A new distribution record in northern Honshu, Japan, for *Argulus coregoni* (Crustacea: Branchiura: Argulidae), a skin parasite of freshwater fishes

Kazuya Nagasawa[1,2] and Kimiaki Naiki[3]

[1]Graduate School of Integrated Sciences for Life, Hiroshima University, 1–4–4 Kagamiyama, Higashi-Hiroshima, Hiroshima 739–8528, Japan

[2]Aquaparasitology Laboratory, 365–61 Kusanagi, Shizuoka 424–0886, Japan

[3]Iwate Inland Fisheries Technology Center, 1–474 Matsuo-Yoriki, Hachimantai, Iwate 028–7302, Japan

Abstract

Adults of both sexes of *Argulus coregoni* Thorell, 1864 were collected from the body surface of masu salmon *Oncorhynchus masou masou* (Brevoort, 1856) and white-spotted charr *Salvelinus leucomaenis leucomaenis* (Pallas, 1814) in Nen-nen-sawa Creek, a tributary of the Akka River, at Nen-nen in Iwaizumi, Iwate Prefecture, northern Honshu, Japan. This represents the first record for *A. coregoni* from Iwate Prefecture, and Nen-nen-sawa Creek is a new locality record. The parasite is briefly described.

Introduction

During a recent study on the ecology of stream-resident salmonids in Iwate Prefecture, northern Honshu, Japan, both masu salmon *Oncorhynchus masou masou* (Brevoort, 1856) and white-spotted charr *Salvelinus leucomaenis leucomaenis* (Pallas, 1814) were found to be infected with argulids in Nen-nen-sawa Creek, a tributary of the Akka River, and these argulids were identified as *Argulus coregoni* Thorell, 1864. This species is known to infect various species of freshwater fishes, including salmonids, in different regions of Japan (Nagasawa et al., 2024a), but it has not yet been reported from Iwate Prefecture. This paper presents the first documented record of *A. coregoni* from the prefecture.

Materials and Methods

Twenty masu salmon were captured by electrofishing in Nen-nen-sawa Creek (39°59'42"N, 141°46'34"E, Fig. 1) at Nen-nen in Iwaizumi, Iwate Prefecture, northern Honshu, on 5 August 2024. Upon capture, these fish were anesthetized and measured for fork length (FL, to the nearest 1 mm), and argulids were carefully removed from the fish body surface using forceps. Argulids were also taken from a white-spotted charr captured together with masu salmon. All of the salmonids, except for one masu salmon that was kept for an endoparasite examination in the laboratory, were released back into the capture site, and the argulids were fixed in 99.5% ethanol on the day of collection. Later, at the Aquaparasitology Laboratory, Shizuoka Prefecture, the argulid specimens were observed using an Olympus SZX10 stereo microscope and an Olympus BX51 phase-contrast compound microscope. They were sexed and measured for total length (TL, to the nearest 0.1 mm, from the anterior tip of the carapace to the posterior tip of the abdomen) and body width (BW, to the nearest 0.1 mm, around midlength of carapace). Two specimens (one male and one female from masu salmon) were 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 (2026). Since several different common names have been used for *S. l. leucomaenis*

Nagasawa, K. and K. Naiki. 2026. A new distribution record in northern Honshu, Japan, for *Argulus coregoni* (Crustacea: Branchiura: Argulidae), a skin parasite of freshwater fishes. *Nature of Kagoshima* 52: 197–201.

✉ KN: Graduate School of Integrated Sciences for Life, Hiroshima University, 1–4–4 Kagamiyama, Higashi-Hiroshima, Hiroshima 739–8528, Japan; present address: Aquaparasitology Laboratory, 365–61 Kusanagi, Shizuoka 424–0886, Japan (e-mail: ornatus@hiroshima-u.ac.jp).

