: 140, fig. 75c, as *Philine*). Both descriptions reflect the real situation but in different cases, depending on the type of microscope used (light microscope or SEM), angle of view, degree of cleaning of the shell, and magnification.

According to the results of our research, the spiral sculpture of the shells of *Hermania indistincta* consists of chains of pits connected to one another. The chains of large and deep pits alternate with those of small and shallow pits. These double spiral chains are clearly visible under the light microscope (this study: Fig. 2A – for *Hermania indistincta*; Ohnheiser & Malaquias, 2013: Fig. 10D – for *H. indistincta* [as *Philine*]; Ohnheiser & Malaquias, 2013: Fig. 25E – for *Hermania scabra* [as *Philine*]). Ribs with chains of large pits are separated by narrow striations with small pits. The double chains are also visible on a well cleaned shell under SEM at high magnification ( $\times 1000$ – $2000$ : Fig. 2K) (Ohnheiser & Malaquias, 2013: Fig. 10G – for *H. indistincta* [as *Philine*]; Fig. 25H – for *H. scabra* [as *Philine*]), or at a viewing angle less than  $90^\circ$  (Ohnheiser &



**Fig. 2.** *Hermania indistincta*, light microscope images of the specimen (**A**, ventral view), male copulatory system (**J**) and gizzard (**L**); scanning electron microscope images of the shell (**B**, ventral view, **E**, apex), spiral sculpture of the shell (**C**, **D**, **F**, **K**) and gizzard plates (**G**, external surface, **H**, internal surface, **I**, microsculpture); *b* – penial bulb, *pr* – prostate, *p sh* – penial sheath, *sh gr* – shallow grooves of the shell. Scale bars: 1 mm (A–B), 500  $\mu$ m (E, G, H, J, L), 100  $\mu$ m (C), 50  $\mu$ m (K, F), 30  $\mu$ m (D, I).

Table 1. Comparative morphology of *Hermania indistincta* and the type species of Philinidae s. str.

Morphological features	<i>Philine aperta</i> (type species of <i>Philine</i> )	<i>Hermania scabra</i> (type species of <i>Hermania</i> )	<i>Hermania indistincta</i>	<i>Yokoyamaia ornatissima</i> (type species of <i>Yokoyamaia</i> )	<i>Philine monterosati</i> (type species of <i>Philingwynia</i> )	<i>Philine fimarchica</i> (type species of <i>Praephiline</i> )
<b>Shell spiral sculpture</b>	absent	ribs with small shallow chains alternating with deep chains	ribs with small shallow chains alternating with deep chains	chains of connected pits	chains of connected pits	spiral striations
<b>Gizzard wall</b>	three separate muscle strips connected by horny layer	thick sheath of circular muscles, partly reduced at ends of plates	thick sheath of circular muscles, partly reduced at ends of plates	thick sheath of circular muscles	–	thick sheath of circular muscles
<b>Radula</b>	1:0:1	1:1:0:1:1	1:1:0:1:1	1:1:0:1:1	1:1:0:1:1	1:0:1
<b>Gizzard plates</b>	almost triangular plates with two holes on outer <sup>(1)</sup> surface	elongate, with two longitudinal slits on outer surface	elongate, with two longitudinal slits on outer surface	elongate, lack slits and pores	in form of canoe	elongate, lack slits and pores
<b>Penis</b>	long prostate; separated ejaculatory duct	short prostate; ejaculatory duct not separated	short prostate; ejaculatory duct not separated	long prostate; separated ejaculatory duct	long prostate; separated ejaculatory duct	long knobbed prostate; separated ejaculatory duct
<b>Penial papilla</b>	hammer-shaped	oval dabble sac with chitinous warts	hook-shaped, verrucose	large conical papilla	hammer-shaped	hammer-shaped
<b>Data from</b>	Price et al, 2011; Ohnheiser & Malaquias, 2013	Lemche, 1956; Thompson, 1976; Ohnheiser & Malaquias, 2013	Ohnheiser & Malaquias, 2013; this study	Chaban & Chernyshev, 2014	Nordsieck, 1972; Bouchet, 1975	Ev. & Er. Marcus, 1969; Chaban & Soldatenko, 2009a, b; Price et al, 2011; Ohnheiser & Malaquias, 2013

Notes: (1) one surface of the gizzard plate is directed to the gizzard cavity and named as *internal* (by Thompson, 1976) or *ventral* (Price et al, 2011; Ohnheiser & Malaquias, 2013) *surface*; another its surface lying on the wall of the gizzard is named as *external* (by Thompson, 1976), *outer* (by Chaban & Soldatenko, 2009) or *dorsal* (by Price et al, 2011; Ohnheiser & Malaquias, 2013) *surface*.

