

A New Record of the Exotic Ocnerodrilid Earthworm  
*Eukerria saltensis* (Beddard, 1895) from Taiwan

台灣新紀錄外來種蚯蚓  
*Eukerria saltensis* (Beddard, 1895)

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Abstract

This paper describes the exotic ocnerodrilid earthworm *Eukerria saltensis* (Beddard, 1895) as a new record from Taiwan. This also constitutes the first time for a member of the family Ocnerodrilidae to be reported from this island. *E. saltensis* is a small, slender earthworm, and its native home is likely in South America. It has been recorded from Nantou, Taitung, Ilan, Taoyuan and Yunlin counties since 1999. It is peregrine and has been found in the United States, South Africa, India, Myanmar (Burma), Laos, Cambodia, Vietnam, Australia and New Caledonia, and recently in Japan.

摘要

本文描述一台灣新紀錄外來種蚯蚓 *Eukerria saltensis* (Beddard, 1895)。其為小型蚯蚓，屬於寒蟪蚓科 (Ocnerodrilidae)，此為該科物種首次於台灣發現的紀錄，自 1999 年起於南投、台東、宜蘭、桃園、雲林等地陸續有採集紀錄。其原產地應為南美，於美國、南非、印度、緬甸、寮國、柬埔寨、越南、澳洲、新喀里多尼亞有分布紀錄，近來於日本亦為一新紀錄外來種蚯蚓。

**Key words:** *Eukerria saltensis*, Ocnerodrilidae, earthworm, Taiwan

**關鍵詞:** *Eukerria saltensis*、寒蟪蚓科、蚯蚓、台灣

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## Introduction

*Eukerria saltensis* is a small, thread-like earthworm belonging to the family Ocnerodrilidae (Oligochaeta: Annelida). It was first described as *Kerria saltensis* by Beddard (1895), based on the specimens collected from Salto, Valparaiso, Chile. Michaelsen (1935b) replaced the generic name with *Eukerria*, because *Kerria* was preoccupied by a Coccidian. Beddard (1895) states that *Eukerria* appears to be a tropical genus or at least a native of the warmer parts of the American continent. Michaelsen (1935a) further states that this genus has endemic species only in the warmer regions of America. There are about a dozen species belonging to the genus *Eukerria* (Blakemore 2006), of which two species, *Eukerria kuekenthali* (Michaelsen, 1908) and *Eukerria saltensis* (Beddard, 1895), are possibly natives of South America, and are peregrine (Michaelsen 1935b; Gates 1972; Blakemore 2002).

*Eukerria saltensis* has been transported presumably by man since 1500 A. D. (Gates 1972). It has been reported from Chile, Argentina, Brazil, United States, South Africa, India, Myanmar (Burma), Laos, Cambodia, Vietnam, Australia and New Caledonia (Gates 1972; Blakemore 2002, 2006), and recently in Japan (Blakemore 2006).

According to Gates (1972), it is presumably biparental, but four generations of uniparental offspring were obtained by isolation experiments by Gavrilov in Argentina, and also male sterile individuals were collected in America. Apparently, *E. saltensis* is an animal of biparental reproduction but with optional and obligatory parthenogenesis. Flexibility in the reproductive modes might be one of the reasons for this species to be peregrine.

The following description is based on 126 specimens of *E. saltensis* deposited at the Endemic Species Research Institute, Jiji, Nantou, Taiwan. They were fixed in a 10% formalin-water solution and preserved in a 70% ethyl alcohol-water solution.

### *Eukerria saltensis* (Beddard, 1895)

*Kerria saltensis* Beddard, 1895: 225. - Michaelsen, 1900: 371; 1935a: 40.

*Kerria gunningi* - Michaelsen, 1913: 276. - Gates, 1942: 67.

*Kerria nichollsi* Jackson, 1931: 121. - Michaelsen, 1935a: 40.

*Acanthodrilus sydneyensis* - Michaelsen, 1935a: 40.

*Eukerria saltensis* - Michaelsen, 1935b: 103.

-Gates, 1942: 67, 73; 1961: 57; 1972: 270.

