

First record of the genus *Entoria* Stål, 1875 (Phasmida: Phasmatidae: Clitumninae) from Guangdong with descriptions of two new species

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ABSTRACT

The genus *Entoria* Stål, 1875 is reported for the first time from Guangdong, China. Two new species, *E. guangdongensis* sp. nov. and *E. heishidingensis* sp. nov., are described.

Key words: Phasmida, *Entoria*, new species, Guangdong, China

廣東新紀錄屬長肛蜚屬並記述二新種（蜚目：蜚科：克蜚亞科）

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摘要：本文首次報導廣東的新紀錄屬長肛蜚屬，並記述長肛蜚屬2新種：廣東長肛蜚 *Entoria guangdongensis* sp. nov. 及黑石頂長肛蜚 *Entoria heishidingensis* sp. nov.。

關鍵字：蜚目，長肛蜚屬，新種，廣東，中國

INTRODUCTION

Stål erected the genus *Entoria* in 1875 (Stål, 1875). Thirty-one species are recognized in this Palaearctic and Oriental genus (Otte and Brock, 2005; Hennemann et al., 2008; Chen and He, 2008; Ho, 2013a, 2013b). To date fourteen species are recognized for Mainland China and most of them occur in the southern regions including Hainan, Fujian, Sichuan, Zhejiang and Hong Kong. *Entoria* was not previously recorded from Guangdong until the present author collected some specimens during two recent collecting trips in the northern parts of Guangdong. They are described as new species, *Entoria guangdongensis* sp. nov. and *E. heishidingensis* sp. nov., in this paper.

MATERIALS AND METHOD

Illustrated drawings are based on the type material which were dried and pinned after the collecting trips. No food plant feed by the collected specimens was observed. Measurements of the specimens are given in millimetres. Ootaxonomic description refers to Clark (1976a, 1976b, 1979, 1988, 1998) and Clark-Sellick (1997). The types are deposited in the private collection of George Ho Wai-Chun (GH), Hong Kong. The author has examined all type material of *Entoria* species which are deposited in Beijing Forestry University, Beijing,

China (BFU), Institute of Zoology, Chinese Academy of Sciences, Beijing, China (IZCAS), National Taiwan University, Taipei, Taiwan (NTU) and Tianjin Natural History Museum, Tianjin, China (TMNH). Types deposited in Natural History Museum, London, England (BMNH) and Naturhistorisches Museum Wien, Vienna, Austria (NHMW) are consulted with the images of Phasmida Species File Online (Brock, 2015). Compared with the described species, the two recently collected Guangdong taxa are considered undescribed. To advance our knowledge on the new taxa and its related taxa, a key to species of the genus from the continental China is given.

RESULTS

Genus *Entoria* Stål, 1875

Type-species: *Entoria denticornis* Stål, 1875, by subsequent designation of Kirby, 1904: 327.

Diagnosis: Body slender, dull colouration, mostly dark brown or dark gray in female and black in male. Head oval; female vertex with a pair of lamellae, spines or horns, male vertex with a pair of small spines or granule-like horns or unarmed. Antennae distinctly segmented, shorter than profemora. Thorax cylindrical; female usually covered with sparse and small granules; smooth in male. Abdomen cylindrical and slender; median segment shorter than metanotum; female anal segment with emargination posteriorly, supra-anal segment elongate, operculum scoop-shaped; male anal segment split into two semi-terga; cerci small in both sexes. Legs slender; female profemora with serrations, mesofemora and metafemora with lamellae basally; male femora lacking distinct armature, tibiae with small spines subapically.

Key to the species of *Entoria* from continental China

Female:

1. Profemora not serrate ventrally. 2
- Profemora serrate ventrally. 3
2. Seventh sternum lacking preopercular organ.
. *E. laminata* Cai & Liu, 1990 [Fujian]
- Seventh sternum with distinct preopercular organ.
. *E. hei* Ho, 2013 [Hong Kong]
3. Vertex with a pair of spines. 4
- Vertex with a pair of lamellate horns. 5

