

A new marine fish leech species of the genus *Oceanobdella* (Clitellata, Piscicolidae) from coastal waters of Sakhalin Island

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Abstract

A new species of marine fish leeches is described and compared with its congeners. *Oceanobdella sakhalinica* possesses a unique combination of characters: the anterior sucker is small; one of posterior transverse bands on the urosome is very dark; a wedge-shaped patch is located on the posterior sucker; posterior crop caeca are separate for their entire length; accessory glands on the atrium are lacking; five pairs of testisacs are present; the copulatory area and the conductive tissue are lacking. Hosts include a sculpin *Myoxocephalus* sp. and the blackline prickleback *Acantholumpenus mackayi*. The leeches were collected in Aniva Bay, southern Sakhalin.

Keywords

Oceanobdella sakhalinica sp. nov., leeches, Piscicolidae, fishes, Sakhalin, North Pacific

Introduction

Members of the genus *Oceanobdella* seem to be among the commonest marine fish leeches (Piscicolidae) in Boreal waters of the North Atlantic and the North Pacific (Burrenson 1977, Appy and Dadswell 1981, Sawyer 1986, Utevsky 2003, Burrenson and Williams 2004). Up to now, 7 species of the genus have been described. The type species *Oceanobdella sexoculata* (Malm, 1863), *Oceanobdella microstoma* (Johansson, 1896) and *Oceanobdella blennii* (Knight-Jones, 1940) occur in the North Atlantic (Appy and Dadswell 1981, Sawyer 1986). The poorly known species *Platybdella quadrioculata* Malm, 1863, along with an unidentified leech, have been recently found in Norwegian waters and assigned to *Oceanobdella* (Karlsbakk 2005). Two species, *Oceanobdella pallida* Burrenson, 1977 and *Oceanobdella khani* Burrenson et Williams, 2004, have been recorded from the north-eastern Pacific Ocean whereas *Oceanobdella alba* (Epshtein et Utevsky, 1996) is very common in the north-western Pacific Ocean. Therefore, the genus *Oceanobdella* can be considered as one of the most diverse genera of piscicolids. In spite of many records of fish leeches from the northern Pacific Ocean (Vasilyev 1939, Moore and Meyer 1951, Epshtein 1967, Khan and Paul 1995, Furiness *et al.* 2007), the leech fauna of this part of the world

appears to be richer than considered before. That was corroborated by finding an undescribed species of *Oceanobdella* during a field trip to Sakhalin Island. This species has been already employed in several molecular phylogenetic analyses under the name of *Oceanobdella* sp. (Utevsky and Trontelj 2004, Williams and Burrenson 2006, Utevsky *et al.* 2007) and its morphological description is presented herein.

Materials and methods

Ten leech specimens were collected from unidentified sculpins *Myoxocephalus* sp. (Cottidae) and the blackline prickleback *Acantholumpenus mackayi* (Stichaeidae) in Aniva Bay, southern Sakhalin, Russian Federation on 21 May 2002. The author joined a team of fishermen and collected parasites immediately from just caught fishes on board a ship. The hosts were examined for leeches on the skin and fins, in the mouth and on the gills. The following description is based upon the examination of specimens anesthetized in 10% ethanol and fixed in 96% ethanol and upon two series of transverse paraffin sections of mature individuals treated with Mallory's triple stain. Sketches of live leeches were made from digital photographs; fixed leeches were drawn using a stereomicroscope equipped

with a grid. Measurements were made with a metric ruler. Sizes and locations of internal organs were referred to numbers of ganglia of the ventral nerve cord. We consider this method more convenient than the reference to segment numbers as the proposed practice does not depend on any theory of the segment composition in leeches and ganglia can be counted straightforwardly. Type specimens were deposited in the Division of Invertebrates, Museum of Nature, V.N. Karazin Kharkiv National University (MNKhNU), Kharkiv, Ukraine.

Results

All of the specimens mentioned above represented an undescribed species of *Oceanobdella*. Description of the new species follows.

