

# Earthworm Fauna of the Lanyu Island (Botel Tobago)

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## Abstract

A total of nine species of terrestrial earthworms were collected at 14 localities on the Lanyu Island on 16 and 17 April 2000. They were *Pontoscolex corethrurus* (Müller) of the family Glossoscolecidae, and *Amyntas aspergillus* (Perrier), *Amyntas corticus* (Kinberg), *Amyntas gracilis* (Kinberg), *Amyntas lautus* (Ude), *Metaphire californica* (Kinberg), *Pithemera bicincta* (Perrier), *Pithemera lanyuensis* Shen and Tsai, and *Polypheretima elongata* (Perrier) of the family Megascolecidae. Of them *P. lanyuensis* is an autochthonous (endemic) species of the island, whereas the other eight species are likely the anthropochorous (exotic) species which were introduced later to the island by native Tao from the Philippines or recently by Chinese from Taiwan.

**Key words:** fauna, earthworms, Lanyu, Botel Tobago

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## Introduction

Lanyu (Botel Tobago) is an oceanic island created by volcanic activities during the Tertiary. Situated in the Bashi Channel between Taiwan and Philippines, it lies southeast of Taiwan with a nearest distance of about 62 km and about 110 km north of the Batan Islands of the Philippines. Its area is about 45.7 km<sup>2</sup> and the highest mountain is 552m in elevation (Chen 1993). The island is covered primarily with tropical littoral forests and mountain rain forests (Su and Ho 1982), and its floras and faunas share the characters of both subtropical Taiwan and tropical Philippines (Liu 1989). Lanyu has been renowned for its unique flora and fauna (Biogeographical Society of Japan 1932, Lin and

Yen 1982, Su and Ho 1982) and offers a resting site on the migrating routes of many species of birds (Lin and Yen 1982).

The terrestrial faunas of Lanyu have been investigated fairly in detail by the Biogeographical Society of Japan (1932) and recently by Lin and Yen (1982). The faunas investigated include insects and mollusks of invertebrates, and freshwater fishes, amphibians, reptiles, birds and mammals of vertebrates (Table 1). Based on geographical affinities of insects and birds of Lanyu to those in Taiwan and the Philippines, Kano (1932a, b, d, e) suggests that the northern Wallace's Line should be drawn between Lanyu and Taiwan.

To study systematics and distribution of terrestrial earthworms has been known to be an

**Table 1.** Number of endemic species and subspecies (n), total number of species (N) and endemism ( $n \times 100/N$ ) in different groups of terrestrial animals reported from Lanyu

	Endemic species and subspecies	Total species	Endemism (%)	References
<u>Invertebrates</u>				
Insects				
Pachyrhynchides	5	6	83.3	Kano (1932d)
Homoptera	10	12	83.3	Kato (1932)
Hemiptera	7	26	26.9	Esaki (1932)
Coleoptera	4	100	4.0	Kano (1932a)
Butterflies	1	105	1.0	Chen (1986)
Dragonflies	0	13	0.0	Kato (1932)
Mollusks	6	15	40.0	Kuroda (1932)
<u>Vertebrates</u>				
Mammals	1	11	9.1	Kuroda (1932), Lin and Yen (1982)
Birds	1	110	0.9	Lin and Yen (1982)
Reptiles	2	20	10.0	Okada (1932), Lin and Yen (1982), Lue <i>et al.</i> (1999)
Amphibians	0	3	0.0	Okada (1932), Lin and Yen (1982), Lue <i>et al.</i> (1999)
Freshwater fishes	1	3	33.3	Kano (1932c), Chen <i>et al.</i> (1998)

excellent tool in the field of zoogeography (James 1998). The endemism of earthworms on the peripheral islands of mainland China, such as Hainan, Taiwan, Ryukyus, and Japan has been known to be high with the ranges of 34.3% to 74.2% (Tsai *et al.* 2000a). This study was intended to examine the earthworm fauna of Lanyu with consideration of its endemism and zoogeographical relation to Taiwan and the Philippines.

