A New Species of Entoria Stål, 1875 from Hong Kong (Phasmatodea: Phasmatidae: Clitumninae)

Author: Ho, George Wai-Chun

Source: Journal of Orthoptera Research, 22(1) : 29-33

Published By: Orthopterists' Society

URL: https://doi.org/10.1665/034.022.0105

A new species of *Entoria* Stål, 1875 from Hong Kong (Phasmatodea: Phasmatidae: Clitumninae)

George Wai-Chun Ho

Hong Kong Entomological Society. P.O. Box No. 73749, Kowloon Central Post Office, Hong Kong. Email: georgehwc@hotmail.com

Abstract

A new species, *Entoria hei* sp. nov., is described and illustrated. Notes on the status of the genus from Hong Kong are given. A key and important figures of the *Entoria* species of Hong Kong are provided.

Key words

Entoria, Hong Kong, new species

Introduction

The genus *Entoria* Stål, 1875 consists of 28 species and is one of the most diverse genera of Phasmatidae in the Oriental Region (Otte & Brock 2005; Hennemann *et al.* 2008; Chen & He 2008; Phasmida Species File online by Brock). Most of the species are described from only one male or one female and need further research. In Hong Kong, a total of five *Entoria* species are thus far recognized (Brock & Seow-Choen 2000; Bi *et al.* 2001; Hennemann *et al.* 2008; Chen & He 2008). However, some of them have been misidentified and a note is provided to clarify their status. This paper also describes a new species, *E. hei* sp. nov., from Hong Kong. A key and important figures of the *Entoria* species of Hong Kong are also provided in this study.

Material and methods

The material mentioned in this study are deposited in Natural History Museum, London, England (BMNH), Hong Kong Entomological Society, Hong Kong (HKES), University of Hong Kong, Hong Kong (HKU), Institute of Zoology, China Academy of Sciences, Beijing, China (IZCAS), National Taiwan University, Taiwan (NTU), Shanghai Entomological Museum, China Academy of Sciences, Shanghai, China (SEM), Tianjin Museum of Natural History, Tianjin, China (TMNH), Museum of Biology, Sun Yat-Sen University, Guangzhou, Guangdong, China (SYSBM), and private collections of Francis Seow-Choen, Singapore (FSC) and George Ho Wai-Chun, Hong Kong, China (GH). The names of plant species mentioned in this study are given according to "Check List of Hong Kong Plants 2012" compiled by Hong Kong Herbarium (AFCD 2012).

Genus *Entoria* Stål, 1875

Type-species.—*Entoria denticornis* Stål, 1875: 72, by subsequent designation of Kirby, 1904: 327.

Notes.—Thirteen species are recognized in mainland China (Hennemann *et al.* 2008; Chen & He 2008; Ho 2013; Phasmida Species File online by Brock 2012). Only two species are currently known from Hong Kong.

Key to the *Entoria* of Hong Kong

1. Medio-ventral carina of mesofemora and metafemora with unarmed elevation near base in both sexes; body grey, postero-ventral carina of profemora serrated in female; semi-tergites curved in male . . . . . *Entoria victoria* Brock & Seow-Choen, 2000
–. Medio-ventral carina of mesofemora and metafemora with spinose elevation near base in both sexes; body brown or entirely green and postero-ventral carina of profemora not serrated in female; semi-tergites straight in male . . . . . *Entoria hei* Ho sp. nov.