Malaquias, 2013: Fig. 10F). Only the simple chains of large pits are visible on poorly cleaned shells (Figs 2C) under SEM at low magnification ( $\times 500$ ), but traces of the narrow striations could be visible even in this case at high magnification (Figs 2D, F).

*Philine* is one of the most morphologically varied genera among cephalaspidean opisthobranch molluscs. During the 19th and 20th centuries several taxa were separated from *Philine* and described on the basis of shell morphology as distinct genera or subgenera (Monterosato, 1884; Habe, 1950; Nordsieck, 1972; Gosliner, 1988), but these taxa were seldom used subsequently (G.O. Sars, 1878; Pilsbry, 1895; Rudman, 1972; Valdés, 2008; Price et al., 2011; Ohnheiser & Malaquias, 2013). According to the recent molecular phylogenetic analysis of Cephalaspidea (Oskars et al., 2015), Philinidae s.l. is a polyphyletic group divided into four clades: Philinidae s.str., Laonidae Pruvot-Fol, 1954 (reinstated as a valid family), "Philinidae" Clade 4 and Philinorbidae Oskars, Bouchet et Malaquias, 2015. According to this molecular phylogenetic analysis, *Philine scabra* (type species of the genus *Hermania*) belongs to the family Philinidae s.str. The comparison of *Hermania indistincta* and *H. scabra* with the type species of other genera (valid or listed as synonyms) of Philinidae s. str. is summarized in Table 1. They are: *Philine aperta* (Linnaeus, 1767) (type species of *Philine* Ascanius, 1772), *Yokoyamaia ornatissima* (type species of *Yokoyamaia* Habe, 1950), *Philine monterosati* Vayssière, 1875 (type species of *Philingwynia* Nordsieck, 1972), and *Philine finmarchica* M. Sars, 1859 (type species of *Praephiline* Chaban et Soldatenko, 2009).

*Hermania scabra* and *H. indistincta* have a unique set of features (Table 1): spiral sculpture with alternating chains of deep and shallow pits; gizzard plates with paired slits on the outer surfaces; the gizzard wall partly reduced at the ends of the plates; a short prostate with the ejaculatory duct not separated from the incurrent duct. This set of features is not found in any other species of Philinidae s. str.

As a result of comparison of morphology of *Hermania scabra* and *H. indistincta* based on the literature and our own data, we consider *Hermania* as a valid genus. The previous diagnosis of *Hermania* included data on shell morphology only (Monterosato, 1884: 147; Nordsieck, 1972: 19). We consider it necessary to emend the diagnosis of the genus (see Results) to include new data obtained by the study of the specimens found in the Barents Sea.

In addition to two North Atlantic species *Hermania scabra* and *H. indistincta*, one more species, *Hermania infantilis* Habe, 1950 from Japan, probably belongs to *Hermania*. It was described based on shell morphology (Habe, 1950: 50, Pl. 9, figs 14–16). Images of the species were also published by Poppe (2010) from Philippines. The spiral sculpture of *H. infantilis* has spiral ribs and looks like that of *H. scabra*; also similar are the shapes of the radula with marginal teeth (1:1:0:1:1) and the fusiform gizzard plates (Habe, 1958). But nothing is known about the morphology of the male copulatory system and about the outer surfaces of the gizzard plates in *H. infantilis*.

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## REFERENCES

- Bouchet Ph.** 1975. Opisthobranches de profondeur de l'Océan Atlantique. 1. Cephalaspidea. *Cahiers de biologie marine*, **16**: 317–365.
- Brown H.H.** 1933–1934. A study of a tectibranch gastropod mollusk, *Philine aperta* (L.). *Transactions of the Royal Society of Edinburgh*, **17**(1): 179–210.
- Chaban E.M.** 2000. Morphology and systematics of philinids (Opisthobranchia: Philinidae) of Northern and Far Eastern seas of Russia. In: **Egorova E.N.** (Ed.) *Mollyuski: problemy sistematiki, ekologii i filogenii*.

