

## A new species of the genus *Callopora* (Bryozoa: Cheilostomatida: Calloporidae) from the Barents and Kara Seas

## Новый вид рода *Callopora* (Bryozoa: Cheilostomatida: Calloporidae) из Баренцева и Карского морей

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A new species, *Callopora septentrionalis* sp. nov., of cheilostome Bryozoa is described from the collection of the Zoological Institute, Russian Academy of Sciences. The species differs from its congeners by presence on gymnocyst of three types of adventive avicularia: two columnar avicularia with triangular mandible of different sizes as well as large avicularia with spatulate mandible, and by bell-shape and cap-shape ovicells.

Новый вид *Callopora septentrionalis* sp. nov. хейлостомных мшанок описан из коллекций Зоологического института РАН. Данный вид отличается от других видов этого рода наличием на гимноцисте трех типов адвентивных авикуляриев: колоновидных авикуляриев с треугольными мандибулами разного размера, а также крупных авикуляриев со шпательевидной мандибулой, и колоколообразной и колпаковидной формой овицелл.

**Key words:** marine bryozoans, Barents Sea, Kara Sea, Arctic, taxonomy, Calloporidae, *Callopora*, new species

**Ключевые слова:** морские мшанки, Баренцево море, Карское море, Арктика, таксономия, Calloporidae, *Callopora*, новый вид

## INTRODUCTION

Our knowledge of the taxonomy, diversity and distribution of many bryozoan species is still insufficient, although a huge work has been made during last decades (Bock, 2016). Using SEM technology has allowed to revise the taxonomy of some arctic bryozoans and their distribution as well as to recognize new species (Hayward, 1994; Soule & Soule 2002; Kuklinsky & Taylor 2006; Kuklinskiy et al., 2007; Winston & Hayward 2012; Denisenko 2015; Denisenko et al., 2014).

The present publication includes a description and illustrations of a new species found in the Arctic seas. It belongs to the genus *Callopora* Gray, 1848. The genus is widely distributed in the World (Bock & Hayward, 2010; Bock, 2014). Seven species

among Calloporidae have been recorded in the Arctic areas (Kluge, 1962; Gontar & Denisenko, 1989; Kuklinsky & Taylor, 2006; Denisenko, 1990, 2008, 2010). But there is opinion that some species of the genus presented in old collections were misidentified (Kuklinsky & Taylor, 2006; Winston & Hayward, 2012). Probably, a reason of incorrect identification was a lack of detailed descriptions in publications as well as, very often, the insufficiently detailed illustrations in the old literature.

The present work aimed not only to describe new taxa from unidentified collection but, also to define species composition of the genus in the systematic collection of the Zoological Institute of the Russian Academy of Sciences (ZIN RAS). Table of parametric measurements of zooidal characters are given herein.

## MATERIAL AND METHOD

Colonies of described below new species were obtained from the Barents Sea during the PINRO (Knipovich Polar Institute of Marine Fisheries and Oceanography) expedition carried out in the Barents Sea in 1968. Sampled material was transferred to the ZIN RAS for storing. Additional material of this species was found after examination of the systematic collections of bryozoans keeping in the ZIN RAS. The new species was studied by scanning electron microscopy (SEM). Selected colonies were cleaned in sodium chlorine, washed, dried and coated with platinum for examination under a QUANTA 250 (FEI) scanning electron microscope (SEM). Measurements were made using the SEM photos. The holotype and the paratype of the new species are stored in the collections of the Zoological Institute, Russian Academy of Sciences, Saint Petersburg.

