

## **A new species of solitary Entoprocta, *Loxosomella angusta* sp.n., from the White Sea**

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**ABSTRACT:** A new solitary entoproct species, *Loxosomella angusta* sp.n. is described. It is a medium-sized species (total length up to 0.575  $\mu\text{m}$ ) with a narrow calyx that bears 8 tentacles. A basal part of a stalk is thinner than the rest of a stalk and looks empty. The new species was found in the Kandalaksha Bay in the White Sea on the gymnolaemate bryozoan *Electra* sp. Bryozoans are one of the usual types of host animals for solitary entoprocts. A list of loxosomatids associated with bryozoans is given.

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**KEY WORDS:** Epibiont, *Electra* sp., Kamptozoa, Loxosomatidae, *Loxosomella*, new species, White Sea.

## **Новый вид одиночных Entoprocta, *Loxosomella angusta* sp.n., из Белого моря**

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**РЕЗЮМЕ:** Описан новый вид одиночных внутрипорошицевых, *Loxosomella angusta* sp.n. Это вид среднего размера (длина особи до 0,575 мкм), с узкой чашечкой, несущей 8 щупалец. Базальная часть ножки уже, чем остальная ее часть и выглядит пустой. Новый вид найден в Кандалакшском заливе Белого моря на голоротой мшанке *Electra* sp. Мшанки — обычный тип хозяев для одиночных внутрипорошицевых. В статье приведен список видов Loxosomatidae, обитающих на мшанках.

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**КЛЮЧЕВЫЕ СЛОВА:** *Electra* sp., Kamptozoa, Loxosomatidae, *Loxosomella*, Белое море, новый вид, эпибионты.

## Introduction

Entoprocta (or Kamptozoa) is a group of mainly marine, small, colonial or solitary invertebrate animals. Most of the species (more than 140 species) belong to the family Loxosomatidae, which comprises the solitary forms (Nielsen, 2010). Two main genera belong to this family: *Loxosomella* Mortensen, 1911 and *Loxosoma* Keferstein, 1863. *Loxosomella* species have a foot with a foot gland and a longitudinal foot groove, at least in the buds. *Loxosoma* never have a foot gland and attach to a substratum by a circular sucking disc (Nielsen, 1964, 1989, 1996; Iseto, Hirose, 2010). *Loxomitra* Nielsen, 1964 could be accepted as a subgenus or a genus of Loxosomatidae with buds attaching to mother zooid by back of calyx or stalk and with the foot bearing a pair of terminal wings (Iseto, 2002; Iseto, Hirose, 2010). Iseto (2002) added the genus *Loxocorone* Iseto, 2002, which has the *Loxosomella*-type foot and buds attaching like in *Loxomitra*. The genus *Loxomespilon* Bobin et Prenant, 1953 which lacks a stalk and attached to the substratum directly by calyx, should be probably considered as the specialized representative of *Loxosomella* (Emschermann, 1971; Nielsen, 2010). Recently the new genus *Emschermannia* Borisanova, 2016 were described, which differs from other loxosomatids by attaching to a substratum via a basal plate and pseudostolons.

Most loxosomatids live as epibionts on various types of animals, mainly polychaetes (69 associated species), sponges (20 species), bryozoans (20 species) (Hyman, 1951; Nielsen, 1964, 2008; Wasson, 2002). Among species reported from bryozoans, 12 species belong to *Loxosomella*. All these species have no foot at adult stage, and attach to a substratum by the end of stalk (Harmer, 1915; Du Bois-Reymond-Marcus, 1957; Nielsen, 1966, 1989; Emschermann, 1993; Bagrov, Slyusarev, 2002; Borisanova, Krylova, 2014). In this paper, one additional *Loxosomella* species from bryozoans is described; it has no foot after attaching to a substratum, and has an unusual structure of the stalk base.

## Materials and Methods

The material was collected by diving at depth 18–24 m on 30 July 2015 in the Velikaja Salma Bay (“Great Salma strait”) of the Kandalaksha Bay in the White Sea, Russia (66°34' N, 33°08'E). Species was found on bryozoans *Electra* Lamouroux, 1816 (Gymnolaemata: Electridae) living on mussel shells. The material was fixed in 2.5% glutaraldehyde in PBS after relaxation in seawater with magnesium chloride solution. Specimens were photographed, drawn and measured under light microscope Leica DM2500.

The type material is deposited in the Zoological Museum of Moscow State University (ZMMU), Moscow.