## Materials and Methods

The earthworms were collected at 14

localities on Lanyu on 16 and 17 April 2000 as follows (Fig. 1):

Locality 1: roadside gutters of the nearby gas station at Kai-yuan Harbor near Yehyu Village.

Locality 2: sides of the uphill road from the Tu-ti-kung temple toward Hsiao-tien-chih.

Locality 3: shore covered with thick underbrush around the pond of Hsiao-tien-chih.

Locality 4: roadside gutters along the lighthouse and the nearby area covered with thick underbrush.

Locality 5: roadsides at Hu-tou-po, south of





diversity on the island.

In this study the earthworm fauna of Lanyu was found to have a total of eight peregrine species and one endemic species, suggesting the presence of low species diversity and low endemism (Table 2). The case was fairly similar to those of mammals and reptiles than feeble moving terrestrial mollusks and insects (Pachyrrhynchides and Homoptera), and contrast to those of flying birds and insects (Table 1).

According to the original home ranges of terrestrial earthworms in Taiwan (Tsai *et al.* 2000a), the eight peregrine species found in Lanyu may be divided into three groups: 1) *Pontoscolex corethrurus* originated from tropical America, 2) *Amyntas aspergillus*, *A. corticus*, *A. gracilis*, *A. lautus*, and *Metaphire californica* originated from the mainland China, and 3) *Polypheretima elongata* and *Pithemera bicincta* originated from Southeast Asia, particularly from the Philippines. *P. corethrurus* was a recent immigrant to Taiwan (Tsai *et al.* 2000b). Therefore, it is reasonable to suspect that the species in Groups 1 and 2 were recently introduced to Lanyu by Chinese from Taiwan, while the species in Group 3 were introduced to the island perhaps earlier by the native people (Tao) from the Philippines.

*Pithemera lanyuensis* was the only species of the terrestrial earthworm found to be endemic to Lanyu. Systematically, it is closely related to *P. bicincta* (Shen and Tsai 2002). Therefore, it is reasonable to consider that *P. lanyuensis* is an autochthonous species differentiated within the island of Lanyu from the ancestor of *P. bicincta* in the Philippines. Such systematic and geographical associations of this endemic species of the terrestrial earthworm to the species

in the Philippines are fairly similar to those found for terrestrial insects (Kano 1932d) and mollusks (Kuroda 1932), and support the content that the northern Wallace's Line should be drawn between Lanyu and Taiwan (Kano 1932a, b, d, e).

The scarcity of endemic species of the earthworms in Lanyu may be due to weak mobility of the earthworms to reach to the island in the past geological history for speciation, and/or a lack of habitat diversity in this small island for further differentiation. It is also possible that there were insufficient efforts in this study to reveal all endemic species present on the island. A further study is needed.

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**Appendix I.** Name of the localities in Chinese and in English or Romanized spellings used in the text

English or Romanized spelling	Chinese
Green Grassland	青青草原
Hsiao-tien-chih	小天池
Hungtou	紅頭
Hu-tou-po	虎頭坡
Kai-yuan Harbor	開元港
Langtao	朗島
Lung-men Bridge	龍門橋
Tungchin	東清
Tu-ti-kung temple	土地公廟
Yehyu	椰油
Yung-hsing Farm	永興農場

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## 摘要

於蘭嶼的蚯蚓採集中共採得九種陸生蚯蚓，分別為*Pontoscolex corethrurus* (Müller)、*Amyntas aspergillus* (Perrier)、*Amyntas corticus* (Kinberg)、*Amyntas gracilis* (Kinberg)、*Amyntas lautus* (Ude)、*Metaphire californica* (Kinberg)、*Pithemera bicincta* (Perrier)、*Pithemera lanyuensis* Shen and Tsai以及*Polypheretima elongata* (Perrier)。其中除了*P. lanyuensis*為原生種，其餘八種蚯蚓均為經由人類活動而帶入島上的外來種。

**關鍵詞：**動物相、蚯蚓、蘭嶼

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