

***Notostomum cyclostomum* (Hirudinida: Piscicolidae) parasitic on
a flathead flounder, *Hippoglossoides dubius* (Pleuronectidae),
in the southern Sea of Japan off western Japan**

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Abstract. A specimen of the piscicolid leech *Notostomum cyclostomum* Johansson, 1898 was collected from the eyed body surface of a flathead flounder, *Hippoglossoides dubius* Schmidt, 1904, caught at 232 m deep in the southern Sea of Japan west off the Oki Islands, Shimane Prefecture, western Japan. This represents the first Japanese record for fish infestation by *N. cyclostomum*. *Hippoglossoides dubius* is a new host of *N. cyclostomum*.

Key words: *Notostomum cyclostomum*, Hirudinida, Piscicolidae, fish parasite, *Hippoglossoides dubius*, new host record

The piscicolid leech *Notostomum cyclostomum* Johansson, 1898 is found on deep-sea crabs in the subarctic waters of the north Pacific Ocean and adjacent seas (e.g., Epstein, 1967; Sloan *et al.*, 1984; Khan & Paul, 1995; Epshtein & Utevsky, 1996; Nagasawa & Fujiwara, 2008). In Far East Asia, the species occurs with its cocoons on the exoskeleton of snow crabs, *Chionoecetes opilio* (O. Fabricius, 1788) (see Epshtein & Utevsky, 1996; Nagasawa & Fujiwara, 2008 for the literature) and four other crabs including *C. bairdi* Rathbun, 1924, *Paralithodes camtschaticus* (Tilesius, 1815), *P. platypus* (Brandt, 1850), and *Lithodes aequispina* Benedict, 1895 (Epshtein & Utevsky, 1996; Utevsky, 2008). The cocoons of *N. cyclostomum* have also been recorded from deep-sea whelks, *Buccinum striatissimum* Sowerby, 1899, in the southern Sea of Japan (Nagasawa & Ueda, 2013). These deep-sea crabs and

whelks serve as the substrates for cocoon deposition by *N. cyclostomum* (Epshtein & Utevsky, 1996; Nagasawa & Fujiwara, 2008; Utevsky, 2008; Nagasawa & Ueda, 2013). In contrast, deep-sea fishes are the hosts of *N. cyclostomum*, and such fish hosts have been reported from the Sea of Japan off Russia (Epshtein & Utevsky, 1996; Utevsky, 2008) and the northeastern Pacific Ocean off British Columbia, Canada (Sloan *et al.*, 1984) and off Alaska, U.S.A. (Khan & Paul, 1995). Recently, we encountered a fish infestation by *N. cyclostomum* for the first time in Japanese waters.

A single leech was found on the eyed body surface near the dorsal fin base of a flathead flounder, *Hippoglossoides dubius* Schmidt, 1904 (Fig. 1A, 309 mm in standard length [SL]) caught at 232 m in depth using a trawl net during a research cruise on board the R/V *Tanshu maru* in the southern Sea of Japan (36°05'23"N, 132°39'50"E) west off the Oki Islands, Shimane Prefecture, western Japan, on

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Fig. 1. *Notostomum cyclostomum* parasitic on *Hippoglossoides dubius* in the southern Sea of Japan off western Japan on 23 May 2013. A, fish infested with *N. cyclostomum* (arrow) on the eyed body surface; B, closeup of *N. cyclostomum* infesting the fish; C, specimen of *N. cyclostomum*, NSMT-An 495. Scale bars: 50 mm in A; 10 mm in B; 20 mm in C.

23 May 2013. The leech was firmly attached to the host using the caudal sucker (Fig. 1B). No leech infestation was found on the other 21 individuals of *H. dubius* (222–367 [mean 305] mm SL) caught at the same location. The infested fish was frozen on board and later sent to the laboratory of Hiroshima University, Higashi-Hiroshima, where it was thawed and the leech was carefully removed from the host. The leech was photographed, fixed, and preserved in 99.5% ethanol. It is deposited in the annelid (An) collection at the National Museum of Nature and Science, Tsukuba, Japan (NSMT-An 495). The scientific and common names of fishes used in this paper follow Froese & Pauly (2017).

The leech specimen is identified as *N. cyclostomum* (Fig. 1C) based on the description of the species given by Nagasawa & Fujiwara (2008) from *C. opilio* from the southern Sea of Japan off Kyoto Prefecture, central Japan. The specimen is almost cylindrical but becomes narrower toward the oral sucker. It is slightly smaller (55.0 mm long including both suckers and 3.2 mm wide before fixation) than the fully grown adults found on the exoskeleton of *C. opilio* (58.0–75.0 [mean 66.5] mm long and 3.5–7.4 [5.7] mm wide, Nagasawa & Fujiwara, 2008). The

oral and caudal suckers are separated from the trachelosome and urosome, respectively. Before fixation, the body color was pale orange with bands of irregular brown blotches.

Hippoglossoides dubius is herein added as a new host of *N. cyclostomum*. The known fish hosts of *N. cyclostomum* include: Alaska plaice, *Pleuronectes quadrituberculatus* Pallas, 1814, rock sole, *Lepidopsetta bilineata* (Ayres, 1855), flathead sole, *Hippoglossoides elassodon* Jordan & Gilbert, 1880, yellowfin sole, *Limanda aspera* (Pallas, 1814), Pacific halibut, *Hippoglossus stenolepis* Schmidt, 1904, and golden skate, *Bathyraja smirnovi* (Soldatov & Pavlenko, 1915) (as *Breviraja smirnovi*) in the Sea of Japan off Russia (Epshtein & Utevsky, 1996; Utevsky, 2008); *L. aspera* and *H. stenolepis* off British Columbia, Canada (Sloan *et al.*, 1984); and *H. stenolepis* off Alaska, U.S.A. (Khan & Paul, 1995). The leech can experimentally infests winter flounder, *Pseudopleuronectes americanus* (Walbaum, 1792) (as *Pleuronectes americanus*), and yellowtail flounder, *Limanda ferrugineus* (Storer, 1839) (as *Pleuronectes ferrugineus*), in an aquarium (Khan & Paul, 1995). All of these hosts excluding *B. smirnovi* are pleuronectids, which are considered to serve as the

major hosts for *N. cyclostomum*.

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