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Relation	



Argulus coregoni (Branchiura: Argulidae) parasitic on the torrent catfish *Liobagrus reinii* in Japan

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Abstract. An adult male of the argulid branchiuran *Argulus coregonis* Thorell, 1864 was collected from the body surface of a torrent catfish *Liobagrus reinii* Hilgendorf, 1878 (Siluriformes: Amblycipitidae) in the Aga River, a tributary of the Agano River, Fukushima Prefecture, central Honshu, Japan. This is the first record of *A. coregoni* infecting the amblycipitid fish as well as a new host record for the species. This collection also extends the distributional range of *A. coregoni* from Tochigi Prefecture northward to Fukushima Prefecture and is the first record of the species in the Tohoku Region of Japan.

Key words: *Argulus coregoni*, Branchiura, distributional range extension, fish parasite, *Liobagrus reinii*, new host

The torrent catfish *Liobagrus reinii* Hilgendorf, 1878 is a freshwater fish endemic to Japan (Mori & Nagoshi, 1989). It usually occurs under or among stones in the middle- and upper-reaches of non-polluted streams in western and central Honshu, Shikoku, and Kyushu islands. It has been designated as a vulnerable species (Ministry of the Environment, 2013). Our knowledge of the parasite fauna of *L. reinii* remains limited, and only two digeneans and three nematodes have been reported from this fish: *Dimerosaccus oncorhynchi* (Eguchi, 1931) (Digenea: Opecoelidae) (Moravec & Nagasawa, 1998 as *Plagioporus honshuensis* Moravec & Nagasawa, 1998; Shimazu & Urabe, 2005), *Neoplagioporus zacconis* (Yamaguti, 1934) (Digenea: Opecoelidae) (Shimazu & Urabe, 2005), *Rhabdochona japonica* Moravec, 1975 (Nematoda: Rhabdochonidae) (Yamaguti, 1935 as *R. zacconis* Yamaguti, 1935; Moravec, 1975; Moravec & Nagasawa, 1998; Moravec & Shimazu, 2008), *Rhabdochona coronacauda*

Belouss, 1965 (Nematoda: Rhabdochonidae) (Moravec & Nagasawa, 1998), and *Mexiconema liobagri* Moravec & Nagasawa, 1998 (Nematoda: Daniconematidae) (Moravec & Nagasawa, 1998; Moravec & Shimazu, 2008). Recently, we collected a specimen of a crustacean parasite *Argulus coregonis* Thorell, 1864 (Branchiura: Argulidae) from *L. reinii*.

One individual of *L. reinii* (ca. 80 mm in total length) was collected using a hand net on 10 July 2010 in the Aga River (37°12'43.2"N, 139°47'16.1"E), a tributary of the Agano River, at Tajima, Minamiaizu Town, Fukushima Prefecture, central Honshu, Japan (Fig. 1). Immediately after capture, this fish was found infected with a single branchiuran, and both were fixed in 70% ethanol. Subsequently, the branchiuran specimen was sent to the laboratory at Hiroshima University, Higashi-Hiroshima City, Hiroshima Prefecture, where it was cleared in a drop of lactophenol and examined using the wooden slide technique of Humes & Gooding (1964). It is deposited in the Crustacea (Cr) collection of the National Museum of Nature and Science,

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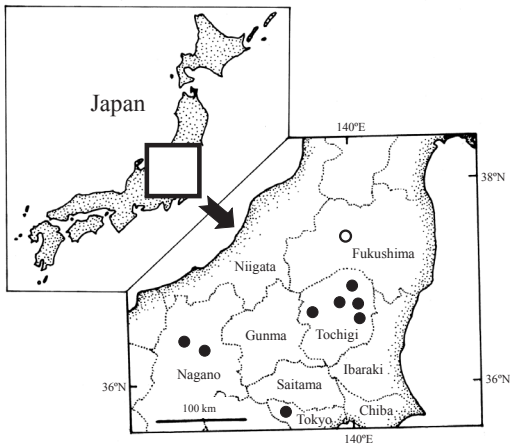


Fig. 1. A map of central Honshu, Japan, showing the sampling localities of *Argulus coregoni* Thorell, 1864. The localities reported in the previous (Nagasawa, 2009; Nagasawa *et al.*, 2015) and present studies are shown by closed and open circles, respectively. Prefectural boundaries are represented by dotted lines.