**Materials examined.** - One mature (clitellate)

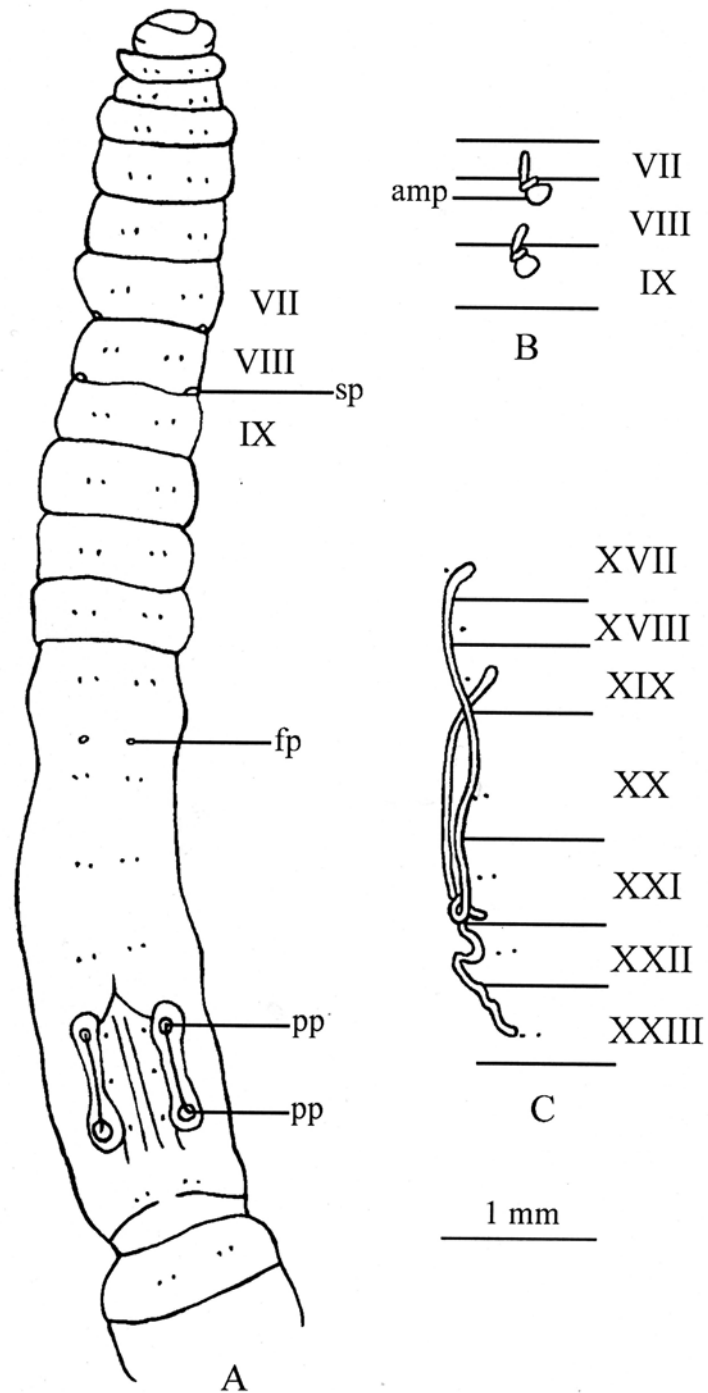
and one immature (acitellate) specimens collected from Benbuhsi (elevation about 750m), Nantou County, Taiwan on 10 Nov. 1999 by C. F. Tsai, S. C. Tsai, M. H. Shen, J. L. Lai, C. Y. Chang and H. P. Shen (coll. no. 1999-21-Shen); 12 mature specimens collected from mud dropped from the truck on the Yenping Forest Road (elevation 1,000 m), Taitung County, Taiwan on 16 Mar. 2000 by C. F. Tsai, S. C. Tsai, H. S. Fang, S. T. Chang, H. P. Yang, T. J. Lin and H. P. Shen (coll. no. 2000-27-Shen); 12 mature and 22 immature specimens collected from clay soil along the No. 100 Forest Road (elevation 1,190m), Chilán, Ilan County, Taiwan on 17 Oct. 2002 by C. F. Tsai, S. C. Tsai, H. P. Shen, S. T. Chang, R. C. Jang, B. H. Lin and C. Y. Chang (coll. no. 2002-24-Shen); two mature specimens collected from grass roots tangled with soil inhabited by beetle larvae along the No. 100 Forest Road (elevation 1,325m), Chilán, Ilan County, Taiwan on 17 Oct. 2002 by C. F. Tsai, S. C. Tsai, H. P. Shen, S. T. Chang, R. C. Jang, B. H. Lin and C. Y. Chang (coll. no. 2002-25-Shen); 15 mature and 12 immature specimens collected from grass roots tangled with soil along the Taipingshan Road (elevation 1,130m), Ilan County, Taiwan on 18 Oct. 2002 by C. F. Tsai, S. C. Tsai, H. P. Shen, S. T. Chang, R. C. Jang, B. H. Lin and C. Y. Chang (coll. no. 2002-28-Shen); one mature and one immature specimens collected from grass roots tangled with soil inhabited by beetle larvae along the Taipingshan Road (elevation 1,770m), Ilan County, Taiwan on 18 Oct. 2002 by C. F. Tsai, S. C. Tsai, H. P. Shen, S. T. Chang, R. C. Jang, B. H. Lin and C. Y. Chang (coll. no. 2002-29-Shen); 28 mature and 17 immature specimens collected along the Balin Road (elevation 1,520 m), Taoyuan County, Taiwan on 30 Aug. 2005 by H. P. Chen, S. T. Chang, T. J. Lin and H. P. Shen