## Description

Family Loxosomatidae Hincks, 1880  
Genus *Loxosomella* Mortensen, 1911

### *Loxosomella angusta* sp.n.

Figs. 1, 2.

Type material: ZMMU Uk-15 (holotype); ZMMU Uk-16 (4 paratypes).

Type locality: Kandalaksha Bay, White Sea (66°34'N, 33°08'E), depth 18–24 m, 30.07.2015; on the bryozoan *Electra* sp. living as an epibiont on a shell of *Mytilus edulis* Linnaeus, 1758.

Etymology: The species' name '*angusta*' means 'narrow' in Latin and refers to a quite narrow calyx which is almost as wide as the upper part of a stalk

Diagnosis:

Average total length of body from end of foot to base of tentacles 520  $\mu$ m (up to 575  $\mu$ m). Calyx narrow, width in lateral view is almost the same as width in frontal view. Calyx bears 8 tentacles. Tentacle crown faces frontally in contracted state and slightly distofrontally in the expanded state. Stomach wide, trilobed. Stalk length of measured specimens from 250 to 380  $\mu$ m with average length about 330  $\mu$ m. Stalk width is about 75  $\mu$ m. Foot and foot gland are absent. Basal part of stalk that serves for attach-

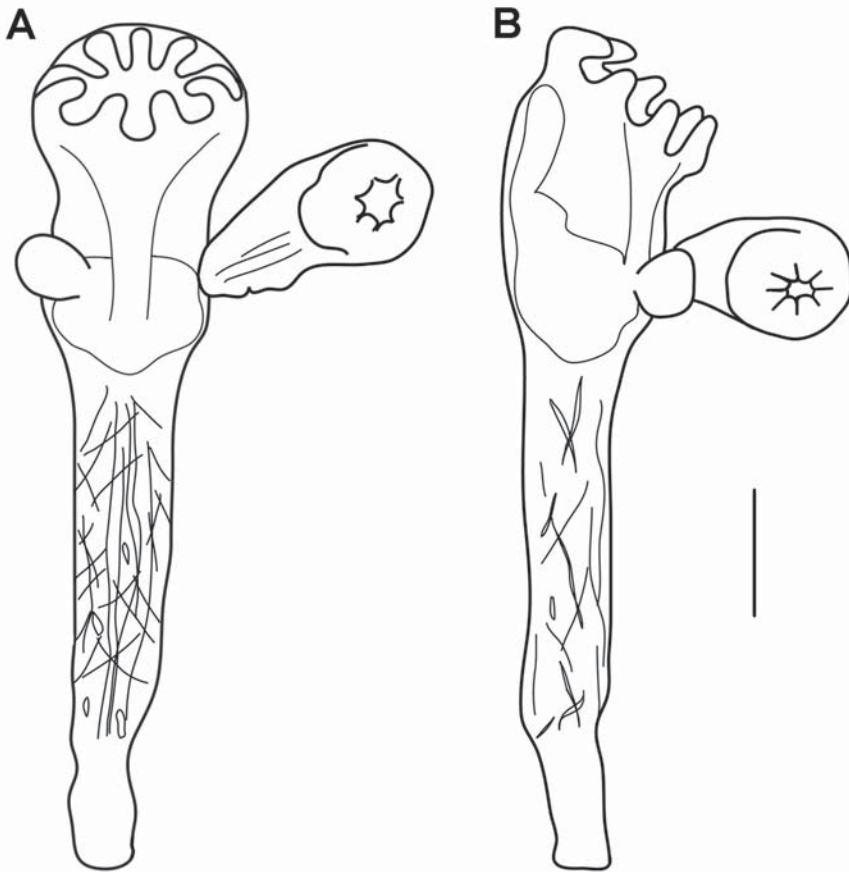


Fig. 1. Overview of *Loxosomella angusta*, scheme. A — specimen in the frontal view; B — calyx in the lateral view. Scale bar: 100  $\mu\text{m}$ .

Рис. 1. Схема строения особи *Loxosomella angusta*. А — особь фронтально; В — чашечка латерально. Масштаб: 100 мкм.

Table 1. Measurements of holotype (\*) and four other specimens ( $\mu\text{m}$ ).  
Таблица 1. основные размеры тела голотипа (\*) и еще четырех особей (мкм).