Hirudinida Lamarck, 1818

Piscicolidae Johnston, 1865

Oceanobdella Caballero, 1956

Oceanobdella sakhalinica sp. nov. (Figs 1 and 2)

Diagnosis

Small leeches, on the average, 13.0 mm in length, excluding suckers. Anterior sucker small, posterior sucker well-developed. Anterior sucker with 2 pairs of eyes; 1 pair of eyes on first annulus of trachelosome. Segmental ocelli on urosome. Posterior sucker with peripheral ocelli. Pigmentation brown. Transverse bands on trachelosome and urosome. One transverse band on posterior quarter of urosome much darker than others. Wedge-shaped patch of pigment on posterior sucker.

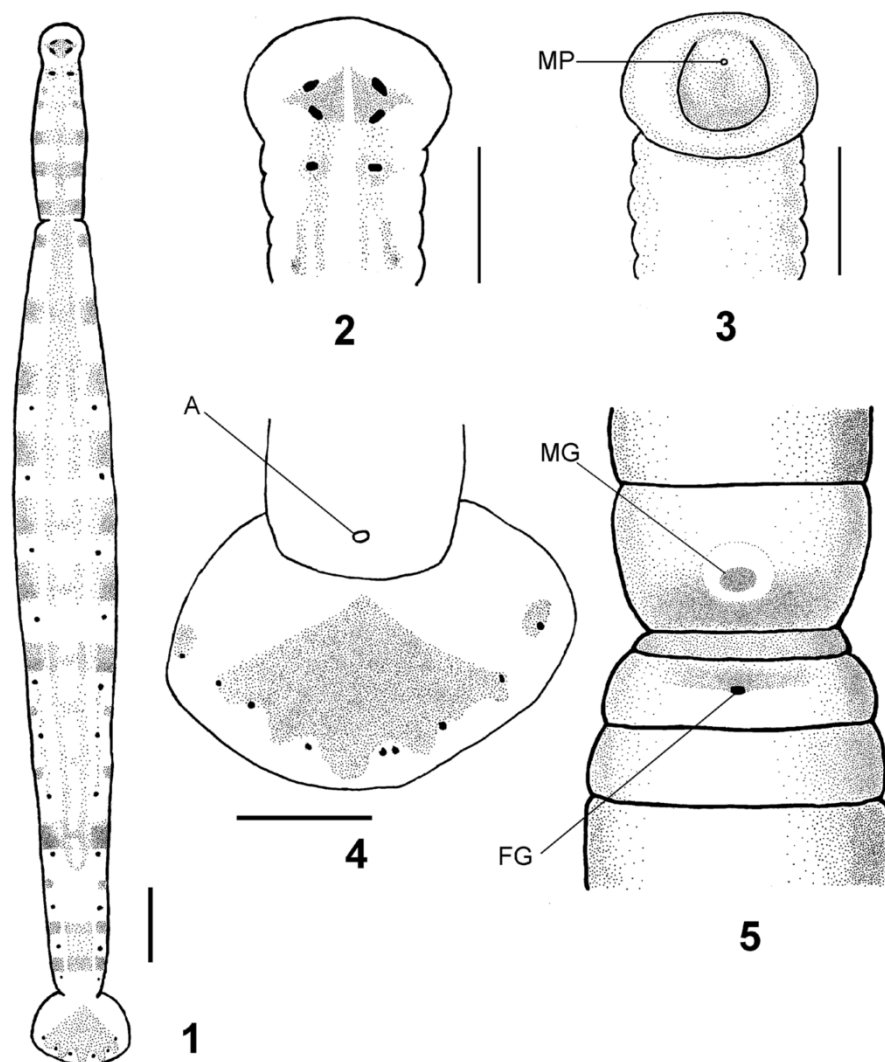


Fig. 1. External characters of *Oceanobdella sakhalinica* sp. nov., holotype after relaxation and fixation; coloration pattern is restored from photographs of live individuals. **1** – dorsal view of entire specimen, showing coloration pattern. Scale bar = 1.0 mm. **2** – anterior sucker, dorsal view, showing eyes and coloration pattern. Scale bar = 0.5 mm. **3** – anterior sucker, ventral view: MP, mouth pore. Scale bar = 0.5 mm. **4** – posterior sucker, dorsal view, showing wedge-shaped patch and ocelli: A, anus. **5** – dorsal view of clitellar region: FG, female gonopore; MG, male gonopore. Scale bar = 0.5 mm

Oesophageal diverticula present. Posterior crop caeca separate for their entire length. No accessory glands on atrium; 5 pairs of testisacs. No copulatory area nor conductive tissue.