4. Hind margin of anal segment with u-shaped emargination.
 E. sichuanensis Cai & Liu, 1990 [Sichuan]
 - Hind margin of anal segment with v-shaped emargination.
 E. fuzhouensis Cai & Liu, 1990 [Fujian]
5. Apex of operculum not exceeding end of supra-anal segment. 6
 - Apex of operculum exceeding end of supra-anal segment. 7
6. Mesonotum with sparse and small granules.
 E. guangdongensis **sp. nov.** [Guangdong]
 - Mesonotum lacking granules.
 E. wuyiensis Cai & Liu, 1990 [Fujian]
7. Operculum lacking elevated keels anterolaterally.
 E. baishanzuensis Chen & He, 1995 [Zhejiang]
 - Operculum with elevated keels anterolaterally. 8
8. Vertex with a pair of apically rounded horns.
 E. heishidingensis **sp. nov.** [Guangdong]
 - Vertex with a pair of apically pointed horns.
 E. victoria Brock & Seow-Choen, 2000 [Hong Kong]

Male:

1. Vertex with a pair of small spines or small granule-like horns. 2
 - Vertex lacking small spines or small granule-like horns. 5
2. Vertex with a pair of small granule-like horns.
 E. bituberculata Bi, 1993 [Fujian]
 - Vertex with a pair of small spines. 3
3. Semi-terga straight. . *E. hei* Ho, 2013 [Hong Kong]
 - Semi-terga curved inward. 4
4. Mesotibiae and metatibiae lacking spines subapically.
 E. victoria Brock & Seow-Choen, 2000 [Hong Kong]
 - Mesotibiae and metatibia with 2-3 small spines subapically.
 E. heishidingensis **sp. nov.** [Guangdong]
5. Mesonotum with yellowish stripe. 6
 - Mesonotum lacking yellowish stripe. 7
6. Legs with yellowish markings.
 E. baishanzuensis Chen & He, 1995 [Zhejiang]
 - Legs lacking yellowish markings.
 E. fujianensis Cai & Liu, 1990 [Fujian]
7. Femora with black apex.
 E. gracilis Bi, 1993 [Fujian]
 - Femora completely yellowish brown.
 E. humilis Bi, 1993 [Fujian]

Entoria guangdongensis **sp. nov.** (Figs. 1-4, 11)

Type: Holotype, ♀, Ruyang, Ruyuan, Guangdong, China, 12.VI.2010, George Wai-Chun Ho; Paratype, 23 eggs (naturally laid by Holotype female), same data as Holotype female.

Differentiation: This new species is similar to *Entoria victoria* Brock & Seow-Choen, 2000 but differs in parallel-sided mesonotum, apex of operculum not reaching the end of supra-anal plate and apex of ovipositor not exceeding the tip of operculum.

Etymology: This new species is named after the type-locality, Guangdong.

Description of female (Figs. 1-2, 11): Large *Entoria*. Body slender. General colour of body and legs grayish brown, with blackish markings of irregular size.

Head: Oval, moderately tapering posteriorly after compound eyes. Vertex with a pair of lamellae, apices pointed apically and towards laterally; also with a shallow depression before the lamellae. Occiput slightly rounded. Median occipital furrow distinct, posterior apex reaching posterior margin of head. Compound eyes light brown, small, prominent and rounded. Ocelli very small and oval, placed above compound eyes. Antennae 26-segmented, covered with golden setae; first segment depressed and elliptical, median carina distinct, longer than combined length of second and third segments; third segment cylindrical, 2.5 times longer than second segment; terminal segment with rounded apices, 3 times longer than subapical segment.

Thorax: Pronotum shorter than head, broadened posteriorly, with longitudinal and transverse sulci crossing near centre, posterior margin rounded. Mesonotum 5.3 times length of pronotum, sparsely covered with small granules, parallel-sided, median line distinct. Mesopleurae with pale granules and small pits. Metanotum 3.5 times length of median segment, parallel-sided, with few small granules. Mesosternum and metasternum covered with minute granules, denser than mesonotum.

Abdomen: Cylindrical and slender, sparsely covered with short black setae, distinctly denser on ventral surface; also with small granules throughout abdomen. Median segment near square. Fifth tergum being longest segment. Fourth tergum almost as long as sixth tergum. Eighth tergum longer than combined length of ninth tergum and anal segment. Anal segment with u-shaped emargination on posterior margin. Supra-anal plate as long as eighth tergum, apex pointed. Operculum acuminate, with elevated keels anterolaterally, also with 6 lateral keels, not reaching apex of supra-anal plate. Ovipositor exposed, almost reaching apex of supra-anal plate, apex pointed. Cerci very small and short, tapering behind, apices pointed.