Received: 16 February 2026; published online: 17 February 2026; https://journal.kagoshima-nature.org/archives/NK_052/052-050.pdf

Fig. 1. Collection site of masu salmon *Oncorhynchus masou masou* and white-spotted charr *Salvelinus leucomaenis leucomaenis* infected with *Argulus coregoni* in Nen-nen-sawa Creek, a tributary of the Akka River, at Nen-nen in Iwaizumi, Iwate Prefecture, northern Honshu, Japan.

in Japanese literature, this paper follows Fausch et al. (2024) and uses "white-spotted charr". The specimens of *A. coregoni* have been deposited in the Crustacea collection of the National Museum of Nature and Science, Tsukuba, Ibaraki Prefecture, Japan (NSMT-Cr 33266, two males and three females from masu salmon; NSMT-Cr 33267, three females from white-spotted charr).

Results and Discussion

Two (77 and 173 mm FL) of the 20 masu salmon (77–179 mm FL) were found to harbor on their body surface three and two argulids, respectively (Fig. 2A). One white-spotted charr (255 mm FL) was also infected with 14 argulids (Fig. 2B). Nen-nen-sawa Creek is a mountain stream with clear running waters (Fig. 1), and the collection site was located at elevations of 210–215 m.

Five and three argulid specimens were collected from masu salmon and white-spotted charr, respectively, and they consisted of two males (4.4–6.0 mm TL, 3.0–4.0 mm BW) and six females (1.5–10.3 mm TL, 1.0–7.1 mm BW).

The argulid specimens are identified as *A. coregoni*, based on the following morphological characters (Figs. 3, 4): *Body* dorsoventrally flattened. *Carapace* nearly circular; frontal region delimited by anterolateral indentations and protruding anteriorly. Paired compound eyes distinct at level of anterolateral indentations of carapace. Naupliar eye visible dorsally at midline of anterior surface of carapace. Posterolateral lobes of carapace separated by sinus; posterior margin rounded. Paired respiratory areas, each consisting of anterior small and posterior large portions, located in lateral regions of carapace. *Thorax* four-segmented; each segment issuing a pair of biramous legs. *Abdomen* bilobed, longer than wide. Paired testes and spermathecae located in anterior region of male and female abdomen, respectively. *First leg* coxae each with six and eight plumose setae near posterior margin in male (Fig. 3C) and four and five setae in female (Fig. 4C). *Second leg* coxae each with two protrusions adorned with small spines and one digitiform projection on ventro- and dorsoposterior margins, respectively, in male (Fig. 3C) and with one and one plumose seta on posterior margin in female (Fig. 4C). *First maxillae* forming well developed cup-like suckers; marginal membranes of suckers each with 58 and 60 supporting rods in male and 63 and 65 rods in female.

Remarks. *Argulus coregoni* is reported herein for the first time from Iwate Prefecture, and Nen-nen-sawa Creek represents a new locality record for the species. Iwate Prefecture is one of the six prefectures (Aomori, Iwate, Miyagi, Fukushima, Akita, and Yamagata) in the Tohoku Region, northern Honshu, and *A. coregoni* has been documented from four prefectures: Aomori (Nagasawa, 2025), Miyagi (Nagasawa et al., 2023a), Fukushima (Nagasawa and Ishikawa, 2015), and Akita (Nagasawa et al., 2019, 2020; Nagasawa and Sato, 2023, 2025).

In this study, *A. coregoni* was collected from masu salmon and white-spotted charr in Nen-nen-sawa Creek, which is a mountain stream at elevations of 210–215 m. These salmonid species are common in streams of Iwate Prefecture (Naiki, unpublished), and they are also likely to harbor *A. coregoni* in streams other than Nen-nen-sawa Creek because this parasite utilizes stream-resident salmonids as its hosts in central and northern Honshu, Japan (Nagasawa and Kawai, 2019; Nagasawa et al., 2020, 2021, 2022; Nagasawa, 2023; Nagasawa and Sato, 2023).

There is no record of a morphologically similar, congeneric species *A. japonicus* Thiele, 1900 in Iwate Prefecture. However, since this species has been reported from three neighboring prefectures [Aomori (Nagasawa et al., 2024b), Miyagi (Nagasawa et al., 2023b), and Akita (Nagasawa et al., 2024b)], it may also occur in Iwate Prefecture. The hosts recorded from the three prefectures are two species of cypriniform fishes: common carp *Cyprinus carpio* Linnaeus, 1758 (Nagasawa et al., 2023b) and big-scaled redfin *Pseudaspius hakonensis* (Günther, 1877) (Nagasawa et al., 2024b).