External characters

Mean length, excluding suckers, 13.0 mm ($n = 7$), maximum body width 1.4 mm, width of anterior sucker 0.6 mm, width of

posterior sucker 1.5 mm. Body long, flattened, distinctly divided into trachelosome and urosome. Length 9.3 times greater than maximum body width. Maximum body width 1.6 times greater than maximum body thickness. Maximum urosome width 1.75 times greater than maximum trachelosome width. Anterior sucker small, not sharply demarcated from trachelosome; its width 1.3 times smaller than maximum trachelosome width. Mouth pore located in anterior half of anterior sucker.

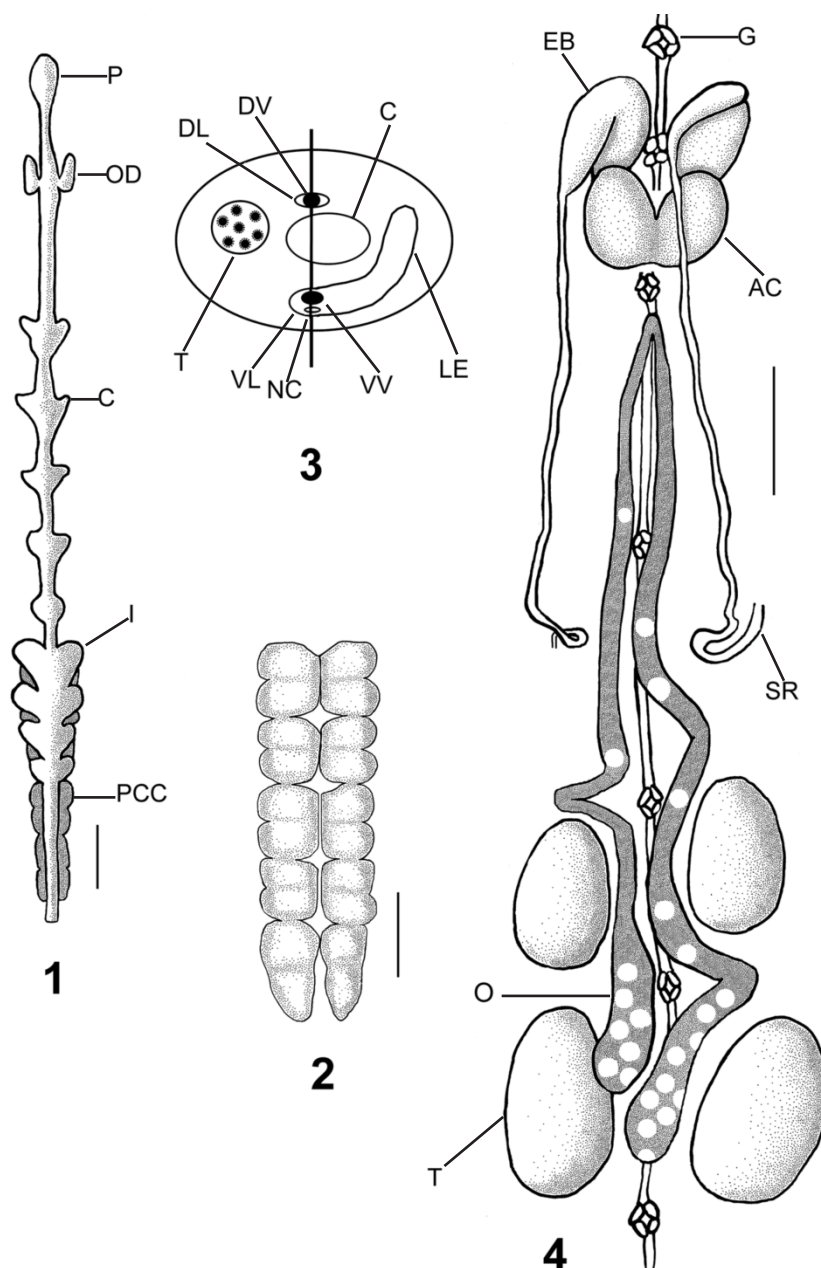


Fig. 2. Internal characters of *Oceanobdella sakhalinica* sp. nov. based on several specimens. **1** – entire digestive system, dorsal view: C, crop; I, intestine; OD, oesophageal diverticulum; P, proboscis; PCC, posterior crop caecum. Scale bar = 1.0 mm. **2** – posterior crop caeca separated for their entire length. Scale bar = 1.0 mm. **3** – diagrammatical view of coelomic system based on serial sections; left side intersegmental, right side in region of ganglion: C, crop; DL, dorsal lacuna; DV, dorsal vessel; LE, lateral expansion of ventral lacuna; NC, ventral nerve cord; T, testisac; VL, ventral lacuna; VV, ventral vessel. **4** – reproductive system, dorsal view: AC, atrial cornu; EB, ejaculatory bulb; G, 4th ganglion of ventral nerve cord; O, ovisac; SR, seminal reservoir; T, testisac. Scale bar = 0.5 mm

Posterior sucker sharply demarcated from urosome, centrally attached; its width 1.1 times greater than maximum urosome width and 2.5 greater than width of anterior sucker. Body surface smooth with no tubercles nor papillae. Clitellum sharply constricted between gonopores. Annulation hardly discernible. Clitellum consists of 4 annuli. Male gonopore located on 1st annulus. Female gonopore on 3rd annulus. No external copulatory area. Midbody segment consisting of about 14 annuli.