Legs: Very slender. Profemora almost as long as combined length of pronotum, mesonotum and metanotum, with 10 to 11 serrations in basal half of posterodorsal

carina, posteroventral carina with 11 to 12 serrations. Protibiae unarmed. Posterodorsal, anteroventral and posteroventral carinae of mesofemora and metafemora with a rounded lobe basally. Posterodorsal and posteroventral carinae of mesotibiae and metatibiae with a lobe near base. Mediodorsal carina of mesofemora and metafemora with a serrate lobe near apex. Mediodorsal carina of mesotibiae and metatibiae with a slightly raised lobe at base.

Male: Unknown.

Measurements: See Table 1.

Distribution: Guangdong (Ruyuan), China.

Description of eggs (Figs. 3-4): The capsule is cylindrical, brown to grayish brown, with irregular-sized black markings; surface rough, densely covered with minute granules, posterior pole rounded. Operculum flat, brown to grayish brown, covered with small granules, central area with a short tubercle; rim with sparse hair-like fringes. Micropylar plate oval shape, central ridge distinctly shorter than length of micropylar plate, as long as median line. Micropylar cup placed at the posterior area of micropylar plate.

Measurements: Length, 5.6-6.0; width, 1.2-1.3; height, 1.5-1.7.

Entoria heishidingensis sp. nov. (Figs. 5-10, 12-13)

Types: Holotype, ♀, Heishiding Nature Reserve, Fengkai, Guangdong, China, 25.VII.2012, George Wai-Chun Ho; Paratypes, 1♂, same data as holotype; 22 eggs (naturally laid by Holotype female), same data as Holotype female.

Differentiation: This new species is similar to *Entoria victoria* Brock & Seow-Choen, 2000 but can be separated by apically rounded horns on vertex and densely granulated thorax in female; and mesotibiae, and metatibia with 2-3 small spines subapically in male.

Etymology: This new species is named after the type locality, Heishiding Nature Reserve, Guangdong, China.

Description of female (Figs. 5-6, 12): Large *Entoria*. Body slender. Covered with short blackish setae. General colour of body and legs grayish brown.

Head: Oval, tapering posteriorly after compound eyes. Vertex with a pair of ear-like lamellae, thickened basally, apices rounded. Occiput slightly rounded. Median occipital furrow distinct. Compound eyes small, prominent and rounded, its length about 3.5 times in that of cheek. Antennae with 27 segments, covered with short setae; first segment depressed and elliptical, median carina distinct, longer than combined length of second and third segments; third segment cylindrical, 2 times longer than second segment; terminal segment with rounded

apices, 3 times longer than subapical segment.

Thorax: Pronotum shorter than head, almost parallel-sided, with longitudinal and transverse sulci crossing at centre, anterior margin curved inward, posterior margin rounded. Mesonotum 5.5 times length of pronotum, covered with small granules, moderately expanded posteriorly, median line distinct. Metanotum 3.5 times length of median segment, with lesser granules than mesonotum.

Abdomen: Cylindrical and slender. Median segment near square. Sixth tergum being longest segment. Seventh tergum as long as eighth tergum. Seventh sternum with indistinct preopercular organ. Eighth tergum shorter than ninth tergum. Anal segment shorter than eighth tergum, longer than ninth tergum, with u-shaped emargination on posterior margin. Supra-anal plate elongate, as long as combined length of ninth tergum and anal segment. Operculum acuminate, with elevated keels anterolaterally, also with 6 lateral keels, exceeding posterior apex of supra-anal plate. Ovipositor exposed, exceeding posterior apex of operculum, apex pointed. Cerci small and short, tapering behind, apices pointed. Legs: Very slender. Left mid leg and left hind leg lost. Profemora almost as long as combined length of pronotum, mesonotum and metanotum, with 10-13 serrations evenly distributed on posterodorsal carina, posteroventral carina with 6 serrations. Right protibia with a triangular lamella near apex. Anteroventral and posteroventral carinae of right mesofemur and right metafemur with a rounded lobe basally. Medioventral carina of right mesotibia and right metatibia with a raised lobe at base. Male (Figs. 7-8, 13): Medium-sized. Smaller and thinner than female. Body slender. Dull colour, generally in black.