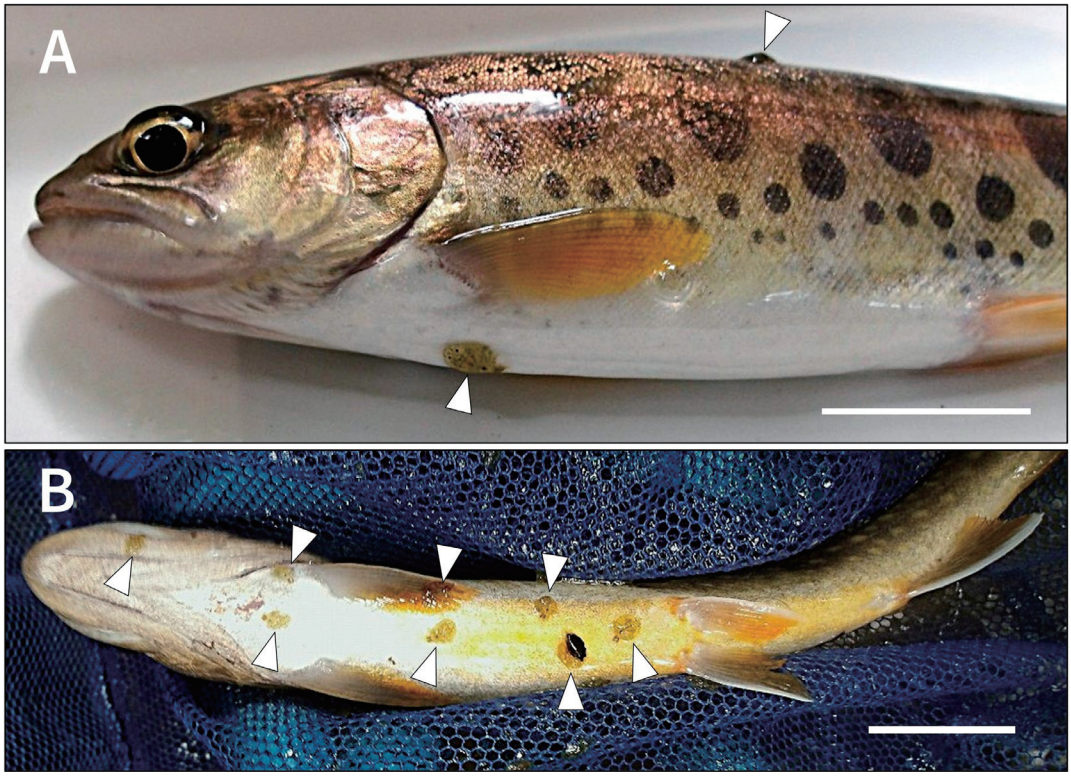

Fig. 2. A masu salmon *Oncorhynchus masou masou* (A, 173 mm FL) and a white-spotted charr *Salvelinus leucomaenis leucomaenis* (B, 255 mm FL) infected with *Argulus coregoni*. Two and eight individuals of *A. coregoni* (indicated by arrowheads) are seen on individual fishes. FL: fork length. Scale bars: A, 20 mm; B, 30 mm.