Specimen	1*	2	3	4	5
Total length	501	566	512	575	470
Calyx length	204	174	174	198	213
Calyx width in lateral view	108	90	95	98	—
Calyx width in frontal view	103	—	99	125	95
Stalk length	297	392	338	377	257
Stalk width	67	79	66	77	81
Length of basal part of stalk	76	94	81	100	95

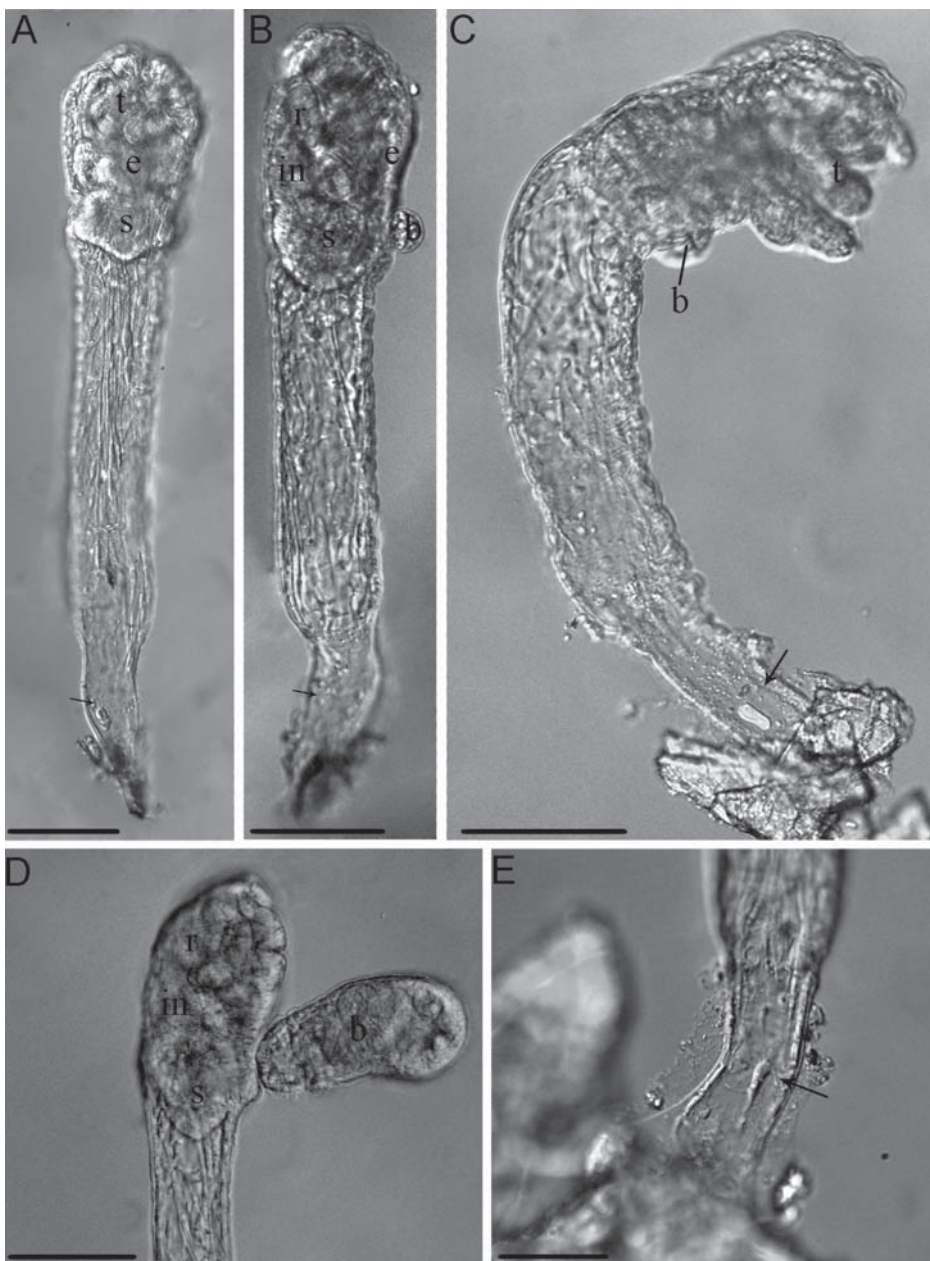


Fig. 2. *Loxosomella angusta*, photography of fixed animals, light microscopy. A — holotype in the frontal view; B — holotype in the lateral view; C — alive specimen with expanded tentacles; D — calyx with large bud in the lateral view; E — lower part of the stalk.

Abbreviations: b — bud; e — esophagus; in — intestine; r — rectum; s — stomach; t — tentacle crown; arrows indicate the lower part of the stalk. Scale bar: A–D — 100  $\mu$ m; E — 50  $\mu$ m.