## DESCRIPTION OF NEW SPECIES

Class **GYMNOLAEMATA**

Order **CHEILOSTOMATIDA**

Family **CALLOPORIDAE** Norman, 1903

*Callopora septentrionalis* sp. nov.  
(Fig. 1)

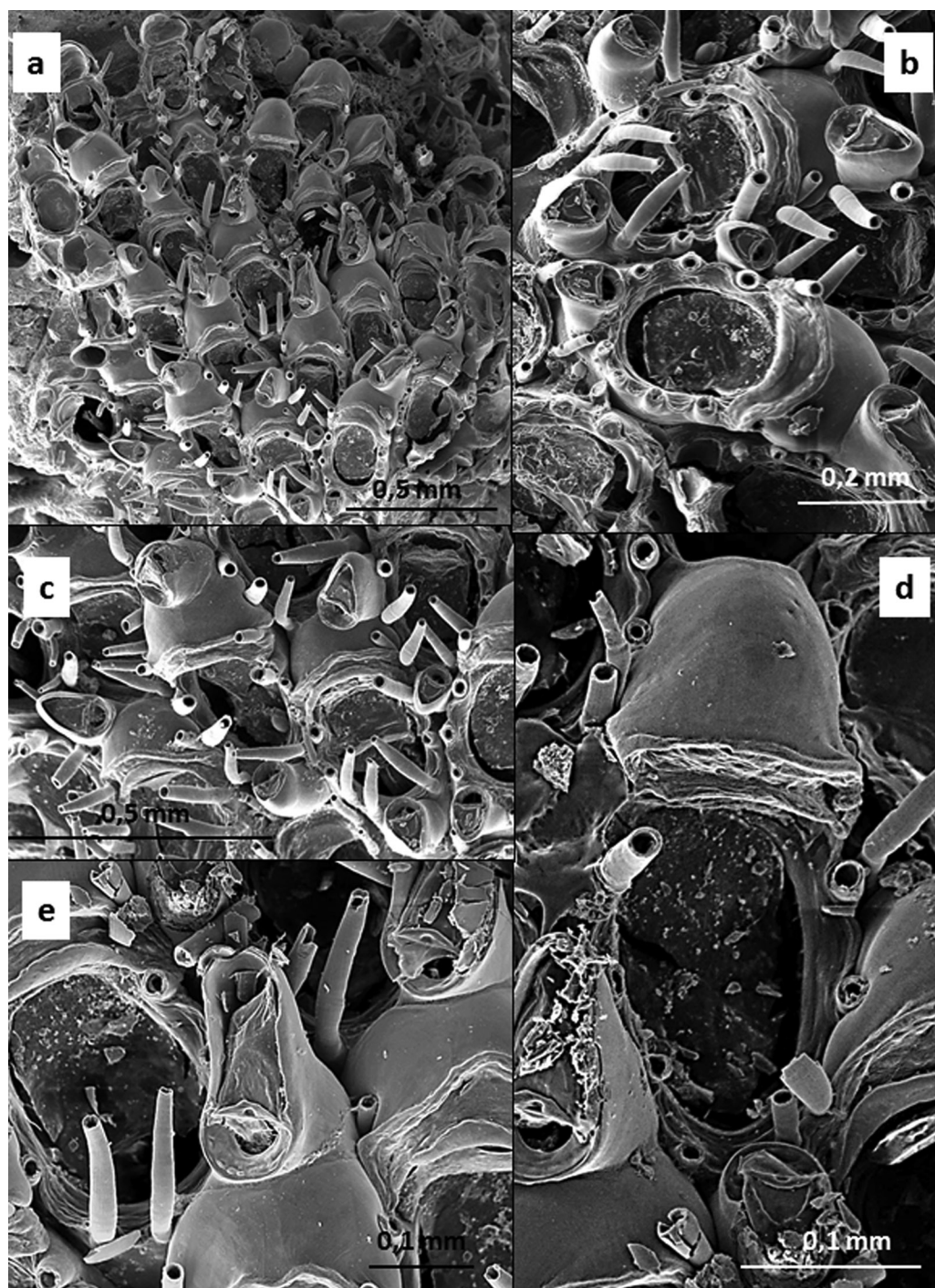
*Holotype.* ZIN – 1/50659, Barents Sea, 74°11,6'N, 19°33'E, expedition vessel "N. Maslov", 5-th expedition of PINRO, station 303/324, bottom trawl Sigsbi, 15.IX.1969, depth 100 m, sediments: clay with pebble; collector: T.V. Antipova.