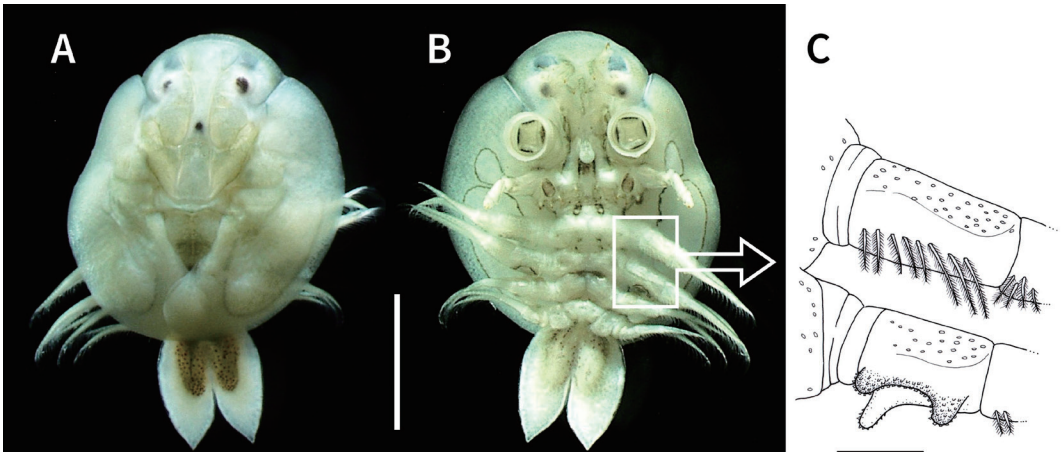

Fig. 3. *Argulus coregoni*, adult male (6.0 mm TL), NSMT-Cr 33266, collected from masu salmon *Oncorhynchus masou masou* in Nen-nen-sawa Creek, a tributary of the Akka River, at Nen-nen in Iwaizumi, Iwate Prefecture, northern Honshu, Japan, on 5 August 2024. A, habitus, dorsal view; B, habitus, ventral view; C, coxae of first and second legs, ventral view. The specimen of *A. coregoni* was fixed in 99.5% ethanol on the day of collection and photographed (A, B) on 17 January 2026. TL: total length. Scale bars: A, B, 2 mm; C, 0.3 mm.

Much remains poorly understood about the fauna of parasitic crustaceans of freshwater fishes of Iwate Prefecture. This paper is the first report of a parasitic crustacean (*A. coregoni*) infecting wild fishes in this prefecture. To date, only the lernaeopodid copepod *Salmincola markewitschi* Shedko and Shedko, 2002 has been recorded from salmonids reared at a hatchery in the prefecture [reported as *Salmincola* sp., Kumagai,

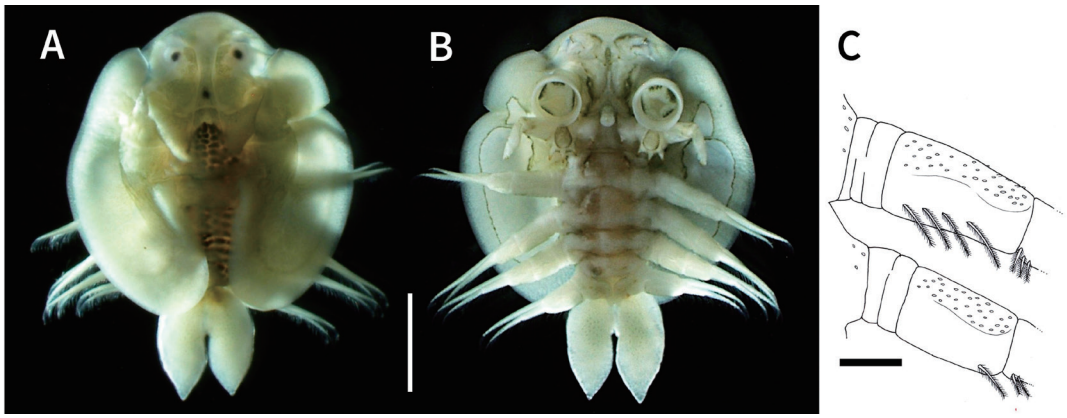

Fig. 4. *Argulus coregoni*, adult female (7.6 mm TL), NSMT-Cr 33266, collected from masu salmon *Oncorhynchus masou masou* in Nen-nen-sawa Creek, a tributary of the Akka River, at Nen-nen in Iwaizumi, Iwate Prefecture, northern Honshu, Japan, on 5 August 2024. A, habitus, dorsal view; B, habitus, ventral view; C, coxae of first and second legs, ventral view. The specimen of *A. coregoni* was fixed in 99.5% ethanol on the day of collection and photographed (A, B) on 17 January 2026. TL: total length. Scale bars: A, B, 2 mm; C, 0.3 mm.

