

# Occurrence of the Exotic Earthworm *Pontoscolex corethrurus* (Müller) (Glossoscolecidae: Oligochaeta) in Taiwan

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## Abstract

This paper describes *Pontoscolex corethrurus* (Müller), a new record of the glossoscolecid earthworm in Taiwan. This newly introduced species, originally endemic to tropic America, occurred in the coastal plain, piedmont and mountain (elevation to about 1,000m) regions of the island. It was a dominant earthworm in disturbed environments, such as banana plantations, betel nut plantations, fruit orchards, agricultural lands, and the Conservation Education Garden of Taiwan Endemic Species Research Institute.

**Key words:** *Pontoscolex corethrurus*, earthworm, Glossoscolecidae, Oligochaeta, Taiwan.

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## Introduction

*Pontoscolex corethrurus* (Müller) (Glossoscolecidae: Oligochaeta) is one of the most peregrine species of terrestrial earthworms. It is originally endemic to tropic America and the West Indies, and its vast distribution has been credited to transportation by man (Gates 1972). At present it is a species of pantropic distribution and one of the most widely spread earthworms in the world. Having a great tolerance to human disturbance, it is often dominant in the earthworm fauna of disturbed environments. Its excrements enrich soil nutrients (nitrogen and phosphorus) that are beneficial to many of the

farm crops, but they harden the soil, so that it becomes unsuitable for the growth of some of the crops (Edwards and Bohlen 1996).

*P. corethrurus* arrived in Asia sometime after 1500 AD, and became a dominant earthworm in rubber plantations in Malaya and Burma (Gates 1972). Later it has been reported in the tropic Asia, including Persia, Pakistan, India, Ceylon, Burma, Thailand, Malaya, Sumatra, Java, Borneo, Celebes, Philippine islands, Christmas Island, Hawaii, Tahiti and many of other South Sea islands (Stephenson 1932; Michaelsen 1934; Gates 1935, 1937, 1938, 1949, 1972). It occurs primarily in coastal lowlands (Gates 1972), but in Cambodia it was

reported from an elevation of 1,100m (Michaelsen 1934).

*P. corethrurus* has never been reported from Taiwan in the past (Goto and Hatai 1898; Gates 1959; Kobayashi 1938a,b; Tsai 1964). We suspect that *P. corethrurus* came to Taiwan in the last few decades with exotic trees introduced from Southeast Asia. Occurrence of *P. corethrurus* in Taiwan reported herein constitutes the island as the most northern range of this pantropical species in Northeast Asia.

In the central portion of Taiwan, *P. corethrurus* is one of the most dominant earthworms in disturbed environments, such as banana plantations, betel nut plantations, fruit orchards, and farm lands. It is easily recognized in the field by its small size, white to light pink color with a bright yellow or orange clitellum. It has a feeble movement and often coils when it is caught.

There are indications that *P. corethrurus* is capable of both sexual and parthenogenetic reproductions (Gates 1972; Edwards and Bohlen 1996). In our collections, entire collections or most of the specimens in a collection showed parthenogenetic degradation of their male reproductive organs; spermathecae, testis sacs, seminal vesicles and prostate glands were either absent or degenerated.

The following description was made based on five preserved mature specimens with well developed clitellum and reproductive organs. They were collected on 2 September 1998 from a ditch along the mountain slope at the Yehlin

Bus Stop, Tungpu (elevation of 1,100m), Nantou prefecture (coll. no. 1998-62). They were anesthetized in the 30% alcohol solution, fixed in the 10% formalin solution, and preserved in the 70% alcohol solution.

#### ***Pontoscolex corethrurus* (Müller) 1856**

1972 *Pontoscolex corethrurus* (Gates). Transactions of the American Philosophical Society 62(7): 54.

Total length 92-128 mm (five mature clitellate specimens), segment number 167-220. Prostomium prolobous. Head segments I-XIV. Clitellum XIV, XV-XXI, XXII (usually seven segments), length 6.48-8.77 mm, width 3.54-4.34 mm, segmented, saddle-shaped, setae absent (Fig. 1A, B). Tubercula pubertatis XV-XXI (Fig. 1B). Secondary segmentation in the middle portion of body, each segment with a narrow anterior non-setal annulate and a wide posterior setal annulate (Fig. 1C). Setae lumbricin, closely paired, aa > bc, dd 1/2 body circumference in anterior portion of the body (Fig. 1E), quincunx pattern in the posterior portion. Dorsal pore absent. Nephridiopores distinct, paired, in intersegmental furrows, two longitudinal rows at the latero-ventral sides of body in the anterior segments.

