

Pseudorhadinorhynchus samegaiensis (Acanthocephala: Echinorhynchida: Illiosentidae) Uses the Amphipod *Jesogammarus* (*Annanogammarus*) *fluvialis* as an Intermediate Host in a Stream of the Lake Biwa Basin, Central Japan

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Cystacanths and acanthellae of the illiosentid acanthocephalan *Pseudorhadinorhynchus samegaiensis* Nakajima and Egusa, 1975 are described from the anisogammarid amphipod *Jesogammarus* (*Annanogammarus*) *fluvialis* Morino, 1985 in a stream at the Samegai Trout Experimental Station, the type locality of the acanthocephalan, in the Lake Biwa basin, Shiga Prefecture, west-central Japan. This amphipod is herein regarded as an intermediate host of *P. samegaiensis*. This is the first description of developmental stages of any member of the genus *Pseudorhadinorhynchus* Achmerov and Dombrovskaja-Achmerova, 1941. Since *J. (A.) fluvialis* does not occur in the Lake Biwa proper but two other congeners, *J. (A.) annandalei* (Tattersall, 1922) and *J. (A.) naritai* Morino, 1985, inhabit the lake, it is suggested that *P. samegaiensis* uses one or both of the latter two amphipods as its intermediate host(s) in the lake.

Key Words: *Pseudorhadinorhynchus samegaiensis*, Acanthocephala, fish parasite, life cycle, *Jesogammarus* (*Annanogammarus*) *fluvialis*, Amphipoda, Lake Biwa basin, Japan.

Introduction

Acanthocephalans of the illiosentid genus *Pseudorhadinorhynchus* Achmerov and Dombrovskaja-Achmerova, 1941 (Palaeacanthocephala: Echinorhynchida) currently comprise 18 valid species (Amin 2013). They are found in the intestine of fish, but no life cycle is known for any species of this genus. Two species of the genus occur in Japan: *P. samegaiensis* Nakajima and Egusa, 1975 (Nakajima *et al.* 1975; Nakajima and Egusa 1975b; Grygier 2004, 2013; Amin *et al.* 2007; Nagasawa and Grygier 2011) and *P. leuciscus* (Krotov and Petrochenko, 1956) (Machida and Araki 1982; Araki and Machida 1987; Hashimoto 2000). The former species was originally described by Nakajima and Egusa (1975b) based on specimens from rainbow trout *Oncorhynchus mykiss* (Walbaum, 1729) (as *Salmo gairdnerii irideus* Gibbons, 1885) (Salmoniformes: Salmonidae) at the Samegai Trout Experimental Station, Shiga Prefecture, west-central Japan. This station is located on the Nyuu River within the watershed of Lake Biwa, which is the largest (640 km²) and oldest (over four million years old) lake in Japan (Horie 1984), and the acanthocephalan has so far been reported only from Lake Biwa and its watershed (Grygier 2004, 2013; Amin *et al.* 2007; Nagasawa and Nitta 2015).

Recently, individuals of the amphipod *Jesogammarus* (*Annanogammarus*) *fluvialis* Morino, 1985 (Gammaroidea: Anisogammaridae) collected at the Samegai Trout Experimental Station were found to be infected with cystacanths and acanthellae of *P. samegaiensis*. In this paper, we describe these cystacanths and acanthellae.

Materials and Methods

Specimens of *J. (A.) fluvialis* were sampled twice using a hand net in a stream along the Nyuu River flowing through the Samegai Trout Experimental Station (35°17'57"N, 136°20'19"E), the type locality of *P. samegaiensis* (Nakajima and Egusa 1975b), at Kami-nyuu, Maibara, Shiga Prefecture, west-central Japan. The first lot of specimens (their number was not counted) was collected on 20 June 2012 from the downstream section of the stream and brought alive to the laboratory at the Lake Biwa Museum, Kusatsu, Shiga Prefecture, where only infected amphipods ($n=10$) were dissected for acanthocephalan larvae. The second lot ($n=123$ in total) was collected on 10 October 2014 from the upstream ($n=58$) and downstream ($n=65$) sections of the stream and transported alive to the laboratory at Hiroshima University, Higashi-Hiroshima, Hiroshima Prefecture, where all speci-