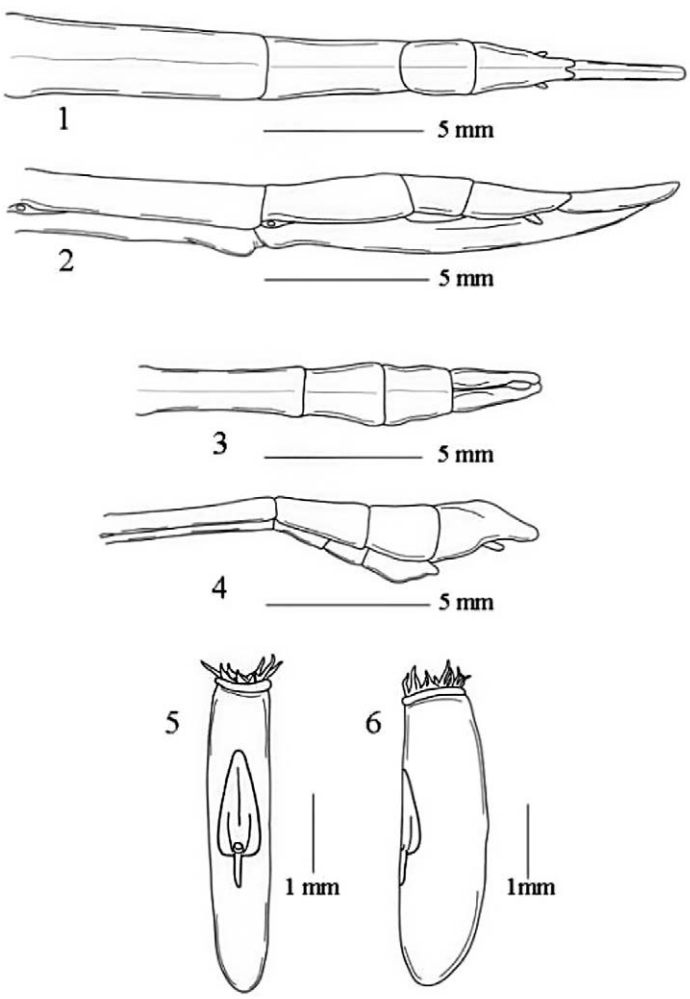
Entoria hei Ho sp. nov.
(Figs 1-7)

Bi *et al.*, 2001: 254. [Misidentified as *Entoria hainanensis* Cai & Liu, 1990 and *E. laminata* Cai & Liu, 1990.]

Type-material.—Holotype ♀, Tai Tam, Hong Kong Island, Hong Kong, 11.X.2008, Ho Wai-Chun George (HKES); Paratype ♂, Tai Tam, Hong Kong Island, Hong Kong, 11.X.2008, Ho Wai-Chun George (HKES); Paratype ♀, Aberdeen, Hong Kong Island, Hong Kong, 6.IX.2009, Ho Wai-Chun George (HKES); Paratype ♂, Po Toi Island, Hong Kong, 18.X.2009, Ho Wai-Chun George (HKES); Paratypes ♂♀, Tai Tam, Hong Kong Island, Hong Kong, 17-18. IX.2009, Ho Wai-Chun George (HKES).

Further material.—♀, Sheung Shui, New Territories, Hong Kong, 9.XI.1983, coll. Chen Ping-Wing (SEM); ♀, Sheung Shui, New Territories, Hong Kong, 29.XII.1995, coll. Chen Ping-Wing (SEM); 1♂, 2♀♀, no data (HKU).

Diagnosis.—Small *Entoria* species, similar to *E. hainanensis* Cai & Liu, 1990 but differs in having a more granulated mesonotum, u-shaped emarginate hind margin of the anal segment, antero and postero-ventral carinae of meso- and metafemora with 3-7 minute spines on the basal elevation, and medio-ventral carina of meso- and metatibiae with spinose elevation basally in female; by larger size,



Figs 1-6. *Entoria hei* Ho sp. nov. 1. ♀, end of abdomen, dorsal view. 2. ♀, end of abdomen, lateral view. 3. ♂, end of abdomen, dorsal view. 4. ♂, end of abdomen, lateral view. 5. Egg, dorsal view. 6. Egg, lateral view.

with two distinct granule-like horns, mesonotum broadly emarginate medially, anal segment longer than 8th tergum and ventral carinae of mesotibiae and metatibiae lacking any spines near apices in male.