Head: Light brown. Oval, tapering posteriorly. Vertex with a pair of granule-like horns between compound eyes. Occiput moderately convex. Compound eyes small and rounded, its length about 3 times in that of cheek. Antennae with 26 segments, almost reaching apices of protibia; first segment constricted and depressed basally, 4 times length of second segment, as long as third segment.

Thorax: Pronotum light brown, shorter than head, parallel-sided, anterior margin curved inward, posterior margin truncate; transverse and longitudinal sulci crossing at centre. Mesonotum 7.3 times length of pronotum, shorter than mesofemora, with distinct median carina. Metanotum shorter than mesonotum, 5.3 times length of median segment.

Abdomen: Smooth and slender. Median segment black with light brown posterior margin, rectangular, longer than wide. Fourth to sixth terga equal in length. Seventh tergum shorter than sixth tergum. Eighth tergum expanded posteriorly. Anal segment as long as eighth tergum, longer than ninth tergum, dilated as two distinct segments; both semi-terga with thickened apices, inner surfaces with minute teeth, strongly curved inward.

Poculum cup-shaped, reaching posterior margin of ninth tergum. Cerci short, slightly curved inward, apices rounded.

Legs: All legs rufous brown, darker at apices. Left fore-leg and right hind leg lost. Profemur unarmed, curved basally, longer than metafemur. Metafemur shorter than combined length of head, pronotum and mesonotum. Apex of metafemur reaching seventh tergum. Anteroventral and posteroventral carinae of mesofemora and metafemur with 3-6 indistinct spines subapically. Mesotibiae and metatibia with 2-3 small spines subapically.

Measurements: See Table 1.

Distribution: Guangdong (Fengkai), China.

Description of eggs (Figs. 9-10): The capsule is cylindrical, bluish grey; surface rough, densely covered with minute granules, posterior pole rounded. Operculum flat, grayish brown, covered with small granules; rim with sparse hair-like fringes. Micropylar plate oblong, central ridge as long as the length of micropylar plate, longer than median line. Micropylar cup placed near the posterior area of micropylar plate.

Measurements: Length, 4.2-4.4; width, 1.0-1.1; height, 1.2-1.3.

DISCUSSION

Entoria Stål, 1875 is a rather diversified genus with currently sixteen recognized species in the Clitumninae of Mainland China (Hennemann et al., 2008; Chen and He, 2008; Ho, 2013a, 2013b). Most species were described based on single or couple of specimens, which could cause difficulty in identifying existing or new taxa. Eggs obtained from the collected specimens are important to assist identification. Further collections of the existing taxa from type locality and study including DNA barcoding should be done to advance our knowledge on the genus and its closely related genera such as *Mesentoria* Chen & He, 2008, *Metentoria* Brunner von Wattenwyl, 1907 and *Paraentoria* Chen & He, 1997.

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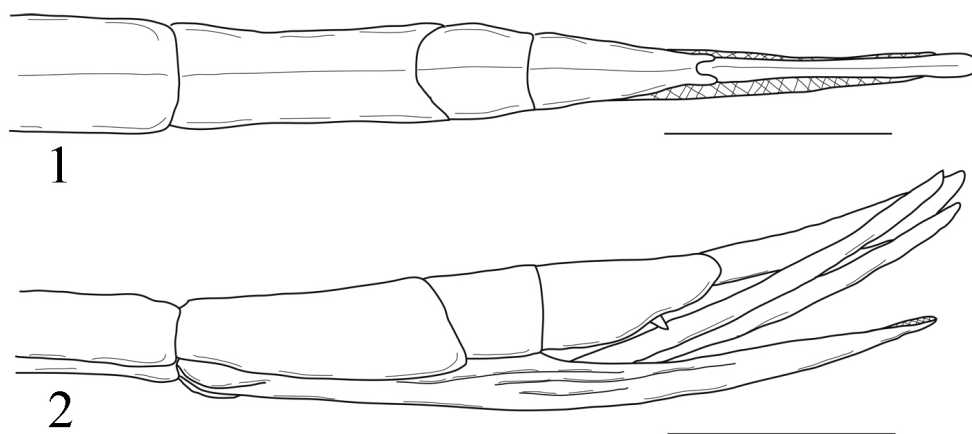
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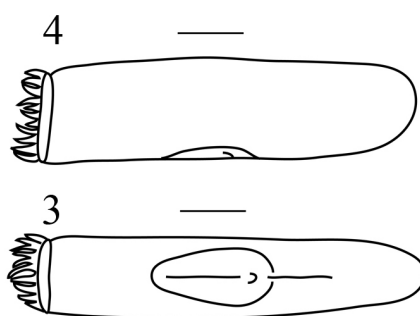
TABLE & FIGURES

