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Some leeches (Annelida: Hirudinida: Piscicolidae, Glossiphoniidae) in the Hii River system, Shimane Prefecture, Japan

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Abstract: During a parasitological survey in the Hii River system including two brackish-water lakes, Shinjiko and Nakaumi, three species of leeches (an unidentified piscicolid, *Limnotrachelobdella* okae, and *Batracobdella kasmiana*) were recorded. The unidentified species was collected from the body surface of Japanese icefish *Salangichthys microdon* captured in Shinjiko and the Ôhashi River. *Limnotrachelobdella okae* was found unattached in both Shinjiko and Nakaumi. *Batracobdella kasmiana* was collected from the mussel *Unio douglasiae nipponensis* from the Hii River. Color photographs of live specimens of these leeches are given.

Key words: *Batracobdella kasmiana, Limnotrachelobdella okae, Unio douglasiae nipponensis, Salangichthys microdon,* brackish-water lake, coloration.

Introduction

Leeches (Annelida: Hirudinida) are distributed worldwide and can be found living in marine, estuarine, moist terrestrial and freshwater ecosystems (Sawyer, 1986). Although about 60 species of leeches are recorded in Japan (Itoh, 2003), only fragmentary information is available. For most species of Japan, little is known about their host preference and geographical distribution.

To date, the leech fauna of Chugoku District has been poorly understood. However, 12 leech species (five in the Glossiphoniidae; one in the Piscicolidae; two in the Hirudinidae; four in the Erpobdellidae) are known in the Hii River system (Uéno, 1943; Anonymous, 2000): *Alboglossiphonia lata* (Oka, 1910) (as *Glossiphonia weberi lata*), *Glossiphonia complanata* (Linnaeus, 1758), *Helobdella stagnalis* (Linnaeus, 1758), *Hemiclepis japonica* (Oka, 1932) (as *Placobdella japonica*), *Placobdelloides okadai* (Oka, 1925) (as *Hemiclepis okadai*), "*Ichthyobdella uobir* Oka, 1910", *Whitmania acranulata* (Whitman, 1886), *Whitmania pigra* (Whitman, 1884), *Dina lineate* (O. F. Müller, 1774) (as *Erpobdella lineata*), *Erpobdella octoculata japonica* Pawlowski, 1962 (as *Erpobdella octoculata*), *Erpobdella testacea* (Savigny, 1822), and *Mimobdella japonica* Branchard, 1897 because many ecological and faunal studies of benthic animals have been conducted in the river system including two brackish-water lakes, Shinjiko and Nakaumi.

During a parasitological survey in the Hii River system, three species of leeches were collected. The present paper provides distributional and ecological data of these leeches in the river system.

Materials and Methods

The Hii River system (Fig. 1) consists of the river itself, Shinjiko, the Ôhashi River, Nakaumi, and the Sakai Channel. Both Shinjiko and Nakaumi form an estuarine system which opens to the Sea of Japan. These lakes and the Ôhashi River, a short connecting river between the

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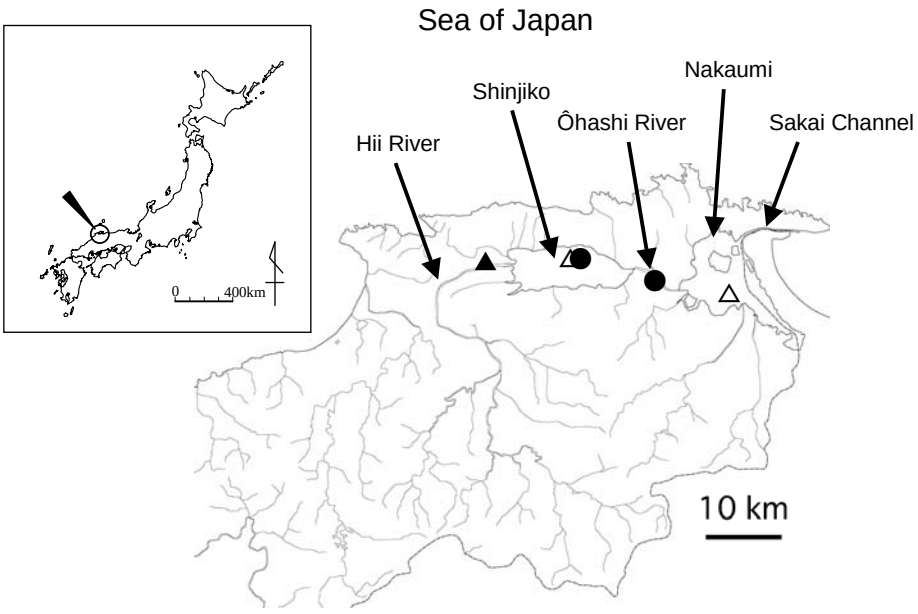