Description.—**Female** (Figs 1-2, 7): Medium-sized. Body slender and long. Inconspicuously granulated. Brown or entirely green. If brown, with irregularly-sized small blackish markings throughout the body and legs. Whole body sparsely covered with short bristles.

Head: Entirely green or brown with blackish markings as other parts of the body. Densely and inconspicuously covered with minute granules. Oval, distinctly longer than wide, gently tapering posteriorly. Eyes buff brown, rounded. With a pair of ear-like lobes between the eyes, thick structurally, apex rounded, near the size of eyes. Antennae short, 26 segments, longer than the combined length of head and pronotum, reaching middle of profemora; the first segment flattened, constricted at base, median carina distinct, 3× length of third segment; second segment cylindrical, distinctly shorter than third segment; apical segment 2× length of the third segment, apices slightly rounded.

Thorax: Colouration as other parts of body. Surface rough. Pronotum with inconspicuous granules, near rectangular, slightly shorter than the head, longitudinal and transverse sulci crossing in the middle; anterior margin strongly curved, posterior margin rounded. Mesonotum elongate, 4× length of pronotum, longer than the combined length of metanotum and median segment, sparsely covered with small granules, denser along lateral margins, also with a row of small pits along the lateral margins. Metanotum as in mesonotum, but less granulated, 4× length of median segment. Mesosternum and metasternum with sparse and inconspicuous small granules. Mesopleurum and metapleurum with small lateral granules.

Abdomen: Cylindrical, tapering posteriorly. Median segment as long as pronotum. Fifth tergum being the longest segment. The 9th tergum about ½ length of 8th tergum. Seventh sternum with distinct preopercular organ at hind margin, elongate posteriorly, apex obtuse. Anal segment longer than the 9th tergum, but shorter than 8th tergum, hind margin with u-shaped emargination. Supra-anal plate elongate, roughly as long as 8th tergum, apex pointed. Subgenital plate smooth, apex not reaching the end of the supra-anal plate. Ovipositor not exposed. Cerci very short, apices pointed.

Legs: Profemora not serrated beneath, but serrated above, with 13-16 small serrations. Dorsal carinae of mesofemora and metafemora unarmed. Antero-ventral and postero-ventral carinae of mesofemora and metafemora with a small and indistinct triangular lobe near base, but smooth in the paratype collected from Aberdeen (Hong Kong Island). Medio-ventral carina of mesofemora and metafemora with a spinose elevation near apices, bearing 4-7 minute spines. Postero-dorsal carina of mesotibiae and metatibiae with a small triangular lobe near base. Medio-ventral carina of mesotibiae with one small spine near the apices. Medio-ventral carina of mesotibiae and metatibiae with a spinose elevation near base, bearing 6-10 minute spines.

Male (Figs 3-4, 7)**:** Dull coloration, generally black. Very slender and slim. Distinctly thinner than female.

Head: Light brown, with blackish markings. Densely covered with small and flattened granules, less distinct on vertex. Oval, 1.5× longer than wide, moderately tapering behind. Vertex with two rounded elevations between eyes and with a pair of very small granule-like horns present behind the elevation. Occiput flat, median and lateral furrows distinct. Eyes yellowish brown, rounded, protruding. Antennae dark brown except the basal two light brown segments, short, not reaching the apices of profemora, 26 segments; the first segment shorter than third segment, flattened, with median carina; 2nd segment about ¼ of the length of the first segment; other segments similar in length.

Thorax: Pronotum light brown, with few granules, gently expanded posteriorly; transverse sulcus short, curved slightly, not reaching lateral margins; anterior margin curved. Mesonotum black with light brown posterior region, very elongate, about 6-7.5× length of pronotum, with very few small granules; constricted at ¼ posteriorly, broadly emarginate medially, widening at ¾ posteriorly. Mesopleurum and metapleurum with small pits. Mesosternum and metasternum light brown. Metanotum black with light brown posterior area, 6× length of median segment.