*Paratype.* ZIN – 38/655; Kara Sea, 80°41'N, 78°37'E, Icebreaker "Lithke", expedition "North-west", station 192, trawl Sigsbi, 05.X.1948, depth 32 m, sediments: sand; collectors: M.V. Koltun, V.L. Vagin.

*Diagnosis.* Colonies incrusting; autozooids small, with narrow gymnocyst and narrow cryptocyst. Oval opesia surrounded by four or five pairs of long, tubular and overlapping spines. Ovicells varying from bell-shaped up to cap-shaped shape, smooth,

two-layered. Inside layer roughly granulated, connected with outside layer by thick rim, changing from straight transverse belt shape up to incurved triangular shape. Adventive avicularia of three different sizes and shapes in colony, all associated with gymnocyst. Smallest avicularia columnar slightly hooked apically, with triangular and directed downward rostrum. Medium sized avicularia with curved columnar cystid, adjoining to ovicell of previous zooid, hooked apically, with extended triangular rostrum directed distally and laterally. Largest avicularia also joined to ovicell of previous zooid; cystid curved and with large spatula-shaped mandible.

*Description.* Colony of irregular form, looking like not large sheets. Autozooids rectangular, small sized (Table 1), separated by deep grooves. Gymnocyst not large, narrow, smooth; reduced cryptocyst in form of narrow band, with coarse longitudinal striation (Fig. 1 a, b, d). Elongated oval opesia surrounded by eight to ten long and hollow spines, thin in non-fertile zooids and thick in zooids with ovicells. Proximal spines directed distolaterally, overlapping aperture and curving in their distal part. Distal spines directed upward from frontal plane. Ovicells large relative to zooid size, to half of zooid length. Ovicells of changeable shape: from cap-shaped to bell-shaped, smooth and two-layered (Fig. 1 b–d). Visible part of entoocelial layer roughly granulated, with thick rim at connecting line with ectoocelial layer. Rim shape varying from transverse linear up to curved triangular shape (Fig. 1 a, c). Colony with three different in size and shape adventive avicularia associated with gymnocyst of autozooids. Smallest avicularia with slightly hooked columnar cystid and with small, broadly triangular rostrum directed downward of opesia. This avicularia type presenting in zooids located above non fertile zooids (Fig. 1 a, c, d). Medium sized avicularia with curved columnar cystid, also hooked, and with more extended triangular mandible directed distally and laterally. Third type of scarcer avicularia



**Fig. 1.** *Callopora septentrionalis* sp. nov., holotype. Part of colony (a), group of zooids with broken spines, small columnar and medium size avicularia (b), zooids with spines and mandible shape in small and medium size avicularia (c), cryptocyst structure and bell-shaped ovicell (d), and third type of avicularium with spatulate mandible (e).

**Table 1.** Measurements (in mm) of *Callopora septentrionalis* sp. nov. N, number of measurements; Mean, average size of character; SD, standard deviation; Min–max, minimal and maximal sizes of each character.

| Character                 | N  | Mean $\pm$ SD   | Min–max   |
|---------------------------|----|-----------------|-----------|
| Autozoid length           | 15 | 0.37 $\pm$ 0.01 | 0.36–0.38 |
| Autozoid width            | 15 | 0.22 $\pm$ 0.02 | 0.20–0.24 |
| Large avicularium length  | 3  | 0.21 $\pm$ 0.01 | 0.21–0.22 |
| Medium avicularium length | 5  | 0.14 $\pm$ 0.01 | 0.12–0.14 |
| Small avicularium length  | 3  | 0.07 $\pm$ 0.00 | 0.05–0.07 |
| Ovicells width            | 15 | 0.21 $\pm$ 0.03 | 0.20–0.22 |
| Ovicells length           | 15 | 0.19 $\pm$ 0.02 | 0.18–0.21 |

with large curved cystid resembling head of bird from lateral view, and with large, spatula-shaped mandible (Fig. 1 e). Last two types of avicularia corresponding to zooids located above fertile zooids and conjugating with their ovicells.