Fig. 1. Map of the Hii River system, Shimane and Tottori Prefectures, Japan. Two closed circles, two open triangles, and a closed triangle represent collection localities of Piscicolidae gen. sp., *Limnotrachelobdella okae*, and *Batracobdella kasmiana*, respectively.

lakes, are the largest brackish-water ecosystem remaining in Japan at present.

In March to July 2002 and February 2004, fishes were captured by a pound stationary net (Japanese name: Masu-ami) in Shinjiko, the Ôhashi River, and Nakaumi and were macroscopically examined. On September 16, 2002, we collected a leech from a mussel *Unio douglasiae nipponensis* Martens, 1877, that had been sampled from the Hii River (between two bridges, Nada-bashi and Mizuho-ô-hashi) and reared in an aquarium of the Shinjiko Nature Museum (SNM). The mussel examined had no experience to cohabit with populations from other localities.

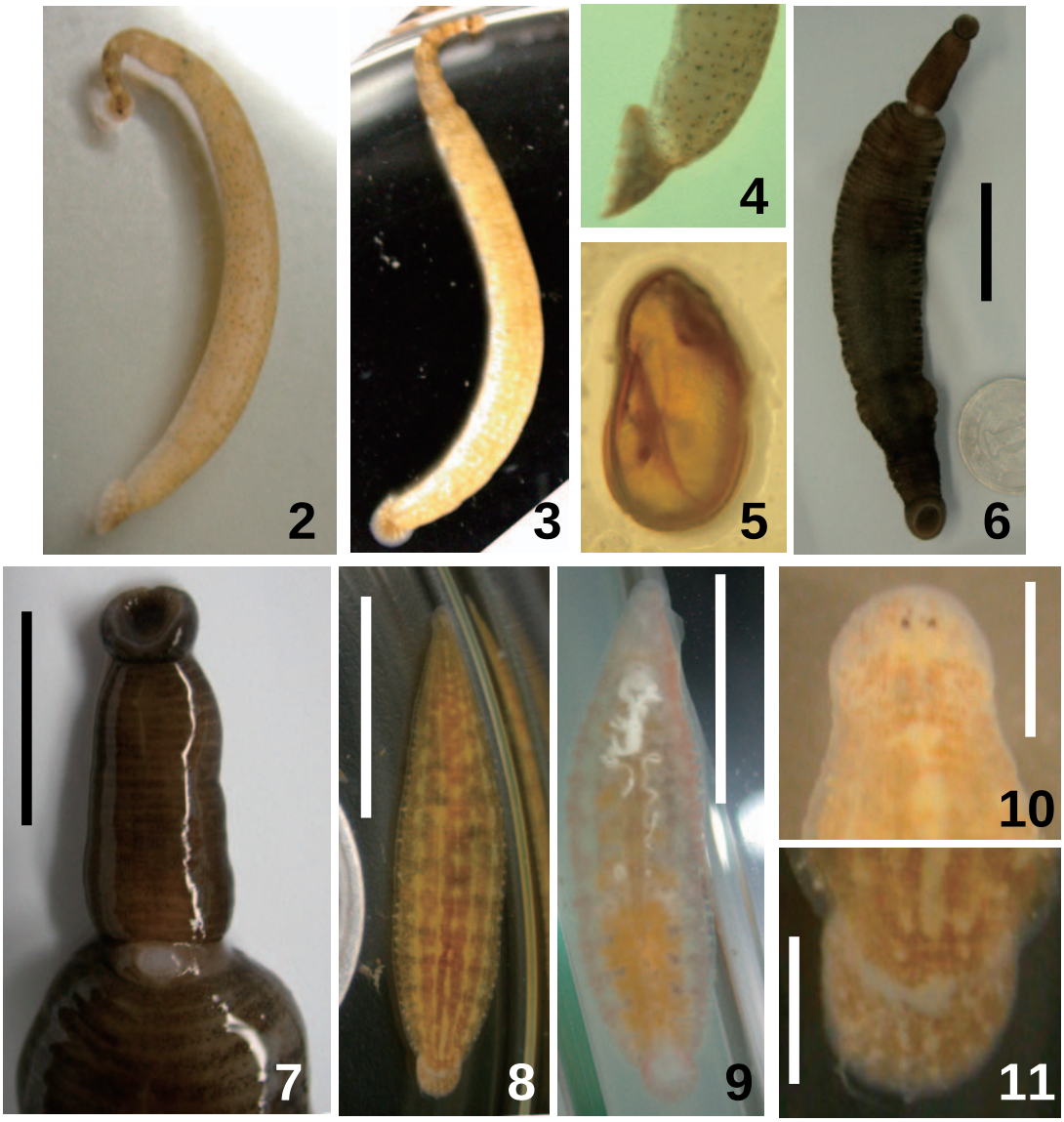
The leeches collected were photographed alive for their coloration. Then, they were fixed in 10% formalin, preserved in 70% ethanol, then examined and measured under a stereoscopic microscope. Specimens examined in this paper are deposited in the National Science Museum, Tokyo (NSMT-An 388, 389, 390, 391). The common and scientific names of fishes follow those recommended by Froese and Pauly (2007) and the scientific names of mussels follow Masuda and Uchiyama (2004).

Results