Three pairs of eyes present. Two pairs located on anterior sucker and one pair on first annulus of trachelosome. Ten or eleven pairs of segmental ocelli located on dorsal surface of urosome. Ventrally segmental ocelli not discernible. Thirteen peripheral ocelli located on posterior sucker. Body white. Internal organs well seen through skin. Anterior sucker with light brown transverse band. Coloration pattern consists of segmental transverse brown bands, well-developed only on margins of body. Four transverse bands located on trachelosome and 13 bands on urosome. One transverse band on posterior quarter of urosome much darker than others. Bands in front of and before strong band weakly developed. Longitudinal light brown stripe located mid-dorsally on trachelosome. The stripe bifurcates on the urosome. Five of peripheral ocelli of posterior sucker included in base of wedge-shaped patch of pigment. No typical radial bands on posterior sucker. Ocelli alternate with small pigment patches.

Internal characters

Musculature weakly developed. Proboscis extending 1st ganglion of nerve cord. Oesophageal diverticula located between 3rd and 4th ganglia. Crop divided into 5 well-developed caeca with small lateral outgrowths. Posterior crop caeca separate for their entire length, forming 5 pairs of chambers. Intestine divided into 4 well-developed chambers with small lateral outgrowths. Rectum tubular. Coelomic system consists of ventral and dorsal lacunae. Lateral and transverse lacunae not discernible. Ventral lacuna contains ventral nerve cord, ventral blood vessel and ovisacs. Ventral lacuna expanding laterally in regions of ganglia but not connected to dorsal lacuna. Five pairs of testisacs located intersegmentally. Seminal reservoirs extending 7th/8th ganglion, forming loops. Ejaculatory bulbs located anterior to ovoid atrial cornua, extending 4th ganglion. Bursa short. No accessory glands on atrium. Ovisacs long, extending 10th ganglion. No conductive tissue.

Biology

Little is known about the biology and the life cycle of *Oceanobdella sakhalinica*. The specimens were found on gills and the body of an unidentified sculpin *Myoxocephalus* sp. and the blackline prickleback *Acantholumpenus mackayi*. The soft body and the weak musculature of the leeches suggest that they stay on their hosts for a long time and leave them for cocoon laying only.

Taxonomic summary

Type host: sculpin *Myoxocephalus* sp., collected 21 May 2002.

Type locality: Aniva Bay (46°30'N, 142°23'E), southern Sakhalin, Russian Federation.

Site of infection: gills, body surface and fins.