**Distribution.** Western part of the Barents Sea, depth 100 m; north-west of the Kara Sea; depth 32 m.

**Etymology.** The species name is the Latin adjective *septentrionalis*, meaning “north-ern”.

**Discussion.** Main characters of the genus *Callopora* Gray, 1848 are well known, and the shape of the avicularia and ovicells also are considered as important characters for the diagnosis of the species in this genus. According to the latest description of *Callopora lineata* (Linneus, 1758), all the adventive avicularia of the species have triangular mandibles and similar size within a colony. The ovicells of the species are prominent and globular; their ectooecium with extensive uncalcified area of roundish shape (Hayward & Ryland, 1998). However, a variability of the characters of *C. lineata* is still present as it has been marked in earlier publications. Hincks (1880) noted the existence of two forms of *C. lineata*. The first one has the short spines and the equal-sized avicularia in zooids with the ovicells and without them (Plate XIX, fig. 4, 6 in Hincks, 1880). The second form is with the long spines and with the avicularia variable in size and shape

between zooids with the ovicells and without them (Plate XIX, fig. 3, 5 in Hincks, 1880). Hayward and Ryland (1998) do not mention the difference in length of the spines as did Hincks, but they wrote about the squat cystid and similar sizes of the avicularia within a colony (Fig. 39 and 42 in Hayward & Ryland, 1998). The description of *C. lineata* given by Kluge (1962) does not include any information about sizes and shapes of the spines and avicularia, but on Fig. 170 the length of the spines is different within the zooids. And the avicularia on Kluge's figure also have different sizes in the zooids with ovicells and without them, as it was mentioned for *C. lineata* by Hincks (1880), but avicularian cystid at Kluge's figure is more prominent (Fig. 170 in Kluge, 1962) in comparison to Hincks's (1880) and Hayward and Ryland's (1998) figures. The shape of the ovicells in the Kluge's illustration of *C. lineata* (Fig. 170 in Kluge, 1962) is also distinguished from an ovicell shape in this species presented at the illustration of Hayward & Ryland (1998, Fig. 39 and 42 D) as well as from the shape of the ovicells of the new species. According to the opinion of Winston and Hayward (2012), the specimen, shown in the Figure 170 of Kluge (1962) looks like *Callopora thaxteri* Winston et Hayward, 2012. However, the spatulated avicularia and bell-shaped ovicells were not mentioned in any publications concerning the genus *Callopora*. After

having found a specimen of the new species in unidentified material we checked the systematic collection of Calloporidae storing in the ZIN RAS and concluded that one specimen in the collection also belongs to the new species due to presence on the gymnocyst of the large adventive avicularia with spatula-shaped mandible, and the difference in a ovicell shape in comparison to *C. lineata* and *C. thaxteri*. One more specimen in the ZIN collection can be regarded as *C. thaxteri*. Remaining specimens can be regarded as *C. lineata* forma  $\beta$  according to Hincks's classification (Hincks, 1880).

