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## Earthworms from Matsu, Taiwan with descriptions of new species of the genera *Amynthas* (Oligochaeta: Megascolecidae) and *Drawida* (Oligochaeta: Moniligastridae)

HUEI-PING SHEN<sup>1,4</sup>, CHIH-HAN CHANG<sup>2</sup> & WEN-JAY CHIH<sup>3</sup>

<sup>1</sup>Zoology Division, Endemic Species Research Institute, 1 Ming-shen East Road, Jiji, Nantou 552, Taiwan

<sup>2</sup>Department of Earth and Planetary Sciences, Johns Hopkins University, 3400 N. Charles St., Baltimore, MD 21218, USA

<sup>3</sup>Department of Life Sciences and Institute of Zoology, National Taiwan University, 1 Roosevelt Road, Section 4, Taipei 106, Taiwan

<sup>4</sup>Corresponding author. E-mail: shenhp@tesri.gov.tw, Tel: 886-49-2761331, Fax: 886-49-2761583

### Abstract

In 2012, we conducted earthworm surveys in Matsu Islands, and described five new species of the genera *Amynthas* and *Metaphire* and reported two new records, *Desmogaster sinensis* Gates, 1930 and *Ocnerodrilus occidentalis* Eisen, 1878. This paper describes three new species, one of them with two new subspecies, *Amynthas nanganensis nanganensis* sp. nov. et ssp. nov. and *Amynthas nanganensis beiganensis* ssp. nov., *Drawida beiganica* sp. nov. and *Drawida dongyinica* sp. nov., provides a new record of *Drawida koreana* Kobayashi, 1938 from the remaining specimens collected in the surveys, reports DNA barcodes (the 5' end sequences of the mitochondrial cytochrome *c* oxidase subunit 1 gene) from type specimens and further reference specimens of the new species, and lists a total of 27 earthworm species and subspecies found from Matsu Islands. Pheretimid earthworms made up 66.7% of the total number of the species, with *Metaphire matsuenensis* Shen, 2014 and *Metaphire californica* (Kinberg, 1867) the most dominant. Our findings indicate that the earthworm fauna of Matsu Islands is more closely related to that of warm temperate China than to Taiwan or tropical southern China.

**Key words:** Earthworms, Clitellata, *Amynthas*, *Drawida*, new species, Matsu, Taiwan

### Introduction

Situated in the Taiwan Strait about 10 km east of Fujian Province, China, about 280 km northeast of Kinmen and about 210 km northwest of Taiwan, the Matsu Islands are composed of six major islands, namely Nangan, Beigan, Dongju, Hsiju, Dongyin and Hsiyin, and other inhabited or uninhabited islets with a total land area of 29.52 km<sup>2</sup> (Shen *et al.* 2014). In 2012, we conducted earthworm surveys in Matsu Islands, and described five new forms and reported two new records. They were *Amynthas bimontis*, *Amynthas hsiyinensis*, *Amynthas dongyinensis*, *Amynthas dongjuensis*, and *Metaphire matsuenensis* (Shen *et al.* 2014), and *Desmogaster sinensis* Gates, 1930 (Shen 2012) and *Ocnerodrilus occidentalis* Eisen, 1878 (Shen 2015), respectively. This paper describes three new species, one of them with two new subspecies, *Amynthas nanganensis nanganensis* sp. nov. et ssp. nov. and *Amynthas nanganensis beiganensis* ssp. nov., *Drawida beiganica* sp. nov. and *Drawida dongyinica* sp. nov., and provides a new record of *Drawida koreana* Kobayashi, 1938 from the remaining specimens collected in the surveys.

*Drawida koreana* Kobayashi, 1938 is also a new record for subtropical East Asia. This species is fairly similar to *Drawida japonica* (Michaelsen, 1892), and its separation from the latter was recently confirmed by Blakemore *et al.* (2014), who reviewed the genus *Drawida* from far East Asia and established three additional subspecies within *D. koreana*. The two specimens of *D. koreana* reported in this study with slight morphological differences potentially belong to two different subspecies. To provide more documented information for identification of this poorly known taxon, detailed descriptions of each of the two specimens were given in this study.

A total of 27 earthworm species and subspecies was found from Matsu Islands (Table 1). Among them,