Zootaxa 3641 (4): 371–378
www.mapress.com/zootaxa/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

http://dx.doi.org/10.11646/zootaxa.3641.4.3
http://zoobank.org/urn:lsid:zoobank.org:pub:3E59252A-6B94-491F-A8A3-D83005F2C4B5

A new species of *Ceratophysella* (Collembola: Hypogastruridae) from Japan, with notes on its DNA barcode and a key to Japanese species in the genus

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Abstract

Ceratophysella comosa **sp. nov.** was collected from ascomata of *Ciborinia camelliae* in Japan and the morphological and molecular characteristics of the species are described here. The species has 3 + 3 cephalic spines as in *Ceratophysella loricata* and *Ceratophysella pilosa*, but a plurichaetosis intermediate between *C. loricata* (absent) and *C. pilosa* (strong). The new species can be distinguished from these two species also by the number of setae on the first thorax segment and ventral tube. Partial DNA sequences of the mitochondrial cytochrome *c* oxidase subunit 1 (*COI*) gene were used as DNA barcodes to distinguish species. Interspecific genetic distances of the gene were higher than the intraspecific distances between *Ceratophysella* species for which sequence data are available. An identification key of Japanese *Ceratophysella* is provided.

Key words: *Ceratophysella comosa* **sp. nov**., chaetotaxy, fungus feeding, plurichaetosis

Introduction

The genus *Ceratophysella* Börner (Hypogastruridae) comprises about 142 species (Bellinger *et al*. 1996–2012), of which 15 are known from Japan (Furuno *et al*. 2000), following revisions by Skarżyński and Christiansen (2008) and Bellinger *et al*. (1996–2012). Plurichaetosis is seen in some species and is well developed in *Ceratophysella horrida* (Yosii, 1960) and *Ceratophysella pilosa* (Yosii) (Babenko *et al*. 1994; Yosii, 1960). We collected a new species with moderate plurichaetosis from the ascomata of *Ciborinia camellia* L. M. Kohn in Japan.

The new species, *Ceratophysella comosa* **sp. nov.**, is described morphologically below together with partial DNA sequence of its mitochondrial *cytochrome c oxidase subunit 1* (*COI*) gene, a DNA barcode now commonly used for species characterisation (Hebert *et al*. 2003). The sequence was compared to those of congeneric species, including *C. pilosa*. Some Japanese species were not included in the keys for *Ceratophysella* in Babenko *et al*. (1994) and Thibaud *et al*. (2004) so an updated key is included here.

Materials and Methods

Specimens of *C. comosa* **sp. nov.** were collected from ascomata of *Ciborinia camelliae* on 9 April 2011 at Nagasaki (32°46'N, 129°53'E; 360 m above sea level) and were fixed in 100% ethanol. In order to study a same specimen both morphologically and molecularly, one of antennae was dissected in 100% ethanol for DNA extraction. For morphological studies, the antennal-dissected specimens were cleared in 10% KOH aqueous solution for a few minutes, mounted between cover slides with Andre and Hoyer's fluid and examined morphologically under an optical microscope. The terminology for the morphological description follows that in Yosii (1960), Babenko *et al.* (1994), Fjellberg (1998) and Thibaud *et al.* (2004). Seven specimens were examined

To distinguish between *C. comosa* **sp. nov.** and the closely related species *C. loricata* (Yosii, 1960) (described from the USA), a holotype and seven paratypes of *C. loricata* were examined. Eight specimens were labelled as

Accepted by P. Greenslade: 6 Mar. 2013; published: 26 Apr. 2013