

## *Amyntas whitteni*, a new species of earthworm from Mawlamyine, Myanmar (Clitellata: Megascolecidae)

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**Abstract.** *Amyntas whitteni*, a new species of earthworm from Mawlamyine, Myanmar, is described herein based on anatomical and morphological characteristics. The new species belongs to the *andersoni* species group and is closely related to *Amyntas andersoni*, but was easily distinguished from it by the position and shape of the post-clitellar genital markings.

**Key words.** *Amyntas*, earthworms, Megascolecidae, Myanmar

### INTRODUCTION

*Amyntas* Kinberg, 1867 is one of the largest genera of terrestrial earthworms, with more than 350 recognised species (Sims & Easton, 1972). Members are mainly distributed in diverse habitats of East and Southeast Asia, including the archipelagoes. From the seminal work of Gates (1972) who published a monograph on Burmese Earthworms in 1972, approximately 57 species of *Amyntas* have been recorded from Myanmar (Gates, 1972; Blakemore, 2006). Since then, there have been only two reports updating the status and distributions of earthworms in Myanmar (Reynolds, 2009; Csuzdi et al., 2015). Recently, a total of 129 species were reported from Myanmar. The authors undertook an inventory of the invertebrate biodiversity on limestone karst in the Mon state of Myanmar; the area was surveyed in 2015, resulting in a new species of *Amyntas* being discovered, which is described below.

### MATERIAL AND METHODS

Earthworm specimens were collected from Pathen Mt. Kyaikmaraw, Mawlamyine, Myanmar by carefully digging up the topsoil near casts and the collected specimens were washed, anaesthetised in 30% (v/v) ethanol, photographed,

transferred to 5% (w/v) formalin for fixation for approximately 12 h, and then transferred to 70% (v/v) ethanol for longer term preservation and subsequent morphological studies. The anatomical and morphological observations were made with an Olympus SZX7 stereoscopic light microscope. Illustrations were made of the body segments and the distinct external characters and internal organs. Holotype and paratype specimens were deposited in the Chulalongkorn University, Museum of Zoology, Bangkok, Thailand (CUMZ). Additional paratypes will be deposited in the Zoological Reference Collection (ZRC) of the Lee Kong Chian Natural History Museum (ex Raffles Museum of Biodiversity Research Collection), Singapore.

### TAXONOMY

#### Family Megascolecidae Rosa, 1891

#### *Amyntas* Kinberg, 1867

#### *Amyntas whitteni*, new species (Figs. 1, 2)

**Material examined.** Holotype: one adult (CUMZ 3805) Pathen Mountain, Kyaikmaraw, Mawlamyine, Myanmar, 16°14'47"N 97°58'09"E, 8 m above mean sea level, coll. S. Panha et al., 5 September 2016. Paratypes: one subadult and five adults (CUMZ 3806), two adults (ZRC), same collection data as for holotype.

**Diagnosis.** Length 190–265 mm, diameter 8.5–10 mm, segments 98–152. Male pores paired in XVIII, each represented by a glandular area, genital markings unpaired, midventral (MV) in intersegments 17/18–19/20; sometimes in 20/21. Spermathecal pore paired, minute in intersegments 5/6–8/9. Spermathecae large ovoid sac, diverticulum as long as ampulla, weakly crooked in middle. Holandric, intestinal caeca simple, first dorsal pore in 12/13. Prostate gland

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Table 1. Comparison of characters of *Amyntas whitteni*, new species, and other species of the *A. andersoni*-group in Myanmar. nd: no data.

Characters	<i>A. whitteni</i>	<i>A. andersoni</i>	<i>A. analecta</i>	<i>A. comptus</i>	<i>A. longicauliculatus</i>	<i>A. choprai</i>
Body length	254	250	102	>86	170	132–138
Body width	9	6	5	6	7	5
Segments	100	120	101	>120	138	118–119
Spermathecal pores	5/6–8/9	5/6–8/9	5/6–8/9	5/6–8/9	5/6–8/9	5/6–8/9
First dorsal pore	12/13	nd	nd	12/13	12/13	12/13
Genital marking	small papillae, unpaired, MV on 17/18–19/20	unpaired, MV on 19/20–24/25	large single on 19/20	three trios on 18/19–20/21	paired on 18/19–20/21	paired on 21/22, unpaired, midventral in 22/23–24/25
Spermathecae	ovoid	heart shaped	long	nd	spherical	ovoid sac
Diverticulum	weakly crooked	convoluted	slender	slender	saccular	tubular; dilated in a club shape
Prostate gland	XVIII–XIX	nd	XVIII	XVIII	XVIII	nd
Intestinal caecum	simple	simple	simple	simple	simple	nd

