

## Infection of Japanese Eel *Anguilla japonica* Elvers by *Hemiclepsis marginata* (Hirudinida: Glossiphoniidae)

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**Abstract** Elvers of the Japanese eel *Anguilla japonica* Temminck and Schlegel (Anguilliformes: Anguillidae) collected at the mouth of a small river on the Pacific coast of central Japan were found infected by the glossiphoniid leech *Hemiclepsis marginata* (O. F. Müller, 1774) (prevalence 3.3%, intensity 1). This finding represents the first and second cases of infection of *A. japonica* by *H. marginata* and by leeches in Japan, respectively, and suggests that the infection by *H. marginata* occurred in brackish waters. The external morphology of *H. marginata* is briefly described. *Anguilla japonica* is a new host for *H. marginata*.

**Key words:** *Anguilla japonica*, elver, *Hemiclepsis marginata*, Japanese eel, leech, new host record, parasite

### INTRODUCTION

The glossiphoniid leech *Hemiclepsis marginata* (O. F. Müller, 1774) is distributed in the Palearctic Region (Soós, 1967, 1969). In Japan, this species is known to infect fishes and sometimes amphibians and pond turtles in fresh waters (Oka and Nagao, 1965), but there has been little information in this country since the first record by Oka (1910). Only two papers are present about its fish infection in Japan: Hayaguri (1934) documented high mortality of salmonids due to the leech at a hatchery, and Kikuchi and Fukatsu (2005) reported that the Amur goby *Rhinogobius brunneus* was the major host of the leech in a lake. The present note reports on the infection of juvenile Japanese eels *Anguilla japonica* by *H. marginata* in Japan.

### MATERIALS AND METHODS

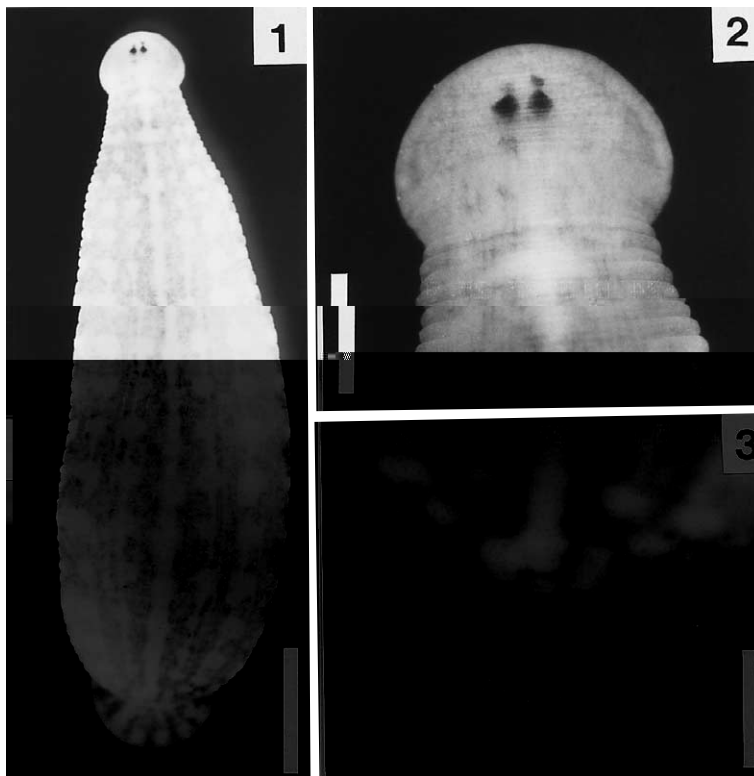
Elvers of the Japanese eel *Anguilla japonica* Temminck and Schlegel (Anguilliformes: Anguillidae) were collected at night using a hand net at the mouth of a small river emptying into Akabane Port (34°36'N, 137°11'E) in Aichi Prefecture on the Pacific coast of central Japan on December 1, 1997. The fish were ascending the river from the sea. In the laboratory, the specimens of *H. marginata* were sampled and examined alive for pigmentation. We added ethanol to the water containing the living leeches in a Petri dish and gradually increased the concentration

up to 70% for fixation and measurements. The specimens of *H. marginata* have been deposited in the annelid (An) collection of the National Science Museum, Tokyo (NSMT) in Japan (NSMT-An 237 and 238).

## RESULTS

Two leeches, identified as *H. marginata*, were found attached to the body surface of two elvers of *Anguilla japonica*. Prevalence of infection was 3.3% (2 fish infected/60 fish examined) and each infected fish harbored a single leech. One elver (61 mm in total length) had a hemorrhage (ca.  $1.0 \times 0.5$  mm), evidence of the feeding attachment by *H. marginata*, on the dorsal side behind the head, while there was no such hemorrhage on another infected elver of the same size.

