

Sakhalin redfin *Pseudaspius sachalinensis* (Cypriniformes: Leuciscidae) for northern Japan, a new host record for *Argulus coregoni* (Crustacea: Branchiura: Argulidae)

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Abstract

An adult female of *Argulus coregoni* Thorell, 1864 was collected from the body surface of a Sakhalin redfin *Pseudaspius sachalinensis* (Nikolskii, 1889) in the Hiranosawa Creek in Akita Prefecture, northern Japan. This represents a new host record for *A. coregoni*, and Sakhalin redfin is the second leuciscid host of this parasite. The specimen of *A. coregoni* is briefly described: it is characterized by three and four plumose setae near the posterior margin of the first leg coxa and 64 and 65 supporting rods in the marginal membrane of the first maxilla. The creek is a small mountain stream in a humid subarctic climate, and the water was running and very clear. Salmonids were dominant in the creek, where they most probably serve as the major hosts for *A. coregoni*. The climate and water conditions of the creek are inferred to provide both salmonids and *A. coregoni* with favorable habitats.

Introduction

Argulus coregoni Thorell, 1864 is not a host-specific parasite and infects freshwaters fishes of various taxonomic groups in Japan (Nagasawa et al., 2024a). Its common hosts are fishes of two salmoniform families Salmonidae and Plecoglossidae (Nagasawa et al., 2022, 2024a; Nagasawa, 2023) but it is also found on those of the gobiiform family Odontobutidae (Nagasawa et al., 2014), the siluriform family Amblycipitidae (Nagasawa and Ishikawa, 2015), and three cypriniform families, i.e., Acheilognathidae

(Tokioaka, 1936; Nagasawa and Taniguchi, 2021), Leuciscidae (Nagasawa and Nishimura, 2025; Nagasawa et al., 2025a, b), and Xenocyprididae (Nagasawa et al., 2024a, 2025a, c; Nagasawa and Nishimura, 2025; Nagasawa and Yamano, 2025; Nagasawa and Miyajima, 2025).

Recently, we collected a branchiuran parasite from a Sakhalin redfin *Pseudaspius sachalinensis* (Nikolskii, 1889) in Akita Prefecture, northern Japan, and identified it as *A. coregoni*. Sakhalin redfin belongs to the Leuciscidae, and its geographical distribution is confined to northern Honshu, Hokkaido, and Iturup Island in Japan and Sakhalin and Khabarovsk Krai in the Russian Far East (Sakai, 1995; Shedko, 2005). So far, there is no record of *A. coregoni* from Sakhalin redfin (Smirnova, 1971; Sokolov et al., 2012; Nagasawa and Katahira, 2013, 2016). We report here on this collection of *A. coregoni* as its new host record.

Materials and Methods

A Sakhalin redfin infected with a branchiuran parasite was accidentally found during an examination of fishes at the laboratory of the Akita Prefectural Institute of Fisheries. Fishes were captured using an electro-shocker in the Hiranosawa Creek (Fig. 1) at San-nai Hiranosawa in Yokote, Akita Prefecture, northern Japan, on 13 September 2024 and deeply frozen for subsequent identification on the day of capture. When these fishes were thawed and examined on 18 November 2024, the parasite found was collected from the body surface of Sakhalin redfin and

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Fig. 1. Collection site of a Sakhalin redfin *Pseudaspius sachalinensis* infected with *Argulus coregoni* in the Hiranosawa Creek at San-nai Hiranosawa in Yokote, Akita Prefecture, northern Japan.

fixed in 70% ethanol. Later, at the Aquaparasitology Laboratory, Shizuoka Prefecture, this specimen was observed using an Olympus SZX10 stereo microscope and an Olympus BX51 phase-contrast compound microscope. It was measured for its total length (to the nearest 0.1 mm, from the anterior tip of the carapace to the posterior tip of the abdomen) and body width (to the nearest 0.1 mm, around midlength of carapace). It was also cleared in lactophenol and examined using the wooden slide procedure (Humes and Gooding, 1964; Benz and Otting, 1996). Drawings were made with the aid of a drawing tube attached to the compound microscope. Morphological terminology follows Benz et al. (1995) and Benz and Otting (1996). Data on the elevation (m) at the collection site reported in this paper are taken from the Geospatial Information Authority of Japan. The scientific names of fishes mentioned in this paper follow Motomura (2025). Although two common names (Sakhalin redfin and Ainu dace) have been proposed for *P. sachalinensis* by Nagasawa and Katahira (2013: 106) and Fujita (2015), respectively, the former name is adopted here based on the priority of publication year. The order and family of fishes follow Froese and Pauly (2025). The specimen of *A. coregoni* has been deposited in the Crustacea collection of the National Museum of

Nature and Science, Tsukuba, Ibaraki Prefecture, Japan (NSMT-Cr 33058).

