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Four new earthworm species and subspecies belonging to genus *Amyntas* and *Metaphire* (Oligochaeta: Megascolecidae) from Hainan Island, China

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Abstract

Three new species and one new subspecies of earthworms from Hainan Island, China, are described: *Amyntas dinganensis* **sp. nov.**, *Amyntas tenuis* **sp. nov.**, *Metaphire wuzhimontis* **sp. nov.** and *Metaphire magna minuscula* **subsp. nov.** *Amyntas dinganensis* and *Amyntas tenuis* have two pairs of spermathecal pores in 5/6–6/7, and *Metaphire wuzhimontis* and *Metaphire magna minuscula* have two pairs of spermathecal pores in 7/8–8/9. COI and 16S gene fragments of the new species taxa have been sequenced. We provide comparisons between these new species taxa and related species using morphological and molecular characters.

Key words: Earthworms, Clitellata, *Amyntas*, *Metaphire*, new species, Hainan Island, China

Introduction

Hainan Island (N 18°10'04"–20°9'40", E 108°36'43"–111°2'31") is the second largest island in China, separated from Leizhou Peninsula in Guangdong province to the north by the shallow and narrow Qiongzhou strait. To-date, and prior to our investigations, 45 species of earthworms were known from Hainan Island (Chen 1938; Quan 1985; Quan & Zhong 1989; Blakemore 2007; Zhao *et al.* 2009; Sun *et al.* 2009, 2010). From 2006 to 2011, we conducted four field surveys on earthworm diversity in Hainan Island. Our findings raise the number of species and subspecies from Hainan to 49. In this paper we describe three new species and one new subspecies of the genera *Amyntas* and *Metaphire* from Dongjiao Coco Forest and Wuzhi Mountain in Hainan Island, found in our last survey in May 2011. They are named *Amyntas dinganensis* **sp. nov.**, *Amyntas tenuis* **sp. nov.**, *Metaphire wuzhimontis* **sp. nov.** and *Metaphire magna minuscula* **subsp. nov.**

Wuzhi Mountain is in the center of Hainan Island. It is not only the highest mountain, but also with the highest original tropical forests on the island. Biodiversity is rich in this mountain, especially regarding rare and endemic animal species. Dongjiao Coco Forest lies in Dongjiao County, eastern Wenchang City. It has a northern tropical oceanic monsoon climate, with a mean annual temperature of 24.4°C and a mean annual precipitation of 1529.8mm. Soil is seashore sandy soil with high level of moisture (Tang *et al.* 2006).

Holotypes and paratypes are deposited in the Shanghai Natural History Museum, Shanghai, China (accession numbers starting with "C-") and at the Station Biologique, Université de Rennes 1, France (accession numbers starting with "F-").

Material and methods

All earthworm species and subspecies described in this article were collected from Hainan Island in May 2011. Specimens were fixed and preserved in 95% ethanol solution, except the holotype of *Metaphire magna minuscula*