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## Original Article

Two new earthworm species of genus *Pithemera* Sims and Easton, 1972 (Clitellata: Megascolecidae) from Mt. Tapulao, Luzon Island, Philippines

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## ABSTRACT

Two new earthworms were collected from Mt. Tapulao, Luzon Island, Philippines. There are two new species of *Pithemera*, *Pithemera zambalesensis* sp. nov. and *Pithemera altaresi* sp. nov. *P. zambalesensis* sp. nov. has five pairs of spermathecal pores in 4/5–8/9, spermathecal pores 0.22 circumference apart, and male pores superficial on oval elevated areas surrounded by outer rings in XVIII at 18th setal line, 0.16 circumference apart. *Pithemera altaresi* sp. nov. has five pairs of spermathecal pores in 4/5–8/9, spermathecal pores 0.28 circumference apart, and male pores superficial on oval porophores in XVIII at 8th setal lines, 0.22 circumference apart.

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## Introduction

Mt. Tapulao, the highest peak (2,037 m) of a mountain range running the length of Zambales Province, is isolated from the Luzon Cordilleras by lowlands. Located in the northern part of the Island of Luzon, the Zambales mountain range is one of the visitor destinations in the Philippines. Tapulao means pine tree in the local dialect, a truly apt description given the presence of pine forests at middle elevations. The zone is now available to researches because an emerging new trail, which traverses lowland rainforest, pine forests, and the high elevation mossy forest, has recently been developed.

This article is one of a series of reports of the earthworm fauna of the Philippines (Aspe & James 2014, 2015, 2016, 2017; Hong & James 2004, 2008a, 2008b, 2009, 2010, 2011a, 2011b; James 2004a, 2004b; James 2006; James et al 2004). Beginning in 2001, numerous sites were surveyed in the Philippines, one of which is covered here. As a result of the taxonomic report, there are 80 new species of *Pheretima* species group by Sims & Easton (1972), reported in studies conducted mostly in mountainous forest regions (Aspe & James 2017).

*Pheretima*-complex species having the intestinal ceca (um) originating in or near segment XXII have been assigned to the genus *Pithemera* by Sims and Easton (1972). They also defined four species groups within *Pithemera*, one of which, the *bicincta* group, contains the type species *Pithemera bicincta* (Perrier 1875). *P. bicincta* group has the first spermathecal pores in 4/5, species in the *pacifica* group have the first spermathecal pores in 5/6, and species in the *sedgewicki* group have a single intestinal cecum. Kobayashi described *Pheretima sempoensis* with intestinal ceca originating in XXIV and three pairs of spermathecal pores in 5/6–7/8 (Kobayashi 1938). It has been later moved to the genus *Pithemera*.

Also the genus includes the absence of copulatory bursae as one of the distinguishing characters of *Pithemera* (Sims & Easton 1972). Despite the presence of copulatory bursae in *Pithemera nolani*, the authors assigned this species to *Pithemera* rather than in *Pheretima* on the basis of having no nephridia on the spermathecal ducts and having the cecal origin near XXII (Aspe & James 2016).

In the present article, I describe two earthworm species reported here belong to the genus *Pi. bicincta* group, *P. zambalesensis* sp. nov. and *P. altaresi* sp. nov.

## Materials and methods

All examinations were done by external examination of whole specimens and by dorsal dissection of 10% formaldehyde-fixed specimens under a stereomicroscope. Measurements are in

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millimeters. Holotypes are deposited in the National Museum of the Philippines Annelid collection (NMA).

### Systematic accounts

Family Megascolecidae Rosa, 1891  
Genus *Pithemera* Sims & Easton, 1972

#### *Pithemera zambalesensis* sp. nov.

(Figure 1)

LSID urn:lsid:zoobank.org:pub:3D2A1256-7447-47FC-98CB-09673BACC6D7

*Type.* Holotype: Clitellate (NMA 4635): Mt. Tapulao, Palauig municipality, Zambales province, Luzon Island, Philippines, (15° 27.13'N, 119° 57.20'E), 33 m, litter layers in forest, 8 iii 2001 (Y. Hong, P. Nillos, B. Andal, M. Tares, M. Altares colls).

*Diagnosis.* Spermathecal pores five pairs in 4/5–8/9, 3.2 mm distance between spermathecal pores, 0.22 circumference apart; male pores in XVIII, superficial on oval elevated areas surrounded by concentric rings; pores centered at 18th setal lines, 0.16 circumference apart. Paired presetal genital papillae in line with male pores in XX.

*Description.* Light brown pigmented, clitellum brown color. Dimensions: 55 mm length by a width of 3.2 mm at segment X, 3.3 mm at segment XXX, 3.0 mm at clitellum; body cylindrical, segments 100. Setae regularly distributed on segments, numbering 69 at VII, 67 at XX, 13 between male pores. Setal formula AA:AB:ZZ:YZ = 1:1:2:1 at XIII. Female pore single in XIV on 0.4 mm oval. Clitellum annular XIV–XVI; setae visible externally.

First dorsal pore 12/13. Male pores in XVIII, superficial on oval elevated areas surrounded by concentric rings; pores centered at 18th setal lines, 0.16 circumference apart, 2.2 mm distance between male pores; single round genital papillae presetal in XIX on left side and paired presetal in XX, 0.16 ventral circumference apart from each other. Spermathecal pores five pairs in 4/5–8/9 at lateral margins of ventrum in white spots 3.2 mm apart, 0.22 ventral circumference apart from each other. Preclitellar genital markings lacking.