Two leeches were found attached to the body surface of Japanese icefish *Salangichthys microdon* (Bleeker, 1860): one (Figs. 2-4) was found in Shinjiko (off Aika, Matsue) on March 24, 2002, and another was in the Ôhashi River on February 15, 2004. The icefish (79.5 mm SL [standard length]) attached by latter was dead when the leech was collected. Two leeches were identified as Piscicolidae gen. sp. on the basis of the following characters: body color light yellow with pale-green pigmentation (in fresh); radial color pattern on the surface of caudal sucker; 18.8 mm in total length [TL]; 2.4 mm in maximum body width [MBW]; cylindrical body; neck region indistinct from abdomen; pulsatile vesicles on both lateral sides of body unclear; male and female gonopores on the segment XII; annulation of body unclear; and one pair of eyes on the dorsal surface of anterior sucker. A few days after the leech was collected in Shinjiko, it was retained in a petri dish containing water of Shinjiko and deposited light-brown cocoons (Fig. 5). Unfortunately, the leech collected in Shinjiko was not preserved.

Two unattached leeches were found among fishes consisting of various species: one (Figs. 6-7) was found in Shinjiko (off Aika, Matsue) on April 26, 2002, and another was in Nakaumi (off Ronden, Yasugi) on April 29, 2002. They were identified as *Limnotrachelobdella okae* (Moore, 1924) based on the following characters: color black (in fresh) or pale black (in 70% ethanol); 75-87 mm TL; 17.0-17.5 mm MBW; body flattened, markedly subdivided into neck and abdomen region; caudal sucker considerably less than maximum body width. Although these specimens almost agree to the descriptions of Sawyer (1986), Epshtein (1987) and Nagasawa et al. (2008), lateral margins of their body have indistinct vesicles. We don't think that this difference is important enough for specific segregation.

