

First record of *Argulus coregoni* (Branchiura: Argulidae), a skin parasite of freshwater fishes, from Kyushu, Japan

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■ Abstract

The argulid branchiuran *Argulus coregoni* Thorell, 1865 is reported based on two adult males from the dorsal skin of land-locked masu salmon, *Oncorhynchus masou masou* (Brevoort, 1856), caught in a mountain stream, Kyushu, the third largest island in Japan. This is the first record of *A. coregoni* from Kyushu.

■ Introduction

Kyushu is the third largest (36,750 km²) among more than 6,800 islands/islets in Japan and located in the southwestern part of the country. It consists of seven prefectures (Fukuoka, Oita, Miyazaki, Kagoshima, Kumamoto, Saga, and Nagasaki). Many species of freshwater fishes occur in inland waters of Kyushu: for example, more than 160 species of fishes, including some brackish-water and anadromous species, are known to occur in the Kita River, Miyazaki Prefecture (Eguchi et al. 2008). The parasite fauna of freshwater fishes of Kyushu remains poorly studied, which is particularly true for that of crustacean parasites. So far, only three species of crustacean parasites have been reported: two species of copepods, *Lernaea cyprinacea* Linnaeus, 1758 (Lernaeidae) from Miyazaki and Nagasaki prefectures (Kasahara 1962; Yoshikoshi and Kô 1988, 1991b) and *Neoergasilus japonicus* (Harada, 1930) (Ergasilidae) from Nagasaki Prefecture (Yoshikoshi and Kô 1988, 1991a, b); and one species of branchiuran, *Argulus japonicus* Thiele, 1900 (Arguli-

dae) from Kagoshima, Kumamoto, Fukuoka, and Oita prefectures (Nagasawa et al. 2012, 2018a; Yamauchi and Shimizu 2013; Nagasawa and Miyajima 2018).

Recently, we collected *Argulus coregoni* Thorell, 1865 from land-locked masu salmon, *Oncorhynchus masou masou* (Brevoort, 1856) (Salmonidae), in Kumamoto Prefecture. This collection represents the first record of *A. coregoni* from Kyushu.

■ Materials and Methods

Three individuals of *O. masou masou* were collected using hook and line with earthworm bait in the uppermost reaches of the Nakabaru River, a tributary of the Chikugo River, at Nakabaru, Minami-Oguni, Kumamoto Prefecture on 28 September 2018. Immediately after capture, argulid branchiurans found on the dorsal skin of the fish were taken using forceps and fixed in 99% ethanol. In the laboratory, the specimens were identified, and a non-damaged specimen was photographed using a camera attached to an Olympus stereo microscope (SZX10). Voucher specimens of *A. coregoni* have been deposited in the Crustacea (Cr) collection of the National Museum of Nature and Science, Tsukuba, Ibaraki Prefecture, Japan (NSMT-Cr 26052). The scientific names of fishes mentioned in this paper are those recommended in Nakabo (2013).

■ Results

Two of the three individuals of *O. masou masou* examined (ca. 150 mm long) were found to be infected with *A. coregoni*. Each infected fish harbored one *A. coregoni*. Two specimens of *A. coregoni* collected were adult males (Fig. 1): one of them measured 6.4 mm long and 5.0 mm wide, and the other was damaged and 6.1 mm long (no measurement for body width). Their