Septa 5/6–8/9 thick, 9/10 absent, 10/11–12/13 thin. Gizzard in VIII. Intestine begins in XV, lymph glands small pairs from XXIII. Typhlosole simple, from XXIII. Intestinal ceca originating at XXII, extending anterior about to XX, simple triangular. Esophageal hearts in X–XIII; IX small. Male sexual system holandric, testes and funnels in single ventral sacs in each of X, XI. Seminal vesicles paired in XI, XII, without dorsal lobes. Prostates in XVIII, extending from XVIII–XIX, stout ducts U-shaped, glandular portions consist of 2 parts, each part may be divided again into 2 small lobes. Genital papilla glands lacking. Ovaries and funnels in XIII. Spermathecae in V–IX, ampulla oval-shaped smooth, short slender ducts shorter than ampulla, diverticulum chamber oval-shaped with slender stalk shorter than ampulla, no nephridia on spermathecal ducts.

*Distribution.* Philippines (Tapulao Mountain, Luzon Island).

*Remarks.* *Pithemera zambalesensis* sp. nov. keys to the *bicincta* group in Sims and Easton (1972). The *bicincta* group (*sensu* Sims and Easton 1972) is composed of species with spermathecal pores in 4/5–8/9. This includes *Pi. bicincta* (Perrier 1875) and *Pithemera violacea* (Beddard 1895). However, several oligochaetologists stated that *Pi. violacea* is a junior synonym of *Pi. bicincta* (Michaelsen 1910; Ohfuchi 1957; Shen and Tsai 2002). Shen and Tsai (2002) added one species to the *bicincta* group, *Pithemera lanyuensis* from Lanyu Island, Taiwan. James et al (2004) also recorded one species of the *Pi. bicincta* group from Mt. Arayat, Luzon Island, Philippines, *Pithemera rotunda*. Hong and James (2008a) added three species of the *Pi. bicincta* group from three locations in Banaue, Ifugao Province, Luzon: *Pithemera duhuani*, *Pithemera fragumae*, and *Pithemera ifugaoensis*. Hong and James (2011a) described two species, *Pithemera glandis* and *Pithemera fusiformis* from Kalbaryo, Luzon Island. After then, Aspe and James (2015) identified 2 species of the *Pi. bicincta* group from Mt. Malindang, Mindanao Island, *Pithemera malindangensis* and *Pithemera duminagati*.

*P. zambalesensis* sp. nov. is similar to the *Pi. fragumae* Hong and James, 2008a,b with respect to body length, in the number of setae on VII and XX, in the number of between male pore setae but easily is distinguished by the genital papillae. *Pi. fragumae* has circular genital papillae, paired in XVII, and presetal and postsetal next to male pores in XVIII within male porophore, but *P. zambalesensis* sp. nov. has round genital papillae presetal in XIX on left side and paired presetal in XX. Unlike those, it has male pores on oval elevated areas surrounded by concentric rings. Also *P. zambalesensis* sp. nov. has septa 8/9, but *Pi. fragumae* has no septa 8/9 (Table 1).

*Etymology.* The species is named for its type locality, Zambales province.

#### *Pithemera altaresi* sp. nov.

(Figure 2)

LSID urn:lsid:zoobank.org:pub:4F822057-616F-4165-A301-CECCD3FCB2B4

*Type.* Holotype: Clitellate (NMA 4636): Mt. Tapulao, Palauig municipality, Zambales province, Luzon Island, Philippines, (15° 28.57'N, 120° 07.02'E), 1,865 m, near summit, in pine forest litter layers, 8 iii 2001 (Y. Hong, P. Nillos, B. Andal, M. Tares, M. Altares colls).

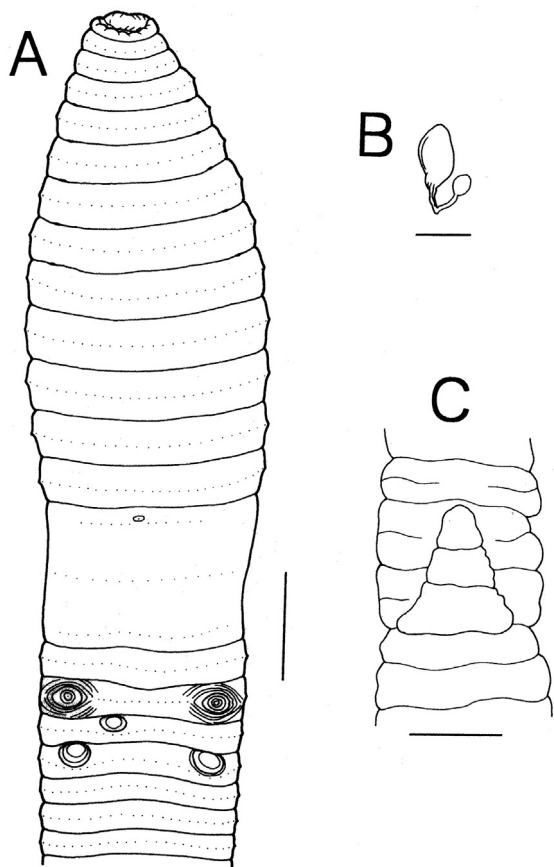


Figure 1. *Pithemera zambalesensis*. new species: A, ventral view; B, spermathecae; C, intestinal ceca. <scale bars: 2.5 mm (A), 2 mm (B, C)>.

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