

## The ergasilid copepod *Neoergasilus japonicus* infecting smallmouth bass *Micropterus dolomieu* in central Japan

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**Abstract** Adult females of the ergasilid copepod *Neoergasilus japonicus* (Harada, 1930) were collected from the fins and skin of the smallmouth bass *Micropterus dolomieu* Lacepède, 1802, an invasive alien fish of North American origin, caught in a pond, Nagano Prefecture, central Japan. This is the first Japanese record of *N. japonicus* from *M. dolomieu* and the third species of parasite infecting this fish species in Japan.

**Key words:** Copepoda, Ergasilidae, fish parasite, invasive alien fish, *Micropterus dolomieu*, *Neoergasilus japonicus*, smallmouth bass

### INTRODUCTION

Two species of the centrarchid genus *Micropterus* Lacepède, 1802, *i.e.*, largemouth bass *M. salmoides* (Lacepède, 1802) and smallmouth bass *M. dolomieu* Lacepède, 1802, were introduced from North America into Japan in 1925 and the 1990s, respectively, and have established their populations in Japan (Senou, 2002; Senou and Hayashi, 2013). The parasitic copepod fauna of these species are poorly known in Japan: two species, *Lernaea cyprinacea* Linnaeus, 1758 (Lernaeidae) and *Neoergasilus japonicus* (Harada, 1930) (Ergasilidae), have been reported only from *M. salmoides* (Kasahara, 1962 for *L. cyprinacea*; Nagasawa and Inoue, 2012; Nagasawa and Sato, 2015 for *N. japonicus*). This paper reports on the occurrence of *N. japonicus* on *M. dolomieu* caught in a pond, Nagano Prefecture, central Japan.

### MATERIALS AND METHODS

Four individuals of *M. dolomieu* were collected using hook and line in Harinoki Pond (36°48'43"N, 138°13'15"E), Shinano Town, Nagano Prefecture, central Japan, on 10 August 2008. These fish were fixed in 10% formalin immediately after capture and brought in a bottle to the laboratory at Hiroshima University, Higashi-Hiroshima City, Hiroshima Prefecture, where they were measured for standard length (SL) in millimeters and examined for metazoan parasites with a dissecting microscope. Copepods were carefully removed from the fish, preserved in 70% ethanol, and identified. Voucher specimens are

deposited in the Crustacea (Cr) collection of the National Museum of Nature and Science, Tsukuba City, Ibaraki Prefecture, Japan (NSMT-Cr 24301). The scientific names of centrarchid fish used in this paper follow Senou and Hayashi (2013).

## RESULTS AND DISCUSSION

All of the four individuals of *M. dolomieu* examined (138-180 [mean 157] mm SL) were found harboring a total of 723 adult females (60-291 [mean 180] females) of *N. japonicus* (Fig. 1) on the fins and skin. Most of these females were found on the fins, especially the dorsal and caudal fins, but some were attached to the skin of the head region. In addition, 215 adult females of *N. japonicus* were found detached on the bottom of the bottle used for the fish transportation, thus the actual number of the species infecting each fish is very likely to be higher than the observed one.

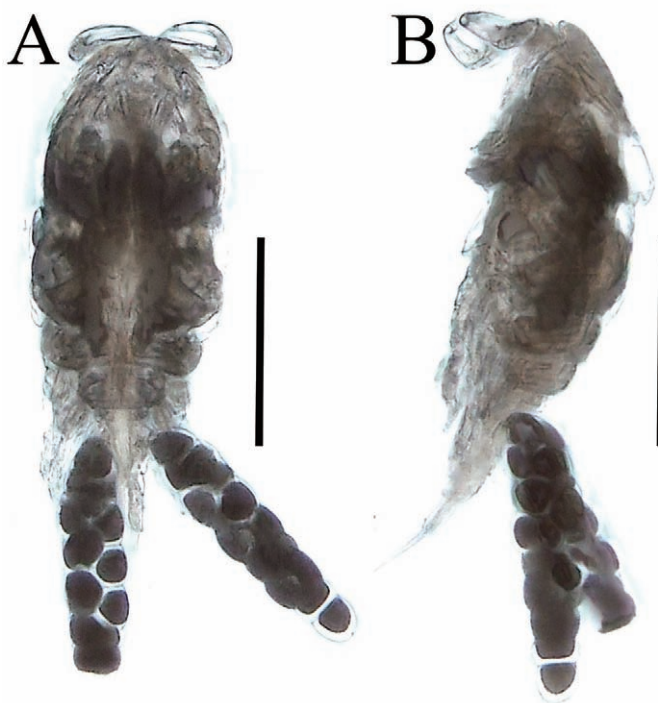


Fig. 1. An adult female of *Neoergasilus japonicus* from a smallmouth bass *Micropterus dolomieu* in Harinoki Pond, Nagano Prefecture, central Japan. Alcohol-preserved specimen. NSMT-Cr 24301. A, dorsal view; B, lateral view. Scale bars: 0.2 mm in A and B.

The present collection represents the first record of *N. japonicus* from *M. dolomieu* in Japan but is not surprising because this copepod is not host-specific to fish and can utilize both native and exotic fish as its hosts (Nagasawa and Uyeno, 2012). It is known to have been introduced into the U.S.A., where it infects *M. dolomieu*, *M. salmoides*, and other freshwater fish species (Hayden and Rogers, 1998; Hudson and Bowen, 2002).

*Neoergasilus japonicus* is the third species of parasite infecting *M. dolomieu* in Japan, where only two species of flatworms (Platyhelminthes) have been reported from this fish species: a digenean *Azygia anguillae* Ozaki, 1924 (Plagiorchiida: Azygiidae) (Shimazu, 2007, 2014) and a cestode *Proteocephalus fluviatilis* Bangham, 1925 (Proteocephalida: Proteocephalidae) (Scholz *et al.*, 2007). As in the case with *N. japonicus*, these parasites were found in Nagano Prefecture, indicating that nothing is known about the parasites of *M. dolomieu* in other prefectures of Japan. Of these two flatworms, *P. fluviatilis* was introduced, most probably with centrarchid fish, from North America into Japan (Scholz *et al.*, 2007). As our knowledge of the parasite fauna of *M. dolomieu* is still quite limited in Japan, more work is needed to clarify it in the country.

The present collection of *N. japonicus* in Nagano Prefecture constitutes its new prefectural record in Japan. To date, the species has been reported from Hokkaido, Gunma, Hiroshima, Shimane, Nagasaki, and Okinawa prefectures in Japan (Nagasawa and Uyeno, 2012, 2015; Nagasawa and Inoue, 2012; Nagasawa and Nitta, 2013; Nagasawa and Obe, 2013; Nagasawa and Sato, 2015; see Nagasawa *et al.*, 2007 for the earlier literature).

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## コクチバスに寄生していたヤマトニセエラジラミ

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**要 旨** 長野県信濃町にある針ノ木池で採集したコクチバス *Micropterus dolomieu* の鱗と体表にヤマトニセエラジラミ *Neoergasilus japonicus* (Harada, 1930) の雌成体が寄生していた。これは、わが国に移入・定着したコクチバスにヤマトニセエラジラミが寄生した初記録である。本種は長野県からは初記録であり、日本産コクチバスから見出された3種目の寄生虫になる。

**キーワード**：カイアシ類, 魚類寄生虫, 国外外来種, コクチバス, ニセエラジラミ科, ヤマトニセエラジラミ