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First Record of *Maculobates* (Acari: Oribatida: Liebstadiidae) from Japan, with a Redescription Based on Specimens from the Ryukyu Archipelago

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Maculobates bruneiensis Ermilov, Chatterjee and Marshall, 2013, formerly known only from Brunei, was collected from the islands of Okinawa and Iriomote in southern Japan. The described specimens represent the first recorded presence of any species of *Maculobates* in Japan. A molecular phylogenetic analysis of *M. bruneiensis* and other oribatid mites based on 18S rRNA does not support the monophyly of *Scheloribates*, Haplozetidae, or Fortuyniidae, but they do support the monophyly of Oripodoidea.

Key Words: *Maculobates bruneiensis*, mangrove forest, Ryukyu Archipelago, 18S rRNA.

Introduction

Oribatid mites worldwide comprise more than 10,000 described species (Subías 2013). Within the order Oribatida, the genus *Maculobates* Hammer, 1962 until recently included 14 species known only from the Southern Hemisphere (Subías 2013). In 2013, a new species, *M. bruneiensis* Ermilov, Chatterjee and Marshall, 2013, was described from mangrove tree bark in Brunei in the Northern Hemisphere. This species distinctly differs from other oribatids in the presence of an hourglass-shaped furrow on the ventral side (Ermilov *et al.* 2013).

Mangrove forests grow in littoral environments in tropical and subtropical regions; as a consequence, portions of mangrove tree bark are submerged by sea water at high tide. Karasawa and Hijii (2004a) surveyed the oribatid fauna in mangrove forests on Okinawa and Iriomote Islands in southern Japan and found a single species dominant on submerged bark at the 0–50 cm above the ground. This was originally considered to be a species of either *Truncopes* or Oripodidae in the superfamily Oripodoidea (Karasawa and Aoki 2004; Karasawa and Hijii 2004a, b). Our examination of newly collected specimens from mangrove trees on these islands revealed that the mites in question actually belong to *M. bruneiensis*.

In this paper, we describe the specimens of *M. bruneiensis* collected from Japan. In addition, we present the results of molecular phylogenetic analyses conducted to clarify the phylogenetic relationship between this species and other littoral oribatids of the families Fortuyniidae and Selenoribatidae.

Materials and Methods

Samples. Specimens of *M. bruneiensis* were collected from the bark of *Bruguiera gymnorrhiza* (L.) Lam. at 0–50 cm above the ground on Iriomote and Okinawa islands, southern Japan (detailed data provided in the "Material examined" section below). In addition, 10 specimens of other species were also collected in Japan for phylogenetic analysis: *Alismobates reticulatus* Luxton, 1992, *Fortuynia rotunda* Marshall and Pugh, 2002, and *Thalassozetes shimojanai* (Karasawa and Aoki, 2005) were collected from littoral algae in the Okukubi River on Okinawa Island, 26°27.382′N, 127°56.497′E; *Hydrozetes confervae* (Schrank, 1781) was collected from a pond at Fukuoka University of Education in Fukuoka, 33°48.778′N, 130°35.739′E; *Oribatula sakamorii* Aoki, 1970, *Peloribates acutus* Aoki, 1961, *Protoribates hakonensis* Aoki, 1994, and *Scheloribates pallidulus* (Koch, 1844) were collected from leaf litter at Fukuoka University of Education in Fukuoka, 33°48.669′N, 130°35.777′E; and *Oripoda* sp. (this species was deposited in DDBJ, DNA Data Bank of Japan, as *Oripoda* sp. SK-2013) and *Hemileius singularis* (Sellnick, 1930) were collected from branches of *Castanopsis sieboldii* (Makino) Hatus. ex T.Yamaz. and Mashiba at Kunigami on Okinawa Island, 26°44.353′N, 128°14.242′E (Table 1). Specimens were extracted with a Tullgren apparatus or by direct sorting under an Olympus SZH-10 microscope (×70) and immediately transferred to 99.5% ethanol for storage.

Morphological observation. The redescription and measurements were based on specimens mounted on temporary slides or immersed in lactic acid on depression slides. Line drawings and measurements were made using an Olympus BH-2 compound microscope and bright-field

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