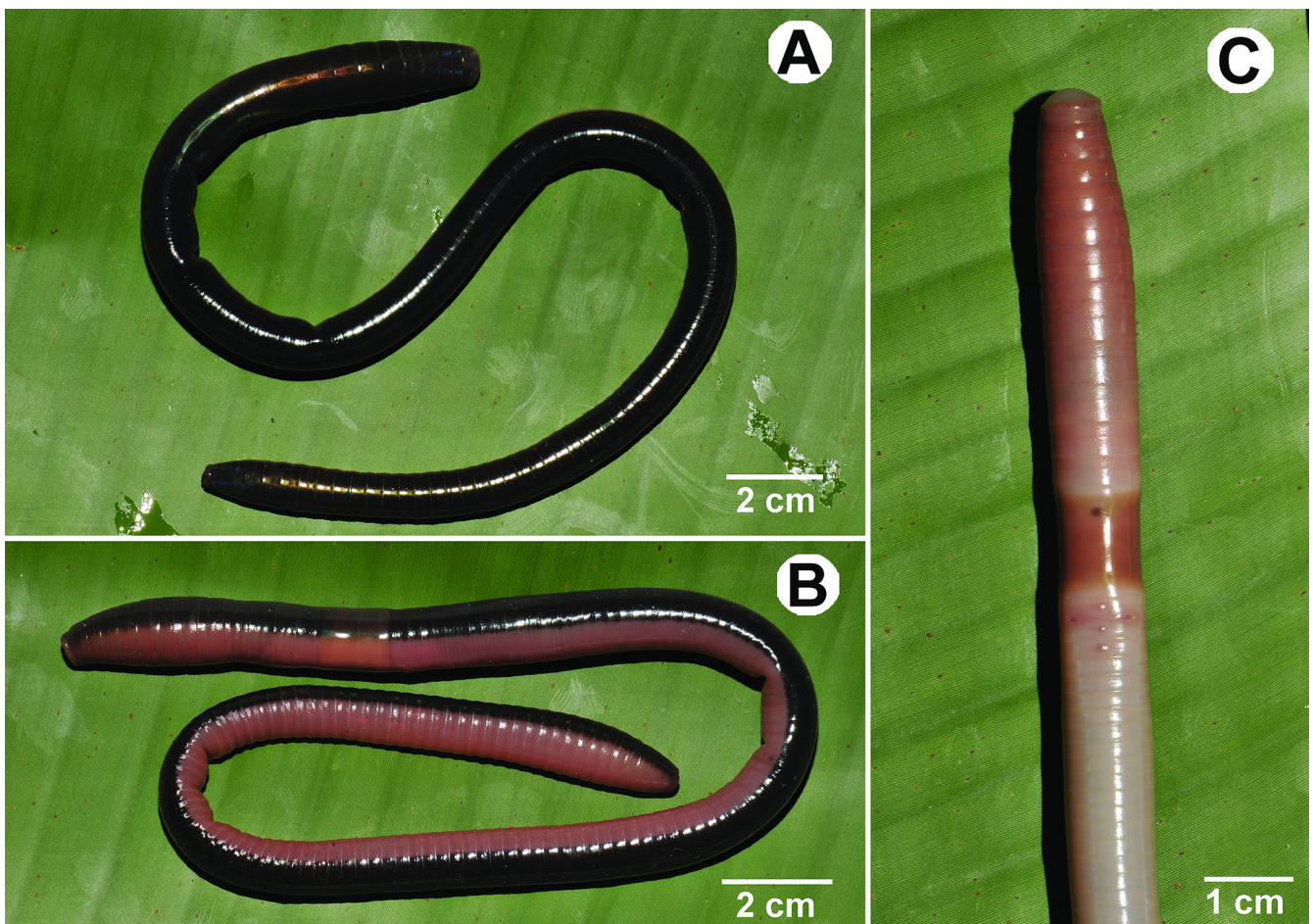
Fig. 1. *Amyntas whitteni*, new species. A, B, paratypes just after anaesthesia step in 30% (v/v) ethanol, dorsal and lateral view; C, colouration of ventral view, with male pores and genital markings. Photographs by R. Srisonchai.

Table 1. (continued).

Characters	<i>A. labosus</i>	<i>A. luxus</i>	<i>A. promolus</i>	<i>A. rufulus</i>	<i>A. sonellus</i>	<i>A. velatus</i>
Body length	>70	190	94	150	130–180	187
Body width	4	10	4	6	7–8	10
Segments	nd	nd	108	107–112	nd	121
Spermathecal pores	5/6–8/9	5/6–8/9	5/6–8/9	5/6–8/9	5/6–8/9	6–9
First dorsal pore	12/13	nd	nd	12/13	12/13	12/13
Genital marking	single transversely oval on XXII	paired on XVIII	single transversely elongated on 18/19	paired on 18/19	single on XXII, XXIV	paired on XVII
Spermathecae	rudimentary	distended	narrowly tubular and zigzag	sac	sac	oval
Diverticulum	rudimentary	slender	long slender	loop	coiled	tubular
Prostate gland	XVIII	XVI–XX	XVIII	XVII–XIX	XVII–XX	XVII–XXI
Intestinal caecum	simple	simple	simple	simple	simple	simple

compact in XVII–XVIII, its duct long and U-shaped. No genital marking glands.