Рис. 2. Микрофотографии *Loxosomella angusta*. А — голотип фронтально; В — голотип латерально; С — живая особь с расправленными щупальцами; D — чашечка с крупной почкой латерально; E — нижняя часть ножки.

Обозначения: b — почка; e — пищевод; in — средняя кишка; r — прямая кишка; s — желудок; t — венчик щупалец; стрелки указывают на нижнюю часть ножки. Масштаб: А–D — 100 мкм; E — 50 мкм.

ing to the substratum differs from the rest of stalk. It is thinner than main part of stalk, and it looks empty when a lot of connective-tissue cells and muscle cells are distinguished in the main part of stalk. Length of basal part of stalk makes about 25% of total length of stalk. Biometrical data of the holotype and some other live individuals are given in Table 1.

Reproduction: Buds emerge from latero-frontal areas at middle level of stomach. Up to two buds (one bud on each side) at a time were observed (holotype has only one young bud). Embryos were not observed.

## Discussion

*Loxosomella angusta* differs from all other *Loxosomella* by the unusual structure of the lower part of a stalk which is more transparent and narrower than other part of a stalk, and by unusually narrow calyx which gradually passes into a stalk without a sharp border.

*L. angusta* is found on bryozoan *Electra* sp. Bryozoans are one of the usual types of host animals for Loxosomatidae (Nielsen, 1964). Among species reported from bryozoans the majority belong to *Loxosomella* (12 species), one species belongs to *Loxomitra* and eight species have uncertain systematic position. These eight species were originally described as *Loxosoma* (Harmer, 1915; Kluge, 1946), but it is not clear from original descriptions, if buds of these species have or have not foot gland (Nielsen, 1996). All but one authentic species of *Loxosoma* are associated with polychaetes (Nielsen, 1996), which further supports the interpretation of the 'uncertain' species as belonging to *Loxosomella*. A list of loxosomatids associated with bryozoans is given below (Table 2).

*L. angusta* has eight tentacles like the following species reported from bryozoans: *Loxosomella marisalbi* Bagrov et Slyusarev, 2002, *Loxosomella nitschei* (Vigelius, 1882), *Loxosomella nordgaardi* Ryland, 1961 and *Loxosomella unicornis* Borisanova et Krylova, 2014. But all these species differ from *L. angusta* by wider calyces and stalks without narrow basal

part. Besides, *L. marisalbi* differs from *L. angusta* by smaller sizes and several pairs of sensitive papillae, *L. nordgaardi* differs by a rigid ring round a calyx, *L. unicornis* by a horn-shaped appendage on a top of calyx and two pairs of lateral papillae. *L. nitschei* is close to *L. angusta* by size, absence of lateral papillae, stomach form and budding area position but differs by shorter stalk and wider calyx.

Emschermann (2011) doubts that all loxosomatids have such a high host specificity as it appears from the species descriptions. Taking this possibility into account, it makes sense to compare *Loxosomella angusta* with all *Loxosomella* species described from the White Sea irrespectively of their host preferences. 11 species have been previously described from the White Sea (Borisanova, Krylova, 2014). Four species (*L. marisalbi*, *L. nitschei*, *L. nordgaardi*, and *L. unicornis*) are epibionts of Bryozoa and their differences from *L. angusta* were discussed above. Seven species (*L. antis* Krylova, 1985, *L. elegans* Nielsen, 1964, *L. harmeri* (Schultz, 1895), *L. kindai* Krylova, 1985, *L. polita* Nielsen, 1964, *L. similis* Nielsen, 1964 and *L. varians* Nielsen, 1964) are associated with polychaetes. *L. antis*, *L. elegans*, *L. harmeri*, and *L. similis* always bear more than 8 tentacles, and all but *L. harmeri* have well developed foot. *L. polita* bears 6 to 10 tentacles, *L. kindai* from 8 to 11 tentacles, but both species differ from *L. angusta* by the calyx shape, and by stalk with a foot. *L. varians* always has 8 tentacles and has no foot, but differs from *L. angusta* in short stalk, quite wide calyx and frontal budding area. Thus, *L. angusta* differs from all other species described from the White Sea, and is therefore described as a new species.

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Table 2. List of *Loxosomatidae* reported from bryozoans.  
Таблица 2. Список видов *Loxosomatidae*, обитающих на мшанках.