Abdomen: Smooth and slender. Median segment completely light brown. Parallel-sided from 2nd to 9th tergites and narrower at the

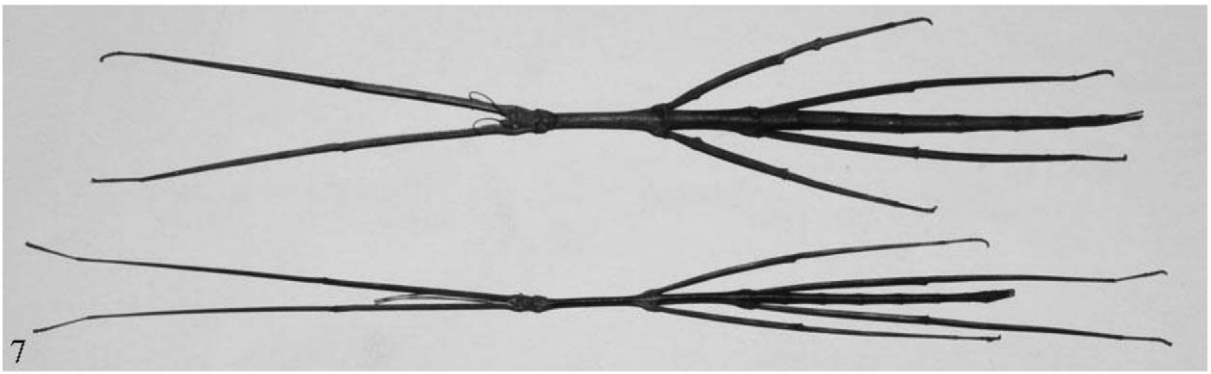


Fig. 7. Habitus of *Entoria hei* Ho sp. nov. Holotype ♀ (above), paratype ♂ (below).

anal segment. Third to 5th tergites slightly equal in length. Ninth tergum shorter than 8th tergum. Anal segment as long as 8th tergum, dilated as two distinct segments; both semi-tergites straight, apices rounded, with setae, inner surfaces with small teeth. Poculum cup-shaped, hind margin rounded, protruding, projecting over the end of 9th tergum. Cerci cylindrical, apices pointed, not projecting behind anal segment.

Legs: Very slender and long. All coxae light brown. All legs rufous brown to blackish brown, darker at apices and with light brown bands. Densely covered with long and black bristles. Profemora curved basally, lacking armature, roughly as long as the combined length of pronotum, mesonotum and metanotum. Protibiae lacking armature. All dorsal carinae of mesofemora, metafemora and mesotibiae lacking armature. Medio-ventral carina of mesofemora and metafemora with 5-7 minute spines near apices. Medio-ventral carina of mesotibiae and metatibiae with 8-12 minute spines near base. Postero-dorsal carina of metatibiae with one short spine near apices in two paratypes both collected from Tai Tam (Hong Kong Island).

Measurements.— (In mm) Holotype ♀, Body length: 115, head: 5, antennae: 11, pronotum: 3.5, mesonotum: 20, metanotum: 13, median segment: 4, profemora: 35, mesofemora: 22, metafemora :27, protibiae: 38, mesotibiae: 21.5, metatibiae: 29. Paratypes ♀, Body length: 98-110, head: 5, antennae: 10-11, pronotum: 3, mesonotum: 17, metanotum: 12, median segment: 3, profemora: 32-33, mesofemora: 21-22, metafemora: 26-27, protibiae: 35-38, mesotibiae: 21-22, metatibiae: 28-29. Paratypes ♂, Body length: 86-96, head: 3-3.5, antennae: 22-28, pronotum: 2.5-3, mesonotum: 17-19, metanotum: 13-15, median segment: 2.5-3, profemora: 36-38, mesofemora: 24-27, metafemora: 30-32, protibiae: 42-46, mesotibiae: 26-29, metatibiae: 33-37.