**Description of holotype.** Length 254 mm, diameter 10 mm, body cylindrical with 100 segments. Setae fine and numerous on each segment, numbering 107 at VII, 110 at XX, 27 between male pores, setae formula AA:AB:ZZ:ZY=1:1:2:1 at XIII. Single female pore in ventral side at XIV. Prostomium epilobitic. First dorsal pore 12/13. Clitellum annular in XIV–XVI smooth on surface.

Male pores paired on ventral side of XVIII, in setal line, rather closely approximated 7 mm in distance, 0.25 times body circumference apart ventrally, each situated lateral to a round and flat papilla-like glandular area. No skin folding. Genital marking unpaired and middle present between intersegmental furrows 17/18–19/20, each papillae-like tubercle. Female pore single in XIV.

Spermathecal pore four pairs in 5/6–8/9, ventral, distance between each pair about 0.26 body circumference ventrally apart. No genital markings in this area.

Colour: in life, colour is two tone, shining black on dorsal side, pale pink ventrally, slightly interrupted at lateral-median line. Clitellum chocolate.

Septa 5/6–7/8 thickened, 8/9–9/10 aborted, 10/11–11/12 slightly thick; 12/13–14/15 thin, very thin behind 15/16. Gizzard large behind 7/8, intestine beginning XV. Intestinal caeca simple in XXVII–XXV. Oesophageal hearts four pairs in X–XIII. Holandric; testes and funnels in X and XI. Seminal vesicles paired in XI–XII quite large in XIII. Prostate glands moderate in size, compact in XVIII–XIX, with a long and U-shaped duct.

Ovaries in XIII. Four pairs spermathecae in VI–IX. Ampullae large ovoid shape distinct from its duct. Diverticulum as long as ampulla, weakly crooked at middle, no special enlarged seminal chamber.

**Variation.** The body length of holotype is 254 mm with 100 segments; the eight paratypes range in size from 190–265 mm (235±27.6 mm) body length with 98–152 segments. The genital markings on segments 17/18 and 19/20 are present in all individuals, with an additional one on 20/21 in one specimen, but in one worm there is a weak spot in 18/19.

**Etymology.** *Amyntas whitteni* is named in honour of the late Dr. Tony Whitten of FFI, who contributed extensively to our knowledge of cave invertebrates and initiated several projects on Asian biodiversity from Indonesia to China, Vietnam and Myanmar.

**Distribution.** So far, this species has been known only from the type locality.

**Remarks.** *Amyntas whitteni*, new species, is an octothecal earthworm with four pairs of spermathecal pores in intersegmental furrows of 5/6–8/9, belonging to *corticis* species group as defined in Sims & Easton (1972) with more than 80 listed species (Sims & Easton, 1972) as well as seven more species of *corticis* group that were reported from Indo-Burma (Sun et al., 2012; Bantaowong et al., 2014, 2015; Nguyen et al., 2016). Of these 21 species were reported from Myanmar (Gates, 1972; Blakemore, 2006). *Amyntas whitteni* keys to the *andersoni* group by Gates (1972), which comprises 11 species: *A. analectus* (Gates, 1932), *A. andersoni* (Michaelsen, 1907), *A. comptus* (Gates, 1932), *A. promolus* (Gates, 1936), *A. labosus* (Gates, 1932), *A. sonellus*