Species	Max length (mm)	Tentacle number	Sensitive papillae	Depths (m)	Host bryozoan species	Area	References
<i>Loxomitra annulata</i>	0.19	9 (11)	One pair of cirriform organs	0–73	<i>Retepora</i> sp.	Indonesia (Arafura Sea, Flores Sea, Ceram Sea, Savu Sea)	Harmer, 1915; Iseto, 2002
' <i>Loxosoma</i> ' <i>breve</i>	0.2	9	Several papillae	32	<i>Shizoporella</i> sp., <i>Cellepora</i> sp.	Indonesia (Ceram Sea)	Harmer, 1915
' <i>Loxosoma</i> ' <i>cingulatum</i>	0.408	8–10	No	41	<i>Rhamphostomella costiata</i>	Arctic Ocean (N 75°52' E 133°23')	Kluge, 1946
' <i>Loxosoma</i> ' <i>cocciforme</i>	0.26	10–12	No	469	<i>Siphonicytara</i> sp.	Indonesia (Halmahera Sea)	Harmer, 1915
' <i>Loxosoma</i> ' <i>infundibuliforme</i>	0.306	8	No	54	<i>Smittina jeffreysi</i>	Arctic Ocean (N 77°44' E 145°32')	Kluge, 1946
' <i>Loxosoma</i> ' <i>loricatum</i>	0.18	8 (10)	One pair	0–113	<i>Canda</i> sp.	Gulf of Thailand, Indonesia (Banda Sea, Java Sea, Timor Sea)	Harmer, 1915
' <i>Loxosoma</i> ' <i>rotundum</i>	0.272	8	No	47.5	<i>Menipea gracilis</i>	Arctic Ocean (N 77°50' E 141°45')	Kluge, 1946
' <i>Loxosoma</i> ' <i>subsessile</i>	0.12	8	No	88	<i>Conescliarellina</i> sp.	Indonesia (Java Sea)	Harmer, 1915
' <i>Loxosoma</i> ' <i>trogloodytes</i>	0.19	9	One pair or more papillae	0–40	<i>Lepralia celleporoides</i>	Indonesia (Ceram Sea, Flores Sea)	Harmer, 1915
<i>Loxosomella brochobola</i>	1.3	14–20	No	260–270	<i>Porella malouinensis</i>	Weddel Sea	Emschermann, 1993
<i>Loxosomella circularis</i>	0.3	12	Two pairs	0–45	<i>Retepora</i> sp.	Indonesia (Banda Sea, Flores Sea, Savu Sea)	Harmer, 1915
<i>Loxosomella cirrifera</i>	0.6	14–18	No	0–57	<i>Retepora</i> sp.	Indonesia (Arafura Sea, Java Sea, Makassar Strait)	Harmer, 1915
<i>Loxosomella illota</i>	0.36	8–12	One pair	80	<i>Amathia vidovici</i>	Atlantic coast of The United States (Miami, Florida)	Nielsen, 1966
<i>Loxosomella marisalbi</i>	0.25	8	Three pairs	5–10	various species	White Sea	Bagrov, Silyusarev, 2002
<i>Loxosomella mepse</i>	0.65	12–15	No	No data	<i>Anguinella palmata</i>	Southeast coast of Brazil (Santos)	Du Bois-Reymond-Marcus, 1957

Table 2 (continued).  
Таблица 2 (продолжение).

Species	Max length (mm)	Tentacle number	Sensitive papillae	Depths (m)	Host bryozoan species	Area	References
<i>Loxosomella nitschei</i>	0.5	8	No	12–40	various species	Eastern Atlantic Ocean, White Sea	Vigelius, 1882; Krylova, 1986; Nielsen, 1989
<i>Loxosomella nordgaardi</i>	0.475	8	No	20–140	various species	Eastern Atlantic Ocean, White Sea	Ryland, 1961; Krylova, 1986; Nielsen, 1989
<i>Loxosomella pusilla</i>	0.25	8–10 (6)	One pair	32–57	<i>Retepora</i> sp.	Indonesia (Arafura Sea, Banda Sea, Ceram Sea, Java Sea)	Harmer, 1915
<i>Loxosomella unicornis</i>	0.65	8	Two pairs	5–24	<i>Electra</i> sp., <i>Cribriolina</i> sp.	White Sea	Borisanova, Krylova, 2014
<i>Loxosomella velata</i>	0.5	14–16	No	0–36	<i>Retepora</i> sp.	Indonesia (Savu Sea)	Harmer, 1915
<i>Loxosomella angusta</i> sp.n.	0.575	8	No	18–24	<i>Electra</i> sp.	White Sea	Our data

carrying out researches and especially to WSBS diving team for help in samples collecting.

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