Eggs (Figs 5-6)**:** The capsule is cylindrical, light brown with irregular-sized black markings; rough surface, densely granulate, posterior pole rounded. Operculum flat, light brown as capsule, central area with a small spot; rim sparsely with sparse hair-like fringes. Micropylar plate spade-shaped, gently tapering anteriorly, posterior margin truncate; central ridge about 1/2 length of the micropylar plate. Median line short, about 1/3 length of the micropylar plate. Micropylar cup distinct, placed at the posterior area of micropylar plate.

Measurements.— (In mm) Length: 6, width: 1.2, height: 1.6.

Food-plants.— Eating Uvaria *Uvaria macrophylla* Roxb. [Annonaceae] and Chinese Lasianthus *Lasianthus chinensis* (Champ. ex Benth.) Benth. [Rubiaceae] in wild.

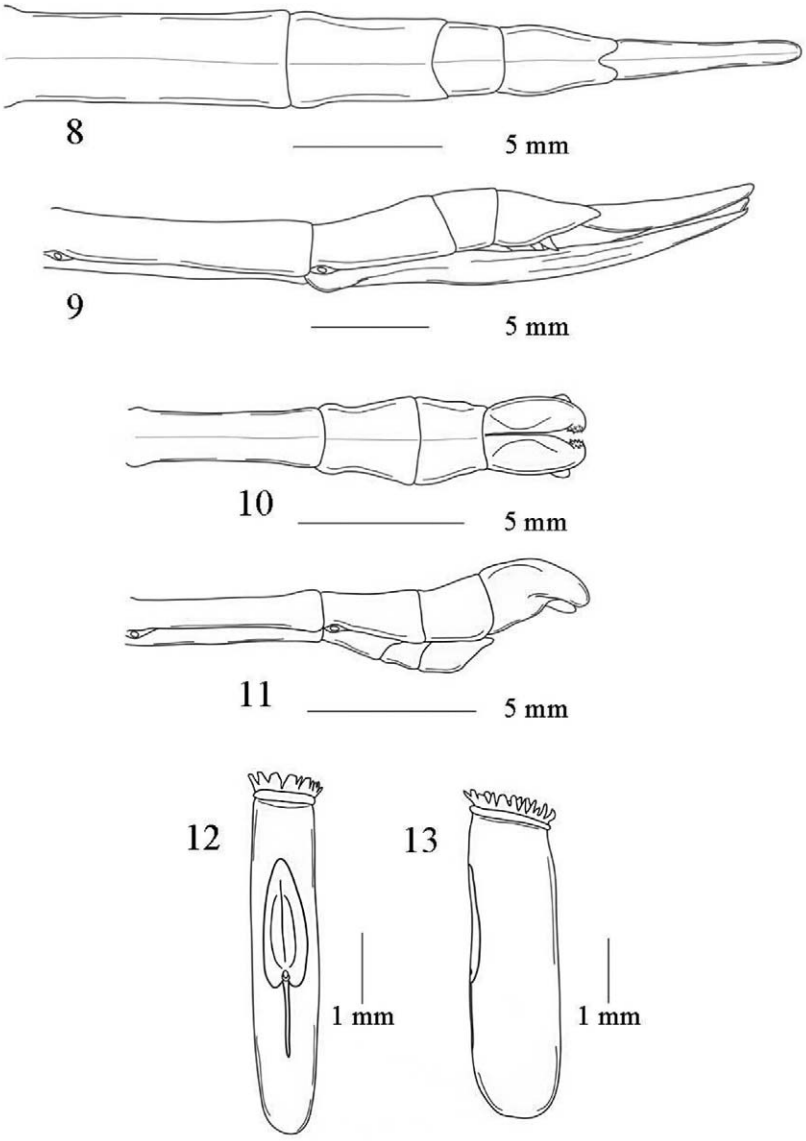
Habitats.— Mountainous shrubland and woodland, altitude between 50 and 400 m above sea level.

