

Salvelinema salmonicola (Nematoda: Cystidicolidae) from lake-resident salmonids in western Honshu, Japan

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Abstract. Specimens of the cystidicolid nematode *Salvelinema salmonicola* (Ishii, 1916) were collected from the swimbladder of amago salmon *Oncorhynchus masou ishikawae* and brown trout *Salmo trutta* in Lake Takase, Yamaguchi Prefecture, western Honshu, Japan. This is the first record of *S. salmonicola* from Yamaguchi Prefecture and brown trout in Japan, and also the third record of the species from lake-resident salmonids in Japan.

Key words: *Salvelinema salmonicola*, Nematoda, fish parasite, *Oncorhynchus masou ishikawae*, *Salmo trutta*, Yamaguchi Prefecture

The cystidicolid nematode *Salvelinema salmonicola* (Ishii, 1916) Margolis, 1966 is a parasite found in the swimbladder lumen of freshwater salmonids in the North Pacific rim countries (Margolis, 1967, 1968; Moravec & Nagasawa, 1999). In Japan, the species has been reported from Honshu, Hokkaido, and the southern Kurile Islands (Nagasawa *et al.*, 1987; Nagasawa & Furusawa, 2006). During a study of the parasite fauna of freshwater fishes of western Japan, we found the nematode (Fig. 1) in two species of salmonids, amago salmon *Oncorhynchus masou ishikawae* Jordan & McGregor and brown trout *Salmo trutta* Linnaeus, caught in Lake Takase (34° 10' 13.9''N, 131° 46' 31.4''E), Shunan City, Yamaguchi Prefecture, western Honshu, Japan. The lake, ca. 80 ha in surface area, was formed after the construction

of a dam in the Shimaji River, one of the tributaries of the Saba River, which empties into the Seto Inland Sea.

A total of 20 fishes (15 *O. masou ishikawae*, four *S. trutta*, and one rainbow trout *Oncorhynchus*



Fig. 1. *Salvelinema salmonicola* infecting the swimbladder lumen of an amago salmon *Oncorhynchus masou ishikawae*, 246 mm SL, caught in Lake Takase, Shunan City, Yamaguchi Prefecture, Japan, on 22 March 2009. Scale bar: 20 mm.

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mykiss (Walbaum)) were captured by rod and line in Lake Takase from April 2005 to August 2012. Fishes were fixed in 10% formalin or frozen and transported to the laboratory at Hiroshima University, where they were measured for standard length (SL, mm) and examined for parasites. Nematodes from the swimbladder were preserved in 70% ethanol and identified based on Moravec & Nagasawa (1999). Voucher specimens are deposited in the Aschelminthes (As) collection at the National Museum of Nature and Science (NSMT-As 3960 from *O. masou ishikawae*; NSMT-As 3961 from *S. trutta*) in Tsukuba, Ibaraki Prefecture, Japan. The scientific names of fishes used in this paper follow those in Nakabo (2013).

Four (26.7%) of the 14 *O. masou ishikawae* (155–495 mm SL) were infected by a total of 39 *S. salmonicola* (1–17 [mean 9.8] per infected host). One *S. salmonicola* parasitized one (25.0%) of the four *S. trutta* (420–530 mm SL). No nematode infection was found in the one *O. mykiss* (485 mm SL). This is the first record of *S. salmonicola* from Yamaguchi Prefecture. In Honshu, the main island of Japan, the species has been from Aomori, Ishikawa, Shiga, and Hiroshima prefectures (Nagasawa & Furusawa, 2006). The present finding of the nematode extends its distribution range westward to Yamaguchi Prefecture, the westernmost prefecture in Honshu.

Salmo trutta is not native to Japan: it was introduced from the U.S.A. into Japan in the late 1920's (Okumoto, 1989). This fish was released into Lake Takase in 2004 and 2005. The individual of *S. trutta* infected by the nematode is likely to be one of those released fish. To date, only one species of parasite (the rhabdochonid nematode *Rhabdochona oncorhynchi*) has been reported from *S. trutta* in Japan (Nagasawa *et al.*, 1987). *Salvelinema salmonicola* is newly added to the parasite fauna of *S. trutta* of Japan.

Our knowledge is limited on the occurrence of *S. salmonicola* in lake-resident salmonids in Japan, where only two papers (Yamaguti, 1935; Nagasawa *et al.*, 2010) reported its infection in salmonids from two lakes (Lake Biwa and Lake Toya). The finding

of *S. salmonicola* in this study represents the third record of the species from lake-resident salmonids in Japan. Since *O. masou ishikawae* and *S. trutta* have not been studied for the ecology in Lake Takase and the Shimaji River, no information is available on their feeding on amphipods, which are known to serve as intermediate hosts for *S. salmonicola* (Moravec & Nagasawa, 1986). Moreover, *O. masou ishikawae* is distributed in the main stream and tributaries of the Shimaji River as well as in the lake (Hatama, unpublished data) and some may move between these locations. Therefore, in order to clarify the life cycle and ecology of *S. salmonicola*, we need to discover its intermediate hosts and study the feeding habits and movement of the salmonids in various locations of the Shimaji River.

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