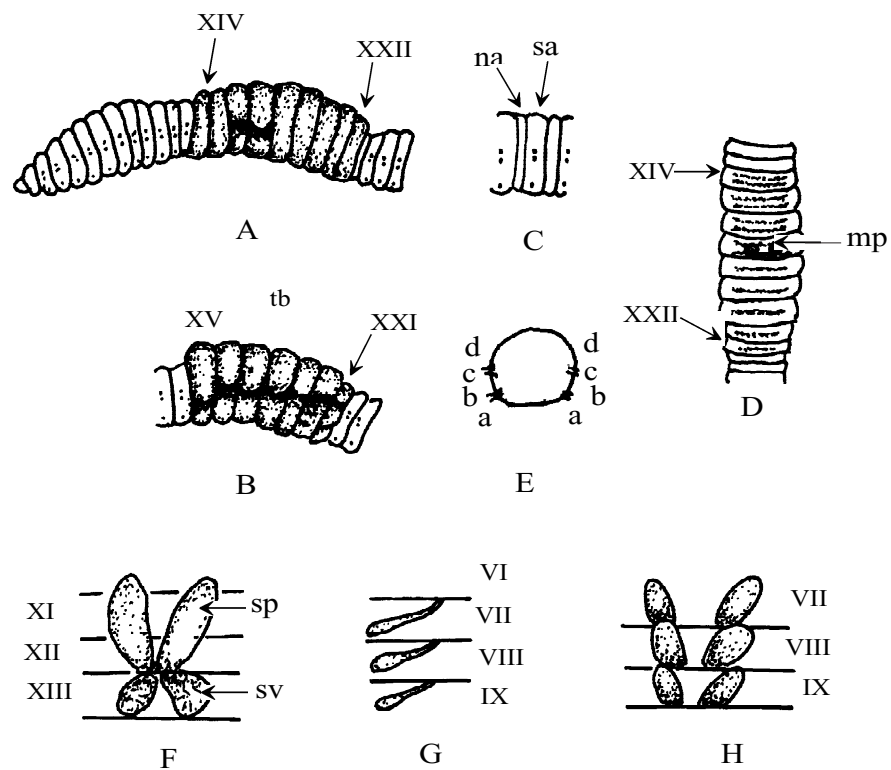
Male pores paired in XVII for a clitellate specimen (125 mm), ventral, distance between the pores 0.88 mm, which is 0.06 circumference apart, left pore with a genital seta. Male pores

invisible for other four specimens. Female pore and spermathecal pores invisible for all specimens.

Preserved specimens uniformly white in color, clitellum light grayish brown, a brown and slightly contracted section (4-5 segments) at about one third of the body from posterior end.

Live specimens without pigments, head portion pink to light purple, clitellum grayish pink, body light bluish pink. When head portion extended, three pairs of bright yellow spots (calciferous glands) on dorsum in front of clitellum.

Septa 6/7-9/10 thick, muscular. Gizzard single in VI, large, extending to IV and V.



**Fig. 1.** *Pontoscolex corethrurus* (Müller): (A) lateral view of the head portion (125 mm specimen); (B) lateral view of clitellum (108 mm specimen; tb, tubercula pubertatis); (C) lateral view of segments in the middle portion of body (na, anterior non-setal annulate; sa, posterior setal annulate); (D) ventral view of clitellum (125 mm specimen; mp, male pores); (E) cross section (diagram) of a segment with locations of setae (a-d); (F) dorsal view of sperm sacs (sp) and seminal vesicles (sv); (G) left spermathecae; (H) dorsal view of calciferous glands.

Intestine enlarged from XV. No intestinal caecum. Three pairs of calciferous glands, dorso-lateral, in VII, VIII and IX, each oval-shaped, dark color (Fig. 1H). Dorsal and lateral hearts greatly enlarged in X and XI. Nephridial batteries paired in IV and V, nephridia holoic (a pair of exoic nephridia per segment) in remaining segments, each with a straight nephridial duct and a slightly enlarged distal end (vesiculate).

Metandry: sperm sacs paired in XII, large extending anteriorly to XI. Seminal vesicles paired in XIII. No prostate gland. Spermathecae three pairs in VII, VIII and IX, each small, with a slender duct and a small ampulla, no diverticulum (adiverticulate) (Fig. 1G). Spermathecal ducts connected laterally to 6/7-8/9.

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## 臺灣新紀錄外來種蚯蚓

### *Pontoscolex corethrurus* (Müller)

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#### 摘要

本文描述一臺灣新紀錄種蚯蚓*Pontoscolex corethrurus* (Müller)。這個新引進物種原產於熱帶美洲，在臺灣自海岸平原至山麓地帶 (海拔約至一千公尺) 均有分布。在遭受人為干擾的環境，諸如香蕉園、檳榔園、果園、農耕地、生態園區之類的棲地中，此種蚯蚓常成爲優勢物種。

**關鍵詞：***Pontoscolex corethrurus*、蚯蚓、Glossoscolecidae、貧毛類、臺灣

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