Distribution.— Restricted to the southern islands (Hong Kong Island and Po Toi Island) of Hong Kong and is probably an endemic species.

Conservation.— This native species has a restricted range and is only known from three localities in Hong Kong. Specimens were not easily observed and are presumably very rare with low density of population in the wild. In two sets of casual observations which were conducted on the second week of October 2008 and the third week of September 2009 respectively, less than 5 pairs of adults were counted along a 5 km walk in Tai Tam (Hong Kong Island). Extra protection and conservation measures should be provided for this species. The type localities, Tai Tam and Aberdeen, are within the boundaries of Tai Tam Country Park and Aberdeen Country Park, limiting any destructive activities and developments to protect the natural environment. The population of this species within the range of the country parks is undoubtedly being protected. However, one of the type localities, Po Toi Island, the southern-most island of Hong Kong, is facing vegetation removal and concrete reclamation, damaging the landscape and diminishing its known ecological value as a crucial refueling stop for migratory birds (more than 300 species of birds have been recorded on the island); and a natural habitat for the endemic Romer's Tree Frog *Chirixalus romeri* which is internationally endangered. The island also has high value in rock formation and landscape. Extra protection should be provided to the island, for example, designating it as a Country Park to restrain habitat destruction.

Notes.— There is material deposited in HKU and SEM which matches this species, but collection details are doubtful or incomplete. Therefore, those specimens are not selected as the type-material for this new species. The male *Entoria hainanensis* Cai & Liu, 1990 is undescribed and a paper is in research progress to deal with this species. The description of differentiation between *E. hei* Ho sp. nov. and *E. hainanensis* is based on the material deposited in the private collection of the present author.

Etymology.— Named in honour of Prof. He Yun-heng (Beijing) for her contributions to the Chinese Phasmatodea.



Figs 8-13. *Entoria victoria* Brock & Seow-Choen, 2000. 8. ♀, end of abdomen, dorsal view. 9. ♀, end of abdomen, lateral view. 10. ♂, end of abdomen, dorsal view. 11. ♂, end of abdomen, lateral view. 12. Egg, dorsal view. 13. Egg, lateral view.

***Entoria victoria* Brock & Seow-Choen, 2000**
(Figs 8-13)

Entoria victoria, Brock & Seow-Choen, 2000: 134, figs. 7-8.
Brock, 2002: 56. [Illustration]
Brock, 2003: 62.
Otte & Brock, 2005: 134.
Hennemann *et al.*, 2008: 11.
Chen & He, 2008: 304, fig. 268.

Type-material.— Holotype ♀, Peel Rise, Victoria Peak, Hong Kong, China, 10.VII.1996, F. Seow-Choen (BMNH); Paratype ♀, Peel Rise, Victoria Peak, Hong Kong, China, V.1995, F. Seow-Choen (BMNH); Paratypes ♂♀, Peel Rise, Victoria Peak, Hong Kong, China, 10.VII.1996, F. Seow-Choen (FSC).

Further material.— Nymph ♀, Tai Po Kau, Hong Kong, IV.2007, Ho, G.W.C (GH); 2♀, Tai Po Kau, Hong Kong, 26.IV.2008, Ho, G.W.C (GH); ♂, 750m., Tai Mo Shan, Hong Kong, 21.VI.2008, Ho, G.W.C (GH); ♀, Lui Ta Shek, Sai Kung, Hong Kong, 25.VI.2008, Ho, G.W.C (GH); 1♂, 2♀, Tai Tung Shan, Hong Kong, 30.VI.2008, Ho, G.W.C (GH); ♀, Ng Tung Chai, Hong Kong, 2009, Ho, G.W.C (GH); ♀, Kowloon Peak, Hong Kong, 23.IV.2009, Ho, G.W.C (GH); ♀, Kowloon Peak, Hong Kong, China, 1.VI.2009, Ho, G.W.C (GH); ♀, Black's Link, Hong Kong Island, Hong Kong, 5.VI.2009, Ho, G.W.C (GH); ♀, Pat Sin Leng, Hong Kong, 18.VI.2009, Ho, G.W.C (GH); ♀, Pak Tam Au, Sai Kung, Hong Kong, 20.VI.2009, Ho, G.W.C (GH).