Body part	<i>Entoria guangdongensis</i> sp. nov.	<i>Entoria heishidingensis</i> sp. nov.	
	Holotype female	Holotype female	Paratype male
Body	136	133	102
Head	7	7	4
Antennae	16	16	43
Pronotum	4.5	4	3
Mesonotum	24	22	22
Metanotum	14	14	16
Median segment	4	4.5	3
Profemur	44	41	49(right)
Mesofemur	28	24(right)	31
Metafemur	35	32(right)	39(right)
Protibia	49	51	49(right)
Mesotibia	32	29(right)	36
Metatibia	43	37(right)	48(left)

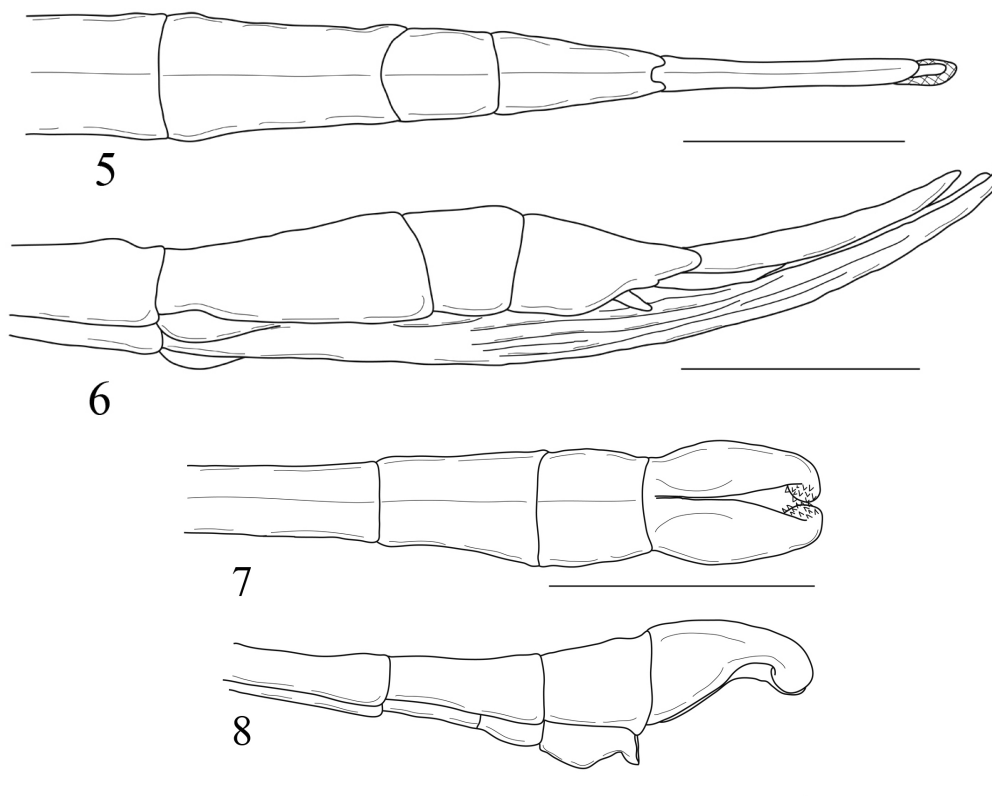
Table 1. Measurements of *Entoria guangdongensis* sp. nov. and *Entoria heishidingensis* sp. nov. (mm.)



