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Relation	



## Gastropod shell as a substrate for cocoon deposition by the deep-sea fish leech *Notostomum cyclostomum* (Hirudinida: Piscicolidae)

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**Abstract.** Cocoons of the piscicolid leech *Notostomum cyclostomum* Johansson, 1898 were found on the shell of the whelk *Buccinum striatissimum* collected at 200 m in depth in the southern Sea of Japan off Hyogo Prefecture, central Japan. The leech appears to utilize whelks as well as snow crabs *Chionoecetes opilio* as a substrate for cocoon deposition.

**Key words:** *Notostomum cyclostomum*, Hirudinida, Piscicolidae, fish leech, cocoon deposition, whelk, *Buccinum striatissimum*

*Notostomum cyclostomum* Johansson, 1898 is a deep-sea piscicolid leech that is distributed in the circumpolar subarctic waters (Epshtein & Utevsky, 1996). This leech sucks the blood from teleosts and deposits cocoons on the exoskeleton of crabs (Sloan *et al.*, 1984). The species is known to occur in the Sea of Japan, where it uses, for cocoon deposition, snow crabs *Chionoecetes opilio* (O. Fabricius) (Oka, 1910; Suzuki, 1979; Nagasawa & Yamasaki, 1990; Nagasawa, 1991; Epstein & Utevsky, 1996; Tsuchida, 2008; Nagasawa & Fujiwara, 2008). Utevsky & Trontelj (2004) also collected the leech from pink shrimps *Pandalus borealis* Krøyer in the Tatar Strait.

Eleven specimens (ca. 10 cm shell length [SL]) of the whelk *Buccinum striatissimum* Sowerby (Gastropoda: Neogastropoda: Buccinidae) were collected on 3 June 2009 using a trawl net during a research cruise of the R/V *Tanshu maru* at 200 m in depth in the southern Sea of Japan (35°49'12"N, 134°51'54"E)

off Kasumi, Hyogo Prefecture, central Japan. One (10.5 cm SL) of these whelks was found carrying 38 cocoons (including 10 scars) of *N. cyclostomum* on the shell (Fig. 1). Almost all of the cocoons (N=37, 97.4%) were found on the body whorl but one cocoon (2.6%) was present on the second body whorl. The cocoons were circular shaped (4–5 mm in diameter) and brown or dark brown in color. Five snow crabs *C. opilio* (ca. 4–10 cm carapace width) were also collected along with *B. striatissimum*, but no observation was made for leech cocoons on these crabs.

Little information is available about the role of gastropods as a substrate for cocoon deposition by *N. cyclostomum*. In a review on the biology of *Notostomum* spp., Epshtein & Utevski (1996) presented a photograph (fig. 6) of a gastropod with several cocoons on the shell, but these authors did not provide any information on the gastropod's scientific name, sampling locality, and number and distribution of the cocoons on the shell. Thus, our finding represents the second record but indeed the first documented

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Fig. 1. Cocoons of *Notostomum cyclostomum* on the shell of *Buccinum striatissimum* collected at 200 m in depth in the southern Sea of Japan off Kasumi, Hyogo Prefecture, central Japan. Scale bar: 20 mm.

report of cocoon deposition by *N. cyclostomum* on the gastropod shell. The deep-sea bottom is usually covered with mud, and due to rareness of hard substrate, the exoskeleton of crabs is frequently utilized by *N. cyclostomum* for cocoon deposition (Moore & Meyer, 1951; Sloan *et al.*, 1984). Nonetheless, as indicated in this paper, this leech is likely to use the gastropod shell to deposit cocoons as well.

Snow crabs, red snow crabs *Chionoecetes japonicus* Rathbun, and some species of buccinid gastropods have been reported as the major deep-sea benthos in the southern Sea of Japan (Kato, 1979; Yoshio & Hayashi, 1994; Shirai *et al.*, 2010). In order to evaluate the importance of these animals as cocoon carriers, it is desirable to compare the occurrence of cocoons of *N. cyclostomum* on the animals in different regions and at different depths in the sea.

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