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## REFERENCES

- Bock P.** 2014. Bryozoa. *World Register of Marine Species* [online]. Available from: <http://www.marinespecies.org/aphia.php?p=taxdetails&id=146142> [updated 15 May 2014; visited 15 November 2016]
- Bock P.** 2016. *Callopora* Gray, 2016. Bryozoa home page [online]. Available from: <http://bryozoa.net/cheilostomata/calloporidae/callopora.html> [updated 31 July 2016; visited 22. November 2016]
- Bock P. & Hayward P.** 2010. *Callopora* Gray, 1848. In: **Bock, P. & Gordon, D.** (2016). World List of Bryozoa. Accessed through: World Register of Marine Species; at <http://www.marinespecies.org/aphia.php?p=taxdetails&id=110851> [update 1 January 2016; visited 15 November 2016]
- Denisenko N.V.** 1990. *Raspreделение i ekologiya mshanok Barentseva moria* [Distribution and Ecology of Bryozoans of the Barents Sea]. Apatity: Kola Scientific Centre, Academy of Sciences of the USSR. 156 p. (In Russian).
- Denisenko N.V.** 2008. Bryozoans of the Chukchi Sea and Bering Strait. In: **Sirenko B.I.** (Ed.). *Fauna i zoogeografiya zoobentosa Chukotskogo morya. Issledovaniya fauny morey* [Fauna and zoogeography of zoobenthos of the Chukchi sea. Explorations of the fauna of the seas], **61**(69): 163–198. St Petersburg: Russian Academy of Sciences, Zoological Institute. (In Russian).
- Denisenko N.V.** 2010. Bryozoans (Bryozoa) of the East-Siberian Sea. In: **Sirenko B.I., Denisenko S.G.** (Eds). *Fauna Vostochno-Sibirskogo morya, osobennosti raspredeleniya i struktura soobtchestv. Issledovaniya fauny morey* [Fauna of the East Siberian Sea, distribution patterns and community structure. Explorations of fauna of seas], **66**(74): 89–129. St Petersburg: Russian Academy of Sciences, Zoological Institute. (In Russian).
- Denisenko N.V.** 2015. New species of the genus *Parasmittina* (Bryozoa: Cheilostomata: Smititinidae) from the Chukchi Sea. *Zoosystematica Rossica*, **24**(2): 303–306.
- Denisenko N.V., Hayward P.J., Tendal O.S. & Sørensen J.** 2016. Diversity and biogeographical patterns of the bryozoan fauna of the Faroe Islands. *Marine Biology Research*, **12**(4): 360–378.
- Gontar V.I. & Denisenko N.V.** 1989. Arctic Ocean Bryozoa. In: **Herman Y.** (Ed.). *The Arctic Seas*: 341–371. New York: Van Nestrand.
- Gray J.E.** 1848. Bryozoa. In: *List of the specimens of British animals in the collection of the British Museum*. Part 1: 91–151. London.
- Hayward P.J. & Ryland J.S.** 1998. Cheilostomatous Bryozoa. Part 1, Aeteoidea – Cribrilinoidea. In: **Barnes, R.S.K. & Crothers J.H.** (Eds). *Synopses of the British Fauna* (New Series), **10**: 1–366. Shrewsbury: Linnaean Society of London and Estuarine and Coastal Sciences Association by Field Studies Council.
- Hincks Th.** 1880. *A history of the British marine Polyzoa*. London: Van Voorst. cxli + 601 p., 83 pls.
- Kluge G.A.** 1962. Mshanki severnykh morey SSSR [Bryozoans of the northern seas of the USSR]. *Opredeleteli po Faune SSSR, Izdavaemye Zoologicheskim Institutom Akademii Nauk SSSR* [Keys to the fauna of the USSR published by the Zoological Institute of the USSR Academy of Sciences], **76**. Moscow-Leningrad: Izdatel'stvo Akademii Nauk SSSR. 582 p. (In Russian).

- Kuklinsky P. & Taylor P.** 2006. A new genus and some cryptic species of Arctic and Boreal calloporid cheilostome bryozoans. *Journal of the Marine Biological Association of the United Kingdom*, **86**(5):1035–1046.
- Kuklinsky P., Taylor P.D. & Denisenko N.** 2007. Arctic cheilostome bryozoan species of the genus *Escharoides*. *Journal of Natural History*, **41**(1–4): 219–228.
- Linnaeus C.** 1758. *Systema Naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis*. Editio Decima, Reformata. Tomus I. Stockholm: Laurentii Salvii. 824 p.
- Norman A.** 1903. Notes on the natural history of East Finmark, Polyzoa. *Annals and Magazine of Natural History*, Ser. 7, **11**: 567–598.
- Soule D.F. & Soule J.D.** 2002. The Eastern Pacific Parasmittina trispinosa complex: new and previously described species. *Irene McCulloch Foundation Monograph Series, Number 5*. Los Angeles: Hancock Institute for marine studies, University of Southern California. 40 p.
- Winston J.E. & Hayward P.J.** 2012. The Marine Bryozoans of the Northeast Coast of the United States: Maine to Virginia. *Virginia Museum of Natural History Memoir*, **11**: 1–180.

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