Results

Description (Fig. 2A, B). Total length and body width of specimen 9.7 and 5.8 mm, respectively. *Body* dorsoventrally flattened. *Carapace* nearly circular and covering frontal and lateral portions of thorax. Frontal region of carapace delimited by anterolateral indentations and protruding anteriorly. Paired compound eyes located dorsally at level of joint of frontal region and main portion of carapace. Naupliar eye present at midline of anterior dorsal surface of carapace. Posterolateral lobes of carapace separated by sinus and ending in rounded margin. Paired respiratory areas, each consisting of anterior small and posterior large portions, present in lateral regions of carapace. *Thorax* four-segmented. *Abdomen* bilobed, longer than wide. Paired spermathecae located in anterior region of abdomen.

First leg (Fig. 2C) coxae each with three and four plumose setae near posterior margin.

First maxillae forming well developed cup-like suckers (Fig. 2B); marginal membranes of suckers each with 64 and 65 supporting rods.

Color in 70% ethanol (Fig. 2A, B). Body white; compound eyes black; respiratory areas fringed with black pigment; thorax dorsally brown and ventrally pale yellow; dark brown oval or rectangular dots scattered on dorsal surface of central portion of body including thorax.

Host. Sakhalin redfin *Pseudaspius sachalinensis* (Cypriniformes: Leuciscidae).

Site of infection. Body surface.

Locality. Hiranosawa Creek (39°15'47"N, 140°37'26"E, Fig. 1), an upstream tributary of the Yokote River, which is a major tributary of the Omono River, at 114 m elevation at San-nai Hiranosawa in Yokote, Akita Prefecture, northern Japan. The creek was ca. 3.7 m wide at the collection site.

Remarks. Based on its gross morphology, the specimen collected in this study belongs to the genus *Argulus*. To date, two species of this genus have reported from freshwater fishes in Akita Prefecture, and they are *A. coregoni* (Nagasawa et al., 2019, 2020; Nagasawa and Sato, 2023) and *A. japonicus* Thiele, 1900 (Nagasawa et al., 2024b). These two congeneric species are similar in their morphology (Tokioka, 1965) but can be differentiated from each other by the number of plumose setae on or near the posterior margin of the first leg coxa (three to nine in *A. coregoni* vs one in *A. japonicus*) (Nagasawa and Miyajima, 2025) and that of supporting rods in