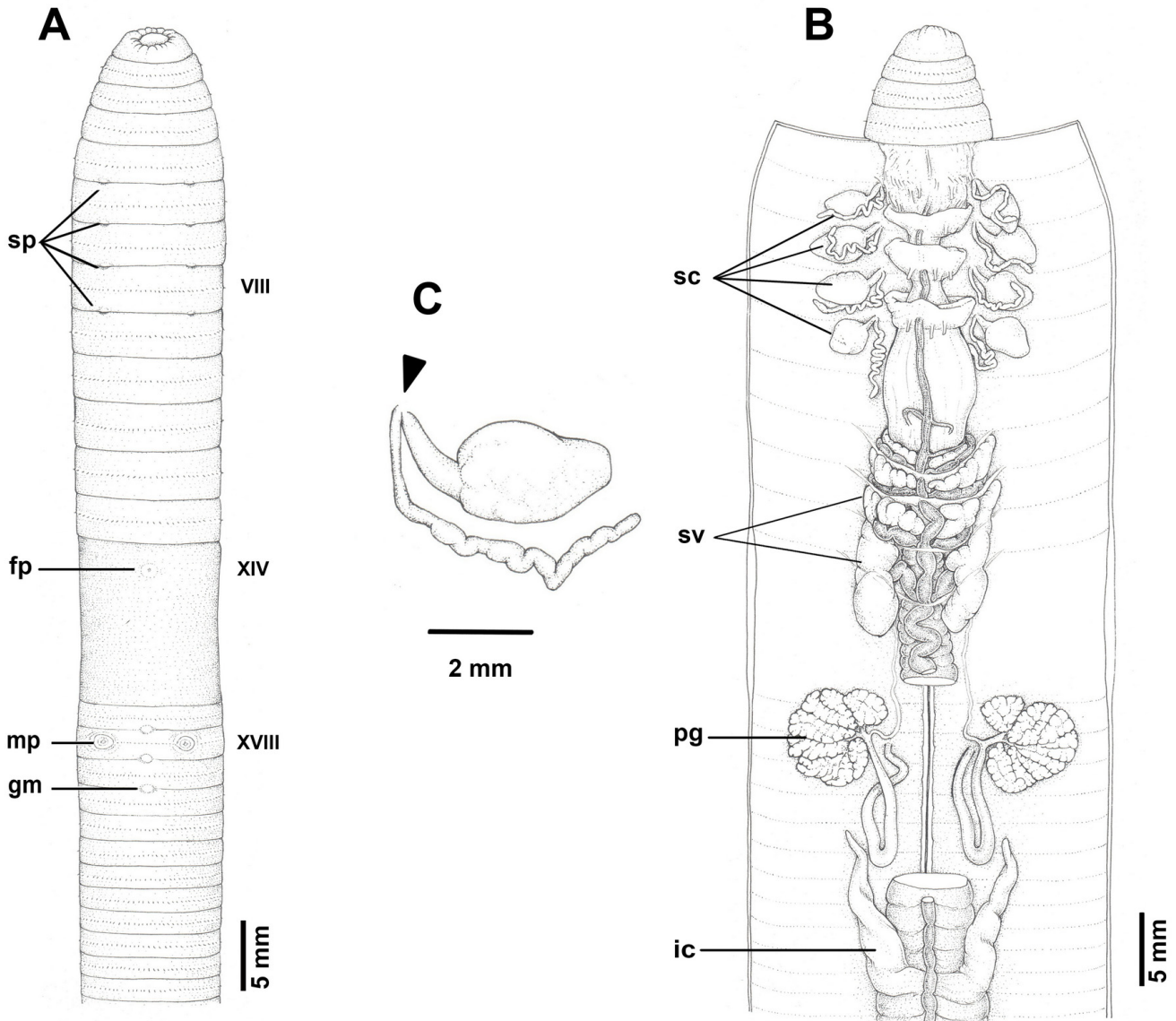


Fig. 2. External and internal morphology of holotype (CUMZ 3805) of *Amynthus whitteni*, new species. A, External ventral view (fp, female pore; gm, genital marking; mp, male pores; sp, spermathecal pores); B, internal dorsal view (gmg, genital marking gland; ic, intestinal caeca; pg, prostate gland; sc, spermathecae; sv, seminal vesicles); C, spermathecae. Black arrow indicates connection of spermathecae and spermathecal pore.

(Gates, 1936), *A. choprai* (Stephenson, 1929), *A. longicauliculatus* (Gates, 1931), *A. luxus* (Gates, 1936), *A. rufulus* (Gates, 1933), and *A. velatus* (Gates, 1930). *Amynthus whitteni* is easily distinguished from the latter five by having small papillae, and a single, midventral genital marking on 17/19–19/20 while the latter five have paired genital markings. *Amynthus labosus* and *A. sonellus* differ from *A. whitteni* by having unpaired genital markings on segment XXII and XXIV. Meanwhile the difference between *A. comptus* and *A. whitteni* is the arrangement of genital markings in the three longitudinal ranks in 18/19–25/26. Moreover, *A. whitteni* is easily separated from *A. analectus* and *A. promolus*, since those two species have a 4–5 mm body width, while *A. whitteni* is over two-fold wider at about 10 mm in diameter. *Amynthus whitteni* is closely related to *A. andersoni* in body size and in having unpaired, midventral genital markings in the posttelitellum. However, it is easily separated from *A. andersoni* by the former's few small papillae

genital markings on intersegment 17/18–19/20, rather than the spindle-shaped genital markings on intersegments 19/20–24/25 of *A. andersoni*. Marker characters of *A. whitteni*, and other species of the *andersoni* group are presented in Table 1.

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