1985; *S. carpionis* (Krøyer, 1837), Nagasawa et al., 1995; see Shedko and Shedko, 2002, Hasegawa et al., 2022, and Shedko et al., 2023 for identification of this parasite]. It is necessary to examine various wild and captive freshwater fishes for clarifying the parasitic crustacean fauna of Iwate Prefecture.

Acknowledgments

We thank Takanori Ishikawa, Nihon University, for his support for this study. We are also grateful to the staff of the Akka River Fisheries Cooperative Association and the Iwate Inland Fisheries Technology Center for their collaboration in the survey. The salmonids were captured under the permission of the Governor of Iwate Prefecture. This work was supported in part by the Fisheries Agency of Japan.

References

Benz, G. W. and R. L. Otting. 1996. Morphology of the fish louse (*Argulus*: Branchiura). Drum and Croaker, 27: 15–22.

Benz, G. W., R. L. Otting and A. Case. 1995. Redescription of *Argulus melanostictus* (Branchiura: Argulidae), a parasite of California grunion (*Leuresthes tenuis*: Atherinidae), with notes regarding chemical control of *A. melanostictus* in a captive host population. Journal of Parasitology, 81: 754–761.

Fausch, K. D., K. Morita, J.-I. Tsuboi, Y. Kanno, S. Yamamoto, D. Kishi, J. B. Dunham, I. Koizumi, K. Hasegawa, M. Inoue, T. Sato and S. Kitano. 2024. The past, present, and a future for native charr in Japan. Ichthyological Research, 71: 461–485.

Hasegawa, R., H. Katahira and I. Koizumi. 2022. *Salmincola markewitschi* or *S. carpionis* (Copepoda: Lernaeopodidae)? A requirement for taxonomic revision due to their high morphological variations. Folia Parasitologica, 69: 05.

Humes, A. G. and R. U. Gooding. 1964. A method for studying the external anatomy of copepods. Crustaceana, 6: 238–240.

Kumagai, A. 1985. On *Salmincola* parasitic on trout. Annual Report of the Iwate Inland Fisheries Experimental Station for the Fiscal Year 1984: 85–93. (In Japanese)

Motomura, H. 2026. List of Japan's all fish species. Current standard Japanese and scientific names of all fish species recorded from Japanese waters. Kagoshima University Museum, Kagoshima. Online ver. 36. Available at: https://www.museum.kagoshima-u.ac.jp/staff/motomura/jaf.html (In Japanese) (21 January 2026)

Nagasawa, K. 2023. Occurrence of fish parasites *Argulus japonicus* and *Argulus coregoni* (Crustacea: Branchiura: Argulidae) in the Lake Biwa Basin, central Japan. Species Diversity, 28: 217–223.

Nagasawa, K. 2025. A new prefecture record in Japan for a freshwater fish ectoparasite *Argulus coregoni* (Crustacea: Branchiura: Argulidae). Nature of Kagoshima, 52: 149–153.

Nagasawa, K. and T. Ishikawa. 2015. *Argulus coregoni* (Branchiura: Argulidae) parasitic on the torrent catfish *Liobagrus reinii* in Japan. Biogeography, 17: 99–102.

Nagasawa, K. and K. Kawai. 2019. Further record of a fish parasite *Argulus coregoni* (Crustacea: Branchiura: Argulidae) in tributaries to Lake Biwa, central Japan. Nature of Kagoshima, 46: 95–98. (In Japanese with English abstract)

Nagasawa, K. and M. Sato. 2023. Note on *Argulus coregoni* (Branchiura: Argulidae) parasitic on ayu *Plecoglossus altivelis altivelis* and stream-resident masu salmon *Oncorhynchus masou masou* in Akita Prefecture, northern Honshu, Japan. Nature of Kagoshima, 50: 115–121. (In Japanese with English abstract)

Nagasawa, K. and M. Sato. 2025. Sakhalin redfin *Pseudaspius sachalinensis* (Cypriniformes: Leuciscidae) from northern Japan, a new host record for *Argulus coregoni* (Crustacea: Branchiura: Argulidae). Nature of Kagoshima, 52: 113–117.