A leech (Figs. 8-11) was collected from *U. douglasiae nipponensis* (infection site unrecorded, see Materials and Methods) on September 16, 2002. The leech was



Figs. 2-11. Live leeches collected in the Hii River system. 2: Piscicolidae gen. sp., lateral view. 3: *Ditto*, dorsal view. 4: *Ditto*, caudal sucker, lateral view. 5: *Ditto*, cocoon. 6: *Limnotrachelobdella okae,* ventral view. 7: *Ditto*, oral sucker and trachelosome, ventral view. 8: *Batracobdella kasmiana*, dorsal view. 9: *Ditto*, ventral view. 10: *Ditto*, oral sucker, dorsal view. 11: *Ditto*, caudal sucker, dorsal view. Scale bars: 20 mm in Fig. 6; 10 mm in Figs. 7-9; 1 mm in Fig. 10; 2 mm in Fig. 11. Scale bars are not given in Figs. 2-5 for Piscicolidae gen. sp. because its live specimen was not measured.

identified as *Batracobdella kasmiana* (Oka, 1910), which show the following characters: color translucent yellowish brown dorsally with five yellow longitudinal stripes (Fig. 8); 11.1 mm TL; 3.8 mm MBW; body elongated, head slightly broadened; eyes one pair (Fig. 10).

Discussion

The unidentified piscicolids found this study resemble members of the genus *Piscicola* in the body shape and radial coloration of the caudal sucker. However, we could not accurately observe their annulation and sexual reproductive organs. Uéno (1943) recorded marine piscicolid leeches (as "Uobiru" in Japanese = *Ichthyobdella uobir*) heavily parasitizing common carp *Cyprinus carpio carpio* Linnaeus, 1758 in Shinjiko. Our specimen is obviously different from *I. uobir*, which is presently as a junior synonym of *Beringobdella rectangulata* (Levinsen, 1881), in the body shape and marking. Japanese icefish is an economically important fish in the two brackish-water lakes surveyed. Further study on the leech infection of fish should be made in the river system.

Limnotrachelobdella okae is distributed in Japan, China, and Russia (Epshtein, 1962, 1987; Yang, 1987; Furiness et al., 2007; Nagasawa et al., 2008a, 2008b, 2009). On the Japanese coast of the Sea of Japan, *L. okae* has so far

been reported only from Ishikawa (as Kaga) (Oka, 1910) and Yamagata (Nagasawa et al., 2009). Accordingly, the present finding represents the third distributional record of *L. okae* from the Japanese coastal Sea of Japan. The species has hitherto been reported from a variety of host fishes from Japan (Mizuno, 1989, 2006; Furiness et al., 2007; Nagasawa and Fukuda, 2008; Nagasawa et al., 2008a, 2008b, 2009). However, it is uncertain whether, when we collected our specimens, they were attached to fish hosts or were free in the water because the specimens were found unattached among the fishes captured by the net. Further, although the species is known to inhabit on marine, brackish and fresh waters (Oka, 1927b, 1947b; Oka and Nagao, 1965b), there is no reliable record in brackish and fresh waters in Japan. This is the first record of *L. okae* from brackish-water lakes. Especially, the finding in Shinjiko, a low saline, brackish-water lake, is significant in relation to its distribution. Nagasawa et al. (2008a) have recently suggested that *L. okae* is a coastal marine or brackish-water species.

Batracobdella kasmiana is known as a parasite of mussels, including *Cristaria plicata* (Leach, 1815) and *Anodonta* spp. (Oka, 1927a, 1947a; Oka and Nagao, 1965a; Sawyer, 1986; Yang, 1996). In China, this leech also parasitizes *Unio douglasiae* (Gray in Griffith and Pidgeon, 1834) (Yang, 1996). Our finding of *B. kasmiana* from *U. douglasiae nipponensis* is the new host record in Japan.

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