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Argulus japonicus (Branchiura: Argulidae) parasitic on a lakeweed chub, *Ischikauia steenackeri* (Cyprinidae), in northern Kyushu, Japan

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Abstract: The lakeweed chub, *Ischikauia steenackeri* (Sauvage, 1883), was originally distributed in the Yodo River system including Lake Biwa, central Japan, and has recently established its populations as a domestic alien species in various inland waters in western and central Japan, including Kyushu. An adult female of *Argulus japonicus* Thiele, 1900 was collected from the body surface of a lakeweed chub in an irrigation canal connected to the Hase River, a tributary of the Nishi River within the Onga River system in Fukuoka Prefecture, northern Kyushu. This repersents a new prefectural and host records for *A. japonicus*. This parasite is considered not to have been introduced to the sampling site by *I. steenackeri* but to naturally occur in the river system.

Key words: *Argulus japonicus*, Branchiura, fish parasite, *Ischikauia steenackeri*, new host record, new prefectural record

The lakeweed chub, *Ischikauia steenackeri* (Sauvage, 1883), is a cyprinid endemic to the Yodo River system including Lake Biwa, central Japan. The species has recently established its populations as a domestic alien fish in various inland waters in western and central Japan, including Kyushu (Takeuchi, 2015). In 2017, we collected a specimen of *Argulus japonicus* Thiele, 1900 from the body surface of an individual of *I. steenackeri* in Fukuoka Prefecture, northern Kyushu. Fukuoka Prefecture is one of the seven prefectures (Oita, Miyazaki, Kagoshima, Kumamoto, Saga, Nagasaki, and Fukuoka) in Kyushu, which is the third largest island (36,750 km^2) of Japan. Little information is available on the geographical distribution of *A. japonicus* in Kyushu, where the species has been reported only from Kagoshima and Kumamoto prefectures (Nagasawa *et al*., 2012; Yamauchi & Shimizu, 2013). Our collection represents a new prefectural record for *A. japonicus* in Japan and its first record from *I. steenackeri*.

Three individuals of *I. steenackeri* were caught by rod and line in an irrigation canal (33°45'34"N, 130°40'31"E) connected to the Hase River, a tributary of the Nishi River within the Onga River system at Hase, Kurate, Fukuoka Prefecture on 29 June 2017. The fish were transported alive to the laboratory of Hiroshima University, Higashi-Hiroshima, where one of them (123 mm in standard length) was found to be infected by an individual of *A. japonicus* on the body surface near the right ventral fin. The specimen of *A. japonicus* was carefully removed from the fish, fixed and then preserved in 99.5% ethanol. It has been deposited in the Crustacea (Cr) collection of the National Museum of Nature and

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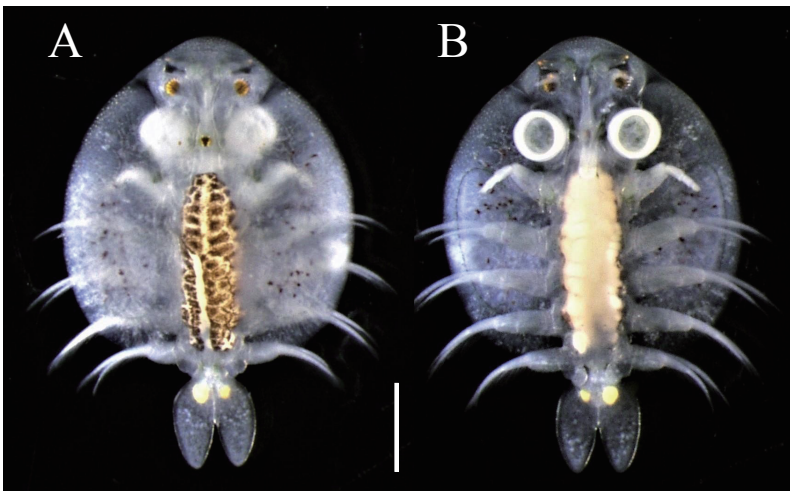

Fig. 1. *Argulus japonicus*, adult female (4.9 mm long, A, dorsal view; B, ventral view), NSMT-Cr 26851, from the body surface of *Ischikauia steenackeri* in an irrigation canal, Fukuoka Prefecture, northern Kyushu. Fresh specimen. Scale bar: 1 mm.

Science, Tsukuba, Ibaraki Prefecture (NSMT-Cr 26851). The scientific and common names of fishes mentioned in this paper follow Nakobo (2013) and Froese & Pauly (2018), respectively. Nonetheless, the scientific name of goldfish is based on Froese & Pauly (2018), and the common name of *I. steenackeri* follows Takeuchi (2015).

The specimen of *A. japonicus* collected (Fig. 1) was an adult female, measuring 4.9 mm long and 3.0 mm wide. It has morphological characters of the species reported by Tokioka (1936) and Yamaguti (1937). In Japan, cyprinids serve as the major hosts for *A. japonicus* (Nagasawa, 2011): the known cyprinid hosts are common carp, *Cyprinus carpio* Linnaeus, 1758; goldfish, *Carassius auratus* (Linnaeus, 1758); Japanese white crucian carp, *Carassius cuvieri* Temminck & Schlegel, 1846; ginbuna, *Carassius* sp. (reported as *Carassius auratus langsdorfii*); unidentified crucian carp, *Carassius* sp.; rosy bitterling, presumably a natural hybrid of *Rhodeus ocellatus ocellatus* (Kner, 1866) and *Rhodeus ocellatus kurumeus* Jordan and Thompson, 1914; silver carp, *Hypophthalmichthys molitrix* (Valenciennes, 1844); bighead carp, *Aristichthys nobilis* (Richardson, 1845); and freshwater minnow, *Opsariichthys platypus* (Temminck & Schlegel, 1846) (Nagasawa *et al*., 2012, 2013; Yamauchi & Shimizu, 2013; Nagasawa & Sato, 2014; Nagasawa, 2017; see Nagasawa, 2009, 2011 for the literature published before 2010). *Ischikauia steenackeri* occurs only in Japan and is here regarded as a new host of *A. japonicus*.

Thirty species of genuine freshwater fishes, which consist of 18 species of the family Cyprinidae (excluding three species introduced from the Yodo River system) and 12 species of other families, are found in the Onga River system (Nakajima *et al*., 2006) and *A. japonicus* is not host-specific (Nagasawa, 2009, 2011). Based on such information, it seems likely that *A. japonicus* was not recently introduced by *I. steenackeri* but naturally occurs in the river system and uses native cyprinid fishes as its hosts.

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