Nagasawa, K., M. Yamamoto, Y. Sakurai and A. Kumagai. 1995. Rediscovery in Japan and host association of *Salmincola carpionis* (Copepoda: Lernaeopodidae), a parasite of wild and reared freshwater salmonids. Canadian Journal of Fisheries and Aquatic Sciences, 52 (supplement 1): 178–185.

Nagasawa, K., T. Ishikawa and Y. Gôma. 2019. New record of a freshwater fish parasite *Argulus coregoni* (Branchiura: Argulidae) from Akita Prefecture, northern Honshu, Japan. Biogeography, 21: 51–53.

Nagasawa, K., M. Sato and M. Yagisawa. 2020. Record of a skin parasite *Argulus coregoni* from wild and farmed salmonids in Akita Prefecture, northern Honshu, Japan. Nature of Kagoshima, 47: 91–95. (In Japanese with English abstract)

Nagasawa, K., A. Nagahama and N. Kawakubo. 2021. *Argulus coregoni* (Branchiura: Argulidae) from a white-spotted char, *Salvelinus leucomaenis* (Salmonidae), in the Maze River, Gifu Prefecture, central Japan. Nature of Kagoshima, 48: 113–117. (In Japanese with English abstract)

Nagasawa, K., D. Kishi and T. Tokuhara. 2022. Occurrence of a skin parasite *Argulus coregoni* (Branchiura: Argulidae) on salmonids in mountain streams, central Japan, with discussion on its longitudinal distribution and host utilization in rivers. Species Diversity, 27: 159–166.

Nagasawa, K., M. Iwashita, Y. Kimijima, S. Kitamura and N. Itagaki. 2023a. New record of *Argulus coregoni* (Branchiura: Argulidae) from Miyagi Prefecture, northern Honshu, Japan. Nature of Kagoshima, 49: 153–157. (In Japanese with English abstract)

Nagasawa, K., T. Asayama, Y. Fujimoto and M. Nitta. 2023b. The fish louse *Argulus japonicus* (Branchiura: Argulidae) parasitic on common carp *Cyprinus carpio* in Lake Izunuma, Miyagi Prefecture, Japan, and records of argulid branchiurans in northern Honshu. Nature of Kagoshima, 50: 55–60. (In Japanese with English abstract)

Nagasawa, K., R. Uchiyama and K. Tomikawa. 2024a. *Argulus coregoni* (Crustacea: Branchiura: Argulidae) parasitic on a dark chub *Nipponocypris temminckii* (Cypriniformes: Xenocyprididae) in a stream, central Japan, with a list of its known hosts in East Asia. Species Diversity, 29: 181–197.

Nagasawa, K., M. Nitta and N. Azuma. 2024b. New records of a freshwater fish parasite *Argulus japonicus* (Branchiura: Argulidae) from northern Honshu, Japan, with a note on its occurrence in a brackish water lake. Crustacean Research, 53: 1–8.

Shedko, M. B. and Shedko, S. V. [Shed'ko, M. B. and Shed'ko, S. V. in English abstract] 2002. Parasitic copepods of the genus *Salmincola* (Lernaeopodidae) from Far-Eastern chars *Salvelinus* (Salmonidae) with a description of the new species *S. markewitschi* sp. n. Zoologicheskii Zhurnal, 81: 141–153. (In Russian with English abstract)

Shedko, S. V., Shedko, M. B., Miroshnichenko, I. L. and Nemkova, G. A. 2023. DNA identification of parasitic copepods *Salmincola* (Copepoda, Siphonostomatoida, Lernaeopodidae): variability and rate of evolution of the mitochondrial cytochrome c oxidase subunit I gene. Russian Journal of Genetics, 59: 1022–1031.