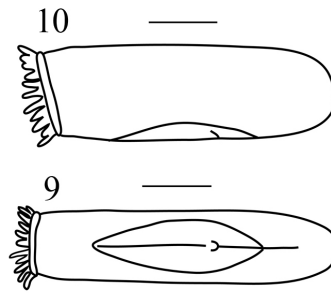
Figures 1-2. *Entoria guangdongensis* sp. nov. [scale bar 5 mm] (Drawings by author). 1. Female, end of abdomen, dorsal view. 2. Female, end of abdomen, lateral view



Figures 3-4. *Entoria guangdongensis* sp. nov. [scale bar 1 mm] (Drawings by author). 3. Egg, dorsal view. 4. Egg, lateral view



Figures 5-8. *Entoria heishidingensis* sp. nov. [scale bar 5 mm] (Drawings by author). 5. Female, end of abdomen, dorsal view. 6. Female, end of abdomen, lateral view. 7. Male, end of abdomen, dorsal view. 8. Male, end of abdomen, lateral view.



Figures 9-10. *Entoria heishidingensis* sp. nov. [scale bar 1 mm] (Drawings by author). 9. Egg, dorsal view. 10. Egg, lateral view

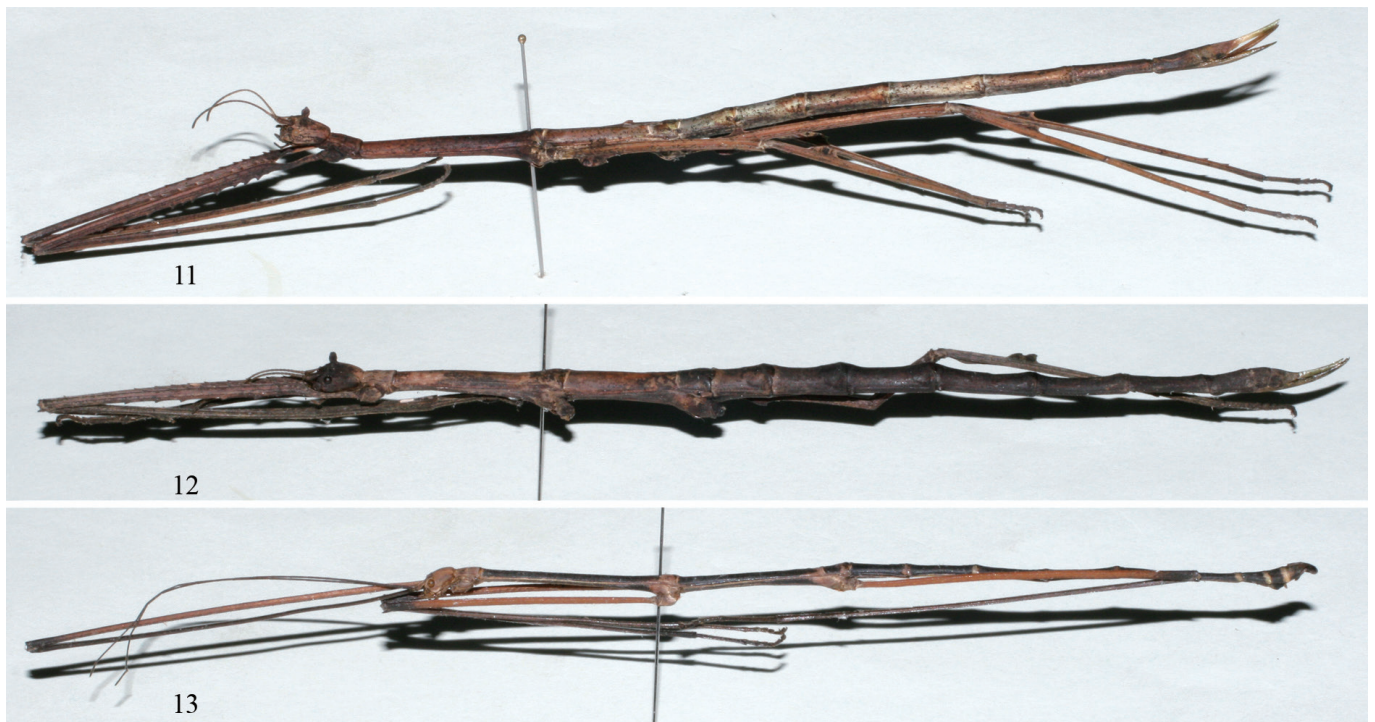


Figure 11-13. Habitus of *Entoria* spp. (Photo by author). 11. *Entoria guangdongensis* sp. nov., female, holotype. 12. *Entoria heishidingensis* sp. nov., female, holotype. 13. *Entoria heishidingensis* sp. nov., male, paratype.