(coll. no. 2005-14-Shen); two mature specimens collected from roadside grass roots tangled with soil near Yuching Valley (elevation 228m), Douliou, Yunlin County, Taiwan on 28 Jun. 2007 by T. J. Lin, Y. P. Lee and H. P. Shen (coll. no. 2007-29-Shen).

**Description.** - Thin, slender worm. Length (mature) 33-85 mm, diameter 1.0-1.7 mm. Segments numbering 87-129. Prostomium epilobous. Dorsal pores absent. Setae lumbricin (eight setae per segment), small and closely paired, aa: ab: bc: cd = 3: 1: 3: 1, b absent on XVII-XIX. Clitellum XIII-XX (Fig. 1A), annular, thinner ventrally, 1.0-1.5 mm in width. Spermathecal pores two pairs in 7/8 and 8/9, lateral, closer to seta c (Fig. 1A). Female pores paired in XIV, each anterior to seta a and close to 13/14 inter-segmental furrow. Genital markings absent. Male pores paired in XVIII in longitudinal grooves, and prostatic pores two pairs at the anterior and posterior ends of the grooves in XVII and XIX (Fig. 1A). Specimens unpigmented with clitellum yellow in color.

Septa present from 5/6, 6/7-8/9 thick. Gizzard in VII. Intestine enlarged from XII. Esophageal hearts in IX-XI. Calciferous glands one pair in IX, thick-walled with numerous capillaries. Nephridia avesculate. Spermathecae small, adiverticulate, two pairs in VIII and IX (Fig. 1B). Ampulla round or oval, yellowish, duct slender, white, twist near ampulla. Ovaries small, paired in XIII. Oviducts connected to female pores in XIV.

Proandry: testes small, flowery, shiny, paired in X. Seminal vesicles paired in IX and XI, each small, yellowish in color. Prostate glands two pairs with prostatic pores in XVII and XIX, each



**Fig. 1.** *Eukerria saltensis* (Beddard, 1895): A, ventral view of preclitellar and clitellar regions (sp, spermathecal pore; fp, female pore; pp, prostatic pore); B, dorsal view of right spermathecae (amp, ampulla); C, dorsal view of right prostate glands.

thin, elongate, tubular, extending four to five segments (Fig. 1C).

**Remarks.** - Occurrence of *E. saltensis* in Taiwan reported herein constitutes the first time for a member of the family Ocnerodrilidae to be found on this island. Unlike the exotic *Pontoscolex corethrurus* (Müller, 1856) that is endemic to tropical America and dominant in Taiwan from coastal plain to mountains at elevation up to about 1,000 m (Tsai *et al.* 2000), *E. saltensis* was collected mostly along the sides of forest roads in hills and mountains at elevations of 750-1,770m. Recently, it was collected near a small valley at an elevation of 228m in Yunlin County in June, 2007, the first time for it to be seen in the coastal plain in Taiwan. The reason for *E. saltensis* not to be collected in the coastal plain in Taiwan in the past was that it might be easily missed in collection because of its small size, or it has adapted to the local climate and environment at low elevations since its first appearance in 1999 here in Taiwan.

According to Stevens and Warren (2000), in southern New South Wales, Australia, *E. saltensis* has colonized the rice-growing areas for more than 10-20 years and has become one of the major pests affecting rice production. The most pronounced effect of dense *E. saltensis* infestation in the rice fields is the dramatic increase of water turbidity, that causes reduced photosynthesis, resulting in high mortality of the seedlings if they cannot break through the water surface before their seed reserves are exhausted, or the seedlings to produce disproportionately long shoots relative to the size of their root systems, vulnerable to uprooting through wind damage. Chemical treatments suppress most of the sediment-dwelling invertebrates in the rice fields, but have no discernible impact on *E. saltensis* populations. It still remains in

question what are the impacts of this exotic earthworm on soil, agriculture, environments, and earthworm fauna in Taiwan.

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