Differentiation.— Large *Entoria* species. This species is similar to *E. hei* Ho but with the following differences: larger size, robust body and medio-ventral carina of mesofemora, and metafemora with unarmed elevation near base in both sexes; lacking praeopercular organ and serrated postero-ventral carina of profemora in female; and curved semi-tergites in male.

Distribution.— Types from Hong Kong. Not a commonly seen species, but widely distributed in most areas in Hong Kong.

Notes.— This species is currently not recorded outside the range of Hong Kong.

Erroneous records of *Entoria* spp. from Hong Kong

***Entoria formosana* Shiraki, 1911**

Entoria formosana, Shiraki, 1911: 309, pl. 6: 9.
Shiraki, 1935: 30, 48.
Yasumatsu, 1942: 8, fig. 8. [Egg illustration]
Bi *et al.*, 2001: 254. [Misidentification]
Huang, 2002: 123. [Illustration]
Brock, 2003: 62.
Otte & Brock, 2005: 133.
Hennemann *et al.*, 2008: 42.
Chen & He, 2008: 308, figs. 273.

Type-material.— Syntype ♀, Nauto, V (unknown year of collection), T. Shiraki, no.724 (NTU); Syntype ♂, ﾄﾊ, IV.1910, unknown collector, no.725 (NTU).

Distribution.— Types from Taiwan.

Notes.— Bi *et al.* (2001: 254) misidentified male *Ramulus caii* (Brock & Seow-Choen, 2000) as *Entoria formosana* Shiraki, 1911 which is restricted to Taiwan and not found in Hong Kong.

Entoria hainanensis Cai & Liu, 1990

Entoria hainanensis, Cai & Liu, 1990: 418, figs. 1, 7-8.
Bi *et al.*, 2001: 254. [Misidentification]
Chen *et al.*, 2002: 108.
Otte & Brock, 2005: 133.
Hennemann *et al.*, 2008: 11.
Chen & He, 2008: 306, fig. 269.

Type-material.—Holotype ♀, Haikou, Hainan Province, China, 15.III.1964, Liu Shengli (TMNH).

Further material.— ♀, Hoihow, Kiungshan District, Hainan Islands, China, VIII.1932, William E. Hoffmann (SYSBM); ♀, Lingshui, Hainan Province, China, 24.V.1957, no data (IZCAS); ♂♀, Jianfengling, Hainan Province, China, 6.VI.2008, Ho, G.W.C. (GH).

Distribution.— Type from Hainan, China.

Notes.— Bi *et al.* (2001: 254) misidentified the new species, *Entoria hei* Ho sp. nov., as *E. hainanensis* Cai & Liu, 1990 which is restricted to Hainan and not found in Hong Kong.

Entoria laminata Cai & Liu, 1990

Entoria laminata, Cai & Liu, 1990: 421, figs. 5 & 12.
Bi *et al.*, 2001: 254. [Misidentification]
Otte & Brock, 2005: 133.
Hennemann *et al.*, 2008: 11.
Chen & He, 2008: 319, fig. 288.

Type-material.— Holotype ♀, Gushan, Fuzhou, Fujian Province, China, 7.VII.1965, Liu Shengli (TMNH).

Distribution.— Type from Fujian, China.

Notes.— Bi *et al.* (2001: 254) misidentified the new species, *Entoria hei* Ho sp. nov., as *E. laminata* Cai & Liu, 1990 which is restricted to Fujian and not found in Hong Kong.

