

An Amphibian Acanthocephalan, *Acanthocephalus lucidus* (Echinorhynchida: Echinorhynchidae), Infecting a Fish, *Salvelinus leucomaenis leucomaenis* (Salmoniformes: Salmonidae)

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An adult male specimen of the amphibian acanthocephalan *Acanthocephalus lucidus* Van Cleave, 1925 was isolated from the intestine of a whitespotted char, *Salvelinus leucomaenis leucomaenis* (Pallas, 1814), collected from a stream in Aomori Prefecture, northern Japan. This represents the second record of fish infection by this species of acanthocephalan. The life cycle of *A. lucidus* is discussed, and the char is assumed to have become infected by preying on a frog harboring the specimen. The known vertebrate hosts of *A. lucidus* and the geographical distribution of this species in Japan and East Asia are tabulated.

Key Words: *Acanthocephalus lucidus*, *Salvelinus leucomaenis leucomaenis*, amphibian parasite, accidental infection, predator-prey relationship.

Introduction

Acanthocephalus lucidus Van Cleave, 1925 is principally a parasite of amphibians in East Asia, including Japan (Uchida 1975; Goldberg and Bursey 2002; Araki 2003), China (Wang 1980), Vietnam (Houdemer 1938), and Thailand (Wongsawad *et al.* 2004). To date, 14 species of amphibian have been reported as vertebrate hosts of this acanthocephalan species (Table 1). In Japan, eight species of frog and toad (Anura) and two species of salamander (Caudata) are known as its hosts, but it has also been found in three species of reptile (Table 1). Concerning its occurrence in the Japanese four-lined ratsnake, *Elaphe quadrivirgata* (Boie, 1826), Hasegawa (1981) suggested that the snake had ingested frogs infected by *A. lucidus*. During a study of the helminth parasites of stream-resident salmonids in northern Japan, a specimen of *A. lucidus* was collected from the intestine of a whitespotted char, *Salvelinus leucomaenis leucomaenis* (Pallas, 1814). The present paper reports on this discovery as the second record of fish infection with *A. lucidus*, following an earlier record from rainbow trout, *Oncorhynchus mykiss* (Walbaum, 1792) (reported as *Salmo gairdneri* Richardson, 1836) (Nagasawa and Egusa 1981a).

Materials and Methods

Twelve specimens of *Salvelinus leucomaenis leucomaenis* were collected using hook and line with earthworm bait on 4 May 1978 in the Ushirogata Stream (40°56'36.2"N,

140°35'48.2"E), a tributary of the Rokumaibashi River, Ushirogata, Aomori Prefecture, northern Honshu, Japan. Aquatic arthropods were also collected at the same site by a hand net, fixed in 5% formalin, and later examined for larval helminths. The fish were transported on ice to the Asamushi Marine Biological Station (now the Research Center for Marine Biology) of Tohoku University, Asamushi, Aomori Prefecture, where they were measured for total length (TL) in millimeters and examined for endoparasites. Acanthocephalans found were flattened with slight pressure, fixed in 5% formalin, stained in alum carmine, dehydrated through a graded ethanol series, cleared in xylene, and mounted in Canada balsam. These specimens consisted of a single male of *A. lucidus* and 287 individuals of *Echinorhynchus cotti* Yamaguti, 1935 (Acanthocephala: Echinorhynchidae). The specimen of *A. lucidus* was used for measurements and counts. All measurements in the text are in millimeters unless otherwise stated. Drawings were made with the aid of a drawing tube fitted on an Olympus BX 51 compound microscope. The specimen is deposited in the Aschelminthes (As) collection of the National Museum of Nature and Science (NSMT-As 4040), Tsukuba, Ibaraki Prefecture, Japan. Two terms, prevalence and intensity, are used in accordance with the definitions of Bush *et al.* (1997). The scientific names of Japanese amphibians and reptiles used in this paper follow those recommended by the Herpetological Society of Japan (Anonymous 2013), whereas the scientific names of Japanese fishes are from Nakabo (2013).