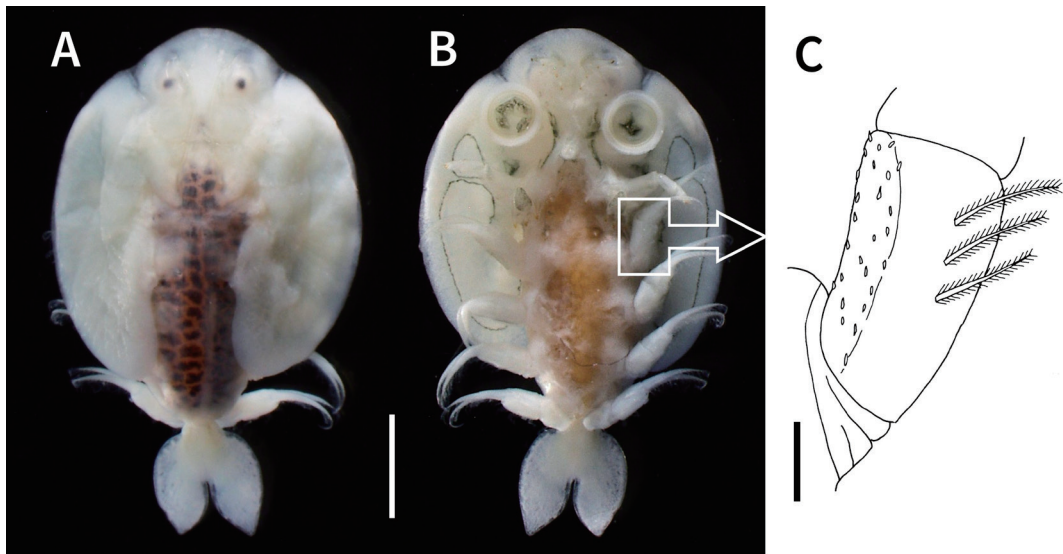


Fig. 2. *Argulus coregoni*, adult female (9.7 mm total length), NSMT-Cr 33058, collected from a Sakhalin redfin *Pseudaspius sachalinensis* in the Hiranosawa Creek at San-nai Hiranosawa in Yokote, Akita Prefecture, northern Japan, on 13 September 2024. A, habitus, dorsal view; B, habitus, ventral view; C, coxa of first leg, ventral view. The specimen of *A. coregoni* was deeply frozen on the day of collection, thawed and fixed in 70% ethanol on 18 November 2024, and photographed (A, B) on 2 November 2025. Scale bars: A, B, 2 mm; C, 0.2 mm.

the marginal membrane of the first maxilla (usually more than 60 in *A. coregoni* vs 40–52 in *A. japonicus*) (Nagasawa et al., 2024a). The specimen examined here has three and four plumose setae on the first leg coxa (Fig. 2C) and 64 and 65 supporting rods in the first maxilla, both of which correspond to the numbers reported from *A. coregoni*, and it is identified here as this species.

In Akita Prefecture, *A. coregoni* has been recorded from three species of wild fishes [ayu *Plecoglossus altivelis altivelis* (Temminck and Schlegel, 1846), whitespotted charr *Salvelinus leucomaenis leucomaenis* (Pallas, 1814), and masu salmon *Oncorhynchus masou masou* (Brevoort, 1856)] and farmed masu salmon (Nagasawa et al., 2019, 2020; Nagasawa and Sato, 2023). Sakhalin redfin is the fourth fish species reported as a host of *A. coregoni* in this prefecture.

In addition to Sakhalin redfin, big-scaled redfin *Pseudaspius hakonensis* (Günther, 1877) occurs in Akita Prefecture, where the latter fish species is known as a host of *A. japonicus* (Nagasawa et al., 2024b). When branchiuran parasites are collected from fishes of *Pseudaspius* in this prefecture, it is important to carefully and correctly identify those parasites because *A. japonicus* bears a close morphological resemblance to *A. coregoni* (Tokioka, 1965).

Discussion

As stated in the Introduction, Sakhalin redfin is a new host of *A. coregoni*. The known leuciscid

host of *A. coregoni* is only upstream fat minnow *Rhynchocypris oxycephala jouyi* (Jordan and Snyder, 1901) (Nagasawa and Nishimura, 2025; Nagasawa et al., 2025a, b), and Sakhalin redfin is the second leuciscid host of this parasite.

The Hiranosawa Creek, from which fishes were collected in this study, is an upstream tributary of the Yokote River. Based on a fish fauna study by the second author (MS, unpublished), this creek is inhabited by many stream-resident masu salmon, a few whitespotted charr and brown trout *Salmo trutta* Linnaeus, 1758, and some other fishes including Sakhalin redfin. Of these fishes, both masu salmon and whitespotted charr are known as the hosts of *A. coregoni* in other streams of Akita Prefecture (Nagasawa et al., 2020; Nagasawa and Sato, 2023), and they are likely to serve as the major hosts for the parasite in the Hiranosawa Creek as well.

In central Japan which is under a temperate climate, salmonids infected with *A. coregoni* have been reported to occur in cold, well-oxygenated, high-elevation mountain streams (Nagasawa et al., 2022; Nagasawa, 2023). Although the Hiranosawa Creek is not located at a high elevation (114 m), it is a mountain stream in northern Japan under a humid subarctic climate, and the water is running and very clear (Fig. 1). Thus, such climate and water conditions of the creek are inferred to provide both salmonids and *A. coregoni* with favorable habitats, like in high-elevation streams in central Japan.

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