Acknowledgements

My profound thanks go to Paul Brock (Natural History Museum, British) for his help in arranging for access to the collection in National Taiwan University, Dr. Francis Seow-Choen (Singapore) for sending requested references and Mr. Graham Reels (England), and Mr. John Lee (Singapore) for his comments and proofreading, which greatly improved the manuscript. Special thanks go to the Institute of Zoology, China Academy of Sciences (IZCAS), National Taiwan University (NTU), Shanghai Entomological Museum (SEM), Museum of Biology, Sun Yat-Sen University (SYSBM), Tianjin Museum of Natural History (TMNH) and University of Hong Kong (HKU) for giving access to the respective collections. The author must also acknowledge The Orthopterists' Society for their funding support to travel to Taiwan in October 2009.

References

Agriculture, Fisheries and Conservation Department/AFCD. 2012. Check list of Hong Kong plants 2012 [compiled by Hong Kong Herbarium]. Agriculture, Fisheries and Conservation Department, HKSAR, Hong Kong. 219 pp.

Bi D.Y., Zhang W.N., Lau C.S.K. 2001. Study on the walking stick insect (Phasmatodea) and the genus *Sipyloidea* from Hong Kong district of China. Entomotaxonomia 23: 253-258.

Brock P.D. Phasmida Species File Online. Version 2.1/4.1. Available from http://Phasmida.SpeciesFile.org (accessed 10 October 2012).

Brock P.D. 2002. Hong Kong insects. Reptilian 6: 54-59.

Brock P.D. 2003. Rearing and studying stick and leaf insects. The Amateur Entomologist 22. The Amateur Entomologists' Society, Orpington, Kent, England. 89 pp.

Brock P.D., Seow-Choen F. 2000. The Stick insects (Insecta: Phasmida) of Hong Kong. Serangga 5: 113-147.

Cai B.L., Liu S.L. 1990. Notes on *Entoria* (Phasmatodea: Phasmatidae) with descriptions of six new species from China. Oriental Insects 24: 415-425.

Chen S.C., He Y.H. 2008. Phasmatodea of China. China Forestry Publishing House, Beijing. 476 pp.

Chen S.C., He Y.H., Li Y. 2002. Phasmatodea, pp. 100-116. In: Huang F.S. (Ed.) Forest insects of Hainan. Science Press, China.

Hennemann F.H., Conle O.V., Zhang W.W. 2008. Catalogue of the stick and leaf-insects (Phasmatodea) of China, with a faunistic analysis, review of recent ecological and biological studies and bibliography (Insecta: Orthoptera: Phasmatodea. Zootaxa 1735: 1-76.

Ho G.W.C. 2013. A new species and a new combination of the genus *Entoria* (Phasmatodea, Phasmatidae, Clitumninae). Acta Zootaxonomica Sinica 38: 78-80.

Huang Y.S.F. 2002. Phasmids in Taiwan. Big Trees, Taiwan. 142 pp.

Kirby W.F. 1904. A synonymic catalogue of Orthoptera. 1. Orthoptera Euplexoptera, Cursoria et Gressoria. (Forficulidae, Hemimeridae, Blattidae, Mantidae, Phasmidae). British Museum, London. 501 pp + ext. 25 pp.

Otte D., Brock P.D. 2005. Phasmida Species File. Catalog of stick and leaf insects of the world. The Insect Diversity Association and the Academy of Natural Sciences, Philadelphia. 414 pp.

Shiraki T. 1911. Phasmiden und Mantiden Japans. Annotationes Zoologicae Japonenses, Tokio 7: 291-331, pl. 12.

Shiraki T. 1935. Orthoptera of the Japanese Empire (Part IV) Phasmidae. Memoirs of the Faculty of Science and Agriculture, Taihoku Imperial University, Formosa, 14: 23-88.

Stål C. 1875. Recensio orthopterorum. 3. Revue critique des Orthoptères décrits par Linné, DeGeer et Thunberg. Öfversigt af Kongliga Vetenskaps-Akademiens Förhandlingar 32: 1-105.

Yasumatsu K. 1942. Eggs of stick insects. Bulletin of Takarazuka Insectarium 18: 1-20.