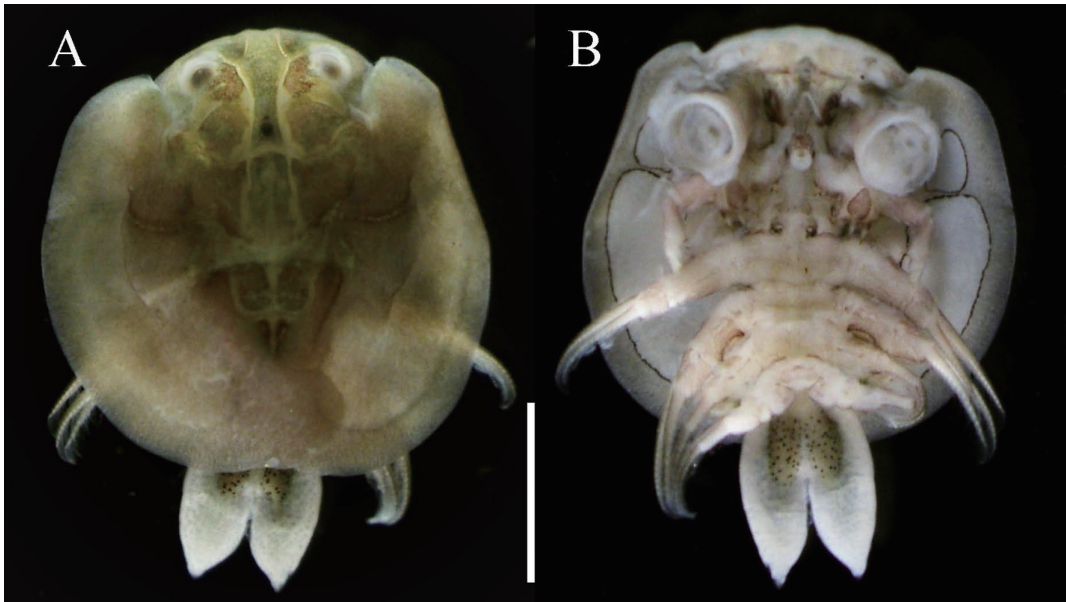


Fig. 1. *Argulus coregoni*, NSMT-Cr 26052, male. A, dorsal view; B, ventral view. The anterior part of the carapace was ventrally bent. Scale bar: 2 mm.

morphology is in accordance with the descriptions of *A. coregoni* given by Tokioka (1936), Yamaguti (1937), and Hoshina (1950).

Remarks: In Japan, *A. coregoni* has so far been reported from two main islands, Honshu and Shikoku (Nagasawa 2009, 2011; Nagasawa and Ikeda 2011). The previous westernmost records on these islands are from Yamaguchi Prefecture (Nagasawa et al. 2017) and Kochi Prefecture (Nagasawa and Ikeda 2011), respectively. In the present study, *A. coregoni* was collected for the first time from Kyushu, and this collection extends its geographical distribution westwards to this island.

■ Discussion

The fish examined in this study were wild masu salmon, whose population is land-locked in the stream sampled. However, two salmonid species (rainbow trout, *Oncorhynchus mykiss* (Walbaum, 1792), and masu salmon) were previously released into the stream from a recreational fishing site in Oita Prefecture. Thus, the possibility cannot be ruled out that *A. coregoni* was introduced into the stream with the released salmonids.

Two subspecies of *Oncorhynchus masou*, i.e., *O. masou masou* and red-spotted masu salmon, *Oncorhynchus masou ishikawae* (Jordan and McGregor, 1925), are distributed in Kyushu, where their populations are restricted to the upper reaches of rivers in the mountain area (Oshima 1957; Kimura 1959). In these reaches,

some other fishes, such as fat minnow, *Phoxinus oxycephalus jouyi* (Jordan and Snyder, 1901), and dark chub, *Candidia temminckii* (Temminck and Schlegel, 1846) (both Cyprinidae), are also abundant (Kimoto et al. 2015; Kimoto 2017). Since *A. coregoni* is known to infect salmonids and other freshwater fishes in Japanese rivers (e.g., Yamaguti 1937; Nagasawa 2009, 2011; Nagasawa et al. 2014, 2015, 2018b; Nagasawa and Ishikawa 2015), it is desirable to investigate the occurrence of the parasite on various fish species in mountain streams of Kyushu in order to clarify its geographical distribution and host utilization on this island.

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