Tsukuba City, Ibaraki Prefecture (NSMT-Cr 24197). The scientific names of fish used in this paper follow those recommended by Nakabo (2013).

The specimen of *A. coregoni* (Fig. 2) was an adult male, measuring 4.5 mm long and 2.8 mm wide. This specimen corresponds well with those described

from Japanese salmonids by Hoshina (1950, fig. 3). Two papillate knobs were present on the ventro-posterior margin of the coxa of the second leg, and there was a stout peg on the anterior margin of the basis of the fourth leg. However, unlike the specimens reported by Tokioka (1936) and Yamaguti (1937), the present specimen had not a digitiform but small process on the dorso-posterior margin of the coxa of the second leg.

The present finding of *A. coregoni* from *L. reinii* represents a new host record and the first record of this parasite from the amblycipitid fish. *Argulus coregoni* is primarily a parasite of salmonids in the Northern Hemisphere (Yamaguti, 1963), but in Japan, it is known to infect not only salmonids, *Salvelinus fontinalis* (Mitchill, 1814), *S. leucomaenis imbricus* Jordan & McGregor, 1925, *S. leucomaenis japonicus* Oshima, 1961, *Salmo trutta* Linnaeus, 1758, *Oncorhynchus masou ishikawae* Jordan & McGregor, 1925, *O. masou masou* (Brevoort, 1856), and *O. mykiss* (Walbaum, 1729), but also *Plecoglossus altivelis altivelis* (Temminck & Schlegel, 1846) (Plecoglossidae), *Acheilognathus melanogaster*

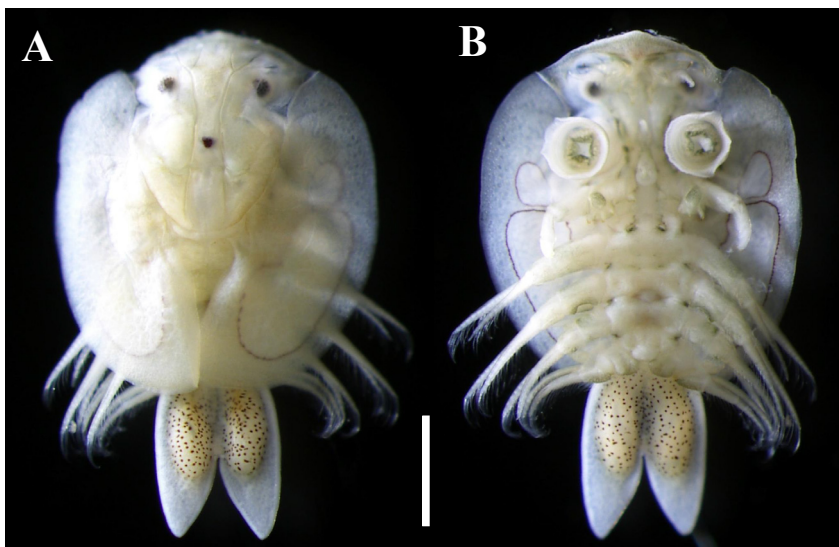


Fig. 2. *Argulus coregoni* Thorell, 1864, adult male, NSMT-Cr 24197, from the body surface of *Liobagrus reinii* Hilgendorf, 1878. Alcohol-preserved specimen. A, dorsal view; B, ventral view. Scale bar: 1 mm.

(Bleeker, 1860) (Cyprinidae), and *Odontobutis hikimius* Iwata & Sakai, 2002 (Odontobutidae) (Nagasawa, 2009, 2011; Nagasawa *et al.*, 2014, 2015). Salmonids, namely *O. masou masou*, *Salvelinus leucomaenis pluvius* (Hilgendorf, 1876), and *S. leucomaenis leucomaenis* (Pallas, 1814), occur near the sampling location, and these fish may serve as the hosts for *A. coregoni* as well.

Fukushima Prefecture, where the present material was collected (Fig. 1), is one of the six prefectures consisting of the Tohoku Region, which is located in the north of Honshu, the largest island of Japan. The previous northernmost distributional record of *A. coregoni* in Japan is from Tochigi Prefecture (Nagasawa, 2009; Nagasawa *et al.*, 2015), which belongs to the Kanto Region south of the Tohoku Region. Thus, the finding of *A. coregoni* in this study extends the distributional range of the species from Tochigi Prefecture northward to Fukushima Prefecture and is also its first record in the Tohoku Region.

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