- Chetvertoe (trinadtsatoe) soveshchanie po izucheniyu mollyuskov (nazemnykh, presnovodnykh i morskikh)* [Molluscs: problems of systematics, ecology and phylogeny. Fourth (Thirteenth) Conference on the Study of Molluscs (terrestrial, freshwater and marine)]. St Petersburg, 27–29 October, 1998. Abstracts of Communications. Zoological Institute, Russian Academy of Sciences: 152–154. St Petersburg. (In Russian).
- Chaban E.M. & Chernyshev A.V.** 2014. Opisthobranch cephalaspidean molluscs (Gastropoda: Opisthobranchia) of Vostok Bay, Sea of Japan. Part 1. *The Bulletin of the Russian Far East Malacological Society*, **18**: 41–62. (In Russian).
- Chaban E.M. & Soldatenko E.V.** 2009a. Comparative morphology of the hammer-shaped penises of two species of opisthobranch mollusks of the genus *Philine* Ascanius, 1772 (Opisthobranchia: Cephalaspidea: Philinidae). *Zoosystematica Rossica*, **18**(1): 5–10.
- Chaban E.M. & Soldatenko E.V.** 2009b. Description of a new genus *Praephiline* gen. nov. (Gastropoda: Opisthobranchia: Philinidae). *Zoosystematica Rossica*, **18**(2): 205–211.
- Gosliner T.M.** 1988. The Philinacea (Mollusca: Gastropoda: Opisthobranchia) of Aldabra Atoll, with descriptions of five new species and a new genus. *Bulletin of the Biological Society of Washington*, **8**: 79–100.
- Habe T.** 1950. Philinidae in Japan. In: **Kuroda T.** (Ed.) *Illustrated Catalogue of Japanese shells*, **8**: 48–52. Society of Publication of Japanese Malacological Literature.
- Habe T.** 1955. A list of the Cephalaspidean Opisthobranchia of Japan. *Bulletin of the Biogeographical Society of Japan*, **16–19**: 54–79.
- Habe T.** 1958. On the shell-bearing opisthobranchiate molluscan fauna from off Choshi, Chiba Pref., Japan. *Annotationes Zoologicae Japonenses*, **31**(2): 117–120.
- Habe T.** 1976. Eight new and little known cephalaspidean Opisthobranchia from Japan. *Venus, the Japanese Journal of Malacology*, **35**(4): 151–157.
- Hori S.** 2000. Cephalaspidea. In: **Okutani T.** (Ed.) *Marine mollusks in Japan*: 732–757. Tokyo: Tokai University Press.
- Lemche H.** 1956. The anatomy and histology of *Cylichna* (Gastropoda, Tectibranchia). *Skrifter udgivet af Universitetets Zoologiske Museum*, **16**: 1–278.
- Marcus Ev. & Marcus Er.** 1969. Opisthobranchian and lamellarian gastropods collected by the “Vema”. *American Museum Novitates*, **2368**: 1–32.
- Martinell J.** 1981. Euthyneura del Plioceno del Empordà (Girona). *Descriptiva y sistemática. Acta Geológica Hispànica*, **16**(4): 223–233.
- Monterosato M.** 1884. *Nomenclatura generica e specifica di alcune conchiglie Mediterranee*. Palermo: Virzi. 152 p.
- Nordsieck F.** 1972. *Die europäischen Meeresschnecken (Opisthobranchia mit Pyramidellidae; Rissoacea)*. Stuttgart: Gustav Fischer Verlag. 327 p.
- Ohnheiser L.T. & Malaquias M.A.** 2013. Systematic revision of the gastropod family Philinidae (Mollusca: Cephalaspidea) in the north-east Atlantic Ocean with emphasis on the Scandinavian Peninsula. *Zoological Journal of the Linnean Society*, **167**: 273–326.
- Oskars, T.R., Bouchet Ph. & Malaquias M.A.** 2015. A new phylogeny of the Cephalaspidea (Gastropoda: Heterobranchia) based on expanded taxon sampling and gene markers. *Molecular Phylogenetics and Evolution*, **89**: 130–150.
- Pilsbry H.A.** 1895. *Manual of Conchology; structural and systematic, with illustrations of the species*, **16**. Philadelphia. 262 p.
- Poppe G.** 2010. *Philippine marine mollusks*, **3**. ConchBooks. 655 p.
- Price R.M., Gosliner T.M. & Valdés A.** 2011. Systematics and phylogeny of *Philine* (Gastropoda: Opisthobranchia), with emphasis on the *Philine aperta* species complex. *The Veliger*, **51**(2): 1–58.
- Pruvot-Fol A.** 1954. *Mollusques Opisthobranches. Faune de France*. Paris: Federation Francaise des Societes de Sciences Naturelles. 448 p.
- Rudman B.** 1972. The genus *Philine* (Opisthobranchia, Gastropoda). *Proceedings of the Malacological Society of London*, **40**: 171–187.
- Sars G.O.** 1878. *Bidrag til kundskaben om Norges Arktiske Fauna. I. Mollusca regionis Arcticae Norvegiae*. Christiania. 426 p.
- Thompson T.E.** 1976. *Biology of opisthobranch mollusks*, **1**. London: The Ray Society. 207 p.
- Valdés Á.** 2008. Deep-sea “cephalaspidean” heterobranchs (Gastropoda) from the tropical southwest Pacific. In: **Héros V., Cowie R.H. & Bouchet P.** (Eds.). *Tropical Deep-Sea Benthos 25. Mémoires du Muséum National d’Histoire naturelle*, **196**: 587–792. Paris.

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