The body of *H. marginata* is ovally elongated and moderately flattened (Fig. 1). Total length, inclusive of suckers, and maximum body width are  $7.0 \times 2.2$  mm and  $8.1 \times 2.6$  mm for individual specimens. The head and oral sucker are broader than the body segments behind them. The mouth pore is situated in the central part of the oral sucker which is 0.8-0.9 mm in diameter. Two pairs of eyes are present; eyes of the posterior pair are larger than those of the anterior pair (Fig. 2). The caudal sucker, with a diameter of 1.1-1.3 mm, is slightly subterminal and narrower than the maximum body width (Fig. 3). Color in life is brown to reddish brown with seven longitudinal rows of pale yellow spots.



Figs. 1-3. *Hemiclepsis marginata* from an elver of *Anguilla japonica*. 1. Whole body, dorsal view. 2. Anterior part of body, dorsal view. 3. Caudal sucker, dorsal view. Freshly-killed specimen. Scale bars = 2.0 mm (Figs. 1 and 3) and 0.4 mm (Fig. 2).

## DISCUSSION

There has been only one record of infection of *A. japonica* by leeches in Japan. Ogawa et al. (1985) reported that the glossiphoniid leech *Batracobdella smaragdina* (Oka) infected *A. japonica* cultured at farms in Aichi and Kagoshima prefectures. The present finding represents the first and second records of infection of *A. japonica* by *Hemicleps marginata* and by leeches in Japan, respectively. *Anguilla japonica* is a new host for *H. marginata*.

Another species, *Hemiclepsis japonica* occurs in Japan (Soós, 1967). This species was originally described as *Placobdella japonica* by Oka (1932) and currently has been placed in the genus *Hemiclepsis* (Soós, 1967, 1969). The species is easily differentiated from *H. marginata* by its small caudal sucker. Since the original description (Oka, 1932), there have been a few records of *H. japonica* (e.g., Kikuchi and Fukatsu, 2005).

*Hemiclepsis marginata* is known as a freshwater species found in lakes, ponds and rivers in Japan (Oka and Nagao, 1965). However, our elver sample was taken at the mouth of a river emptying into the North Pacific Ocean, suggesting that infection occurred in brackish waters. It is also known that the species can survive in a 1% NaCl solution (Hayaguri, 1934). These indicate that *H. marginata* occurs in brackish waters as well, in Japan.

To collect seedlings for Japanese eel aquaculture, elvers are collected during winter in coastal waters and river-mouth areas along the Pacific coast of central Japan. After collected, elvers are usually kept in tanks containing fresh waters for a while before being released into culture ponds. Leeches, if present, should be removed from elvers in order not to introduce them into culture sites.

In Japan, infection of *H. marginata* resulted in heavy mortality of salmonids, including age-2 and age-3 brook trout *Salvelinus fontinalis* (Mitchill), chum salmon fry *Oncorhynchus keta* (Walbaum), adult rainbow trout *O. mykiss* (Walbaum) and age-2 masu salmon *O. masou masou* (Brevoort) at a hatchery (Hayaguri, 1934). Since *H. marginata* occurs in fresh (and also possibly brackish) waters in Japan (Oka and Nagao, 1965) and survives in a wide range of water temperatures from 3.0° to 35.0°C (Hayaguri, 1934), this species can be regarded as a potential parasite of various cold- and warm-water fishes cultured in fresh and brackish waters. Recently Japanese populations of *H. marginata* have been reported to be infected by bacteria of the genus *Rickettsia* (Kikuchi et al., 2002; Kikuchi and Fukatsu, 2005). Various aspects of the biology, including the role as a vector of bacteria, of *H. marginata* have been reviewed by Burreson (2006). More study is needed on *H. marginata* in Japan because only limited information is available on the ecology and pathological effects on the host.

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## シラスウナギに寄生したアタマヒル

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**要 旨** 愛知県にある小河川の河口域で養殖種苗用に採集されたウナギ *Anguilla japonica* のシラスにアタマヒル *Hemiclepsis marginata* の寄生を認めた。本事例は日本産ウナギからアタマヒルとヒル類が採集された1例目と2例目にあたり、ウナギはアタマヒルの新宿主である。寄生率は3.3%、寄生数は1個体であった(検査尾数60尾)。寄生を受けたシラスの体表には寄生していた部位に出血が認められた。これまでアタマヒルは淡水産とされてきたが、シラスへの寄生が汽水域で起きたと考えられるため、アタマヒルが汽水域にも生息することが示唆された。採集個体に基づいて、生時の体色を含むアタマヒルの外部形態を記載した。

キーワード：アタマヒル，ウナギ，寄生虫，シラス，新宿主，*Hemiclepsis marginata*