Type specimens: Holotype MNKhNU-An 11: hosts sculpin *Myoxocephalus* sp., infection site gills and body surface, 1 specimen; paratypes MNKhNU-An 12: hosts sculpin *Myoxocephalus* sp., infection site gills and body surface, 1 specimen; MNKhNU-An 13: hosts two sculpins *Myoxocephalus* sp., infection site gills and body surface, 2 specimens; MNKhNU-An 14: hosts sculpin *Myoxocephalus* sp., infection site unknown, 3 specimens; MNKhNU-An 15: hosts blackline prickleback *Acantholumpenus mackayi*, infection site gills and pelvic fin, 3 specimens.

Etymology: The species' name '*sakhalinica*' refers to coastal waters of Sakhalin where the leeches were found.

Discussion

Oceanobdella sakhalinica possesses generic characters such as the small anterior sucker, weak pigmentation, coloration pattern consisting of transverse bands, lack of accessory glands on the atrium and the copulatory area on the clitellum and the conductive tissue is absent or weakly developed. The constriction between the gonopores appears to be caused by relaxation and fixation. The new species resembles *Oceanobdella microstoma* in the wedge-shaped patch on the posterior sucker (Khan and Meyer 1976). However, *O. sakhalinica* can be easily distinguished from its congener by the well-developed coloration pattern on the body and the transverse band on the anterior sucker, whereas, in *O. microstoma*, the body is almost entirely unpigmented and the anterior sucker bears a cross-like figure. *O. sakhalinica* is similar to *Oceanobdella sexoculata* in segmental bands, but can be distinguished by the wedge-shaped patch on the posterior sucker and separate posterior crop caeca. *O. sakhalinica* can be distinguished from *O. blennii* by having 13 ocelli on the posterior sucker whereas the latter species has a reduced number of ocelli (Sawyer 1970). The new species is quite similar to *Oceanobdella quadrioculata* and *Oceanobdella* sp. (see Karlsbakk 2005) in coloration. All of the species have transverse bands including a strong band on the urosome and the wedge-shaped patch on the posterior sucker but, in *O. sakhalinica*, the wedge-shaped patch includes at least five of peripheral ocelli in contrast to *O. quadrioculata* and *Oceanobdella* sp. The new species has 3 pairs of eyes whereas *O. quadrioculata* has only four eyes. In *O. sakhalinica*, pigment bands are brown in contrast to *Oceanobdella* sp., which has olive coloration.

A recent phylogenetic analysis suggests that *O. sakhalinica* is related to North Pacific members of the genus to a greater extent than its North Atlantic congeners since the new

species clustered with *Oceanobdella khani* while *Oceanobdella sexoculata* occupied the basal position with relation to the two species (Williams and Burreson 2006). However, *O. sakhalinica* differs from the Pacific leeches in its coloration pattern. In addition, the new species can be distinguished from *Oceanobdella pallida* and *O. khani* (Burreson 1977, Burreson and Williams 2004) by having ocelli on the posterior sucker. Moreover, *O. sakhalinica* differs from *O. pallida* by having separate posterior crop caeca and from *Oceanobdella alba* in shorter ovisacs (Epshtein and Utevsky 1996, Utevsky 2003). There are more differences between *O. sakhalinica* and *O. alba*, which occurs closest geographically to the new species. The pigmentation of *O. alba* is weak, its anterior sucker is with a light brown transverse band. The coloration pattern consists of segmental transverse brown bands, frequently well-developed only on margins of the body. The posterior sucker is with 14 radial bands, often consisting of individual fragments. The body of some leeches lacks any coloration pattern. Thus, *O. alba* does not possess the strong band on the urosome and the wedge-shaped patch on the posterior sucker, which are characteristic to the new species.

The richness of the leech fauna of the North Pacific can be interpreted through Sawyer's (1986) speculations about salinity/temperature limitation on the distribution of fish leeches. Most piscicolids can tolerate low salinities only at low temperatures, resulting in the relative absence of piscicolids in the tropics, especially in fresh water. Conversely, piscicolids are more prosperous in the low temperature/high salinity conditions of cold and temperate waters of both hemispheres, including the northwestern Pacific Ocean where the new species was found.

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