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Taxonomic note on Necroscia shukayi (Bi, Zhang & Lau 2001) comb. nov. (Phasmida: Necrosciinae: Necrosciini) and first description of its egg

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Abstract

Necroscia ovata Chen & He, 2008 is synonymised with *Necroscia shukayi* (Bi, Zhang & Lau, 2001) *comb. nov.* and here transferred from the genus *Sipyloidea* Brunner v. Wattenwyl, 1893. The egg is illustrated for the first time.

Key words

Phasmida, Necrosciinae, *Necroscia shukayi*, egg, Hong Kong, Guangdong, China

Introduction

Within the order Phasmida, the mainly winged subfamily Necrosciinae consists of 617 species in 66 genera (Phasmida Species File online), mainly distributed over Asia and also Australasia. They are characterized by long wings and long slender antennae that are longer than forefemora. If species are brachypterous or apterous, the anal segment is not split or the female is without a beak-shaped ovipositor (Bradley & Galil 1977, Brock 1999).

The Hong Kong fauna has only recently been described (Brock & Seow-Choen 2000, Bi, Zhang & Lau 2001, Brock 2002, Ho 2008). There are 18 described species in Hong Kong with 7 species (39%) belonging to this subfamily, including six winged species and one apterous species (Ho unpub. data). They mostly inhabit the canopy of woodland.

Ootaxonomy has become significantly important to the taxonomy of Phasmatodea only in recent years (*e.g.*, Clark 1976a, 1976b, 1979, 1988, 1998; Clark-Sellick 1997; Zompro 2004). This is the first paper to describe the egg of *Necroscia shukayi* (Bi, Zhang & Lau 2001), *comb. nov.* from Hong Kong and south China.

Material and methods

While working on phasmids from Hong Kong and mainland China, one species was identified as *Sipyloidea shukayi* Bi, Zhang & Lau, 2001, but also perfectly matched with *Necroscia ovata* Chen & He, 2008. Research to establish whether both were the same species included: an examination of type material in ICRI, relevant phasmid literature, collecting of specimens in various localities in Hong Kong and surrounding parts of China, search for nontype material in collections, as well as rearing specimens and comparing them with related taxa. For examining and drawing the morphological details of material, microscope and photo processing software (Photoimpact) were used.

Acronyms used for collections are as follows: ICRI: Institute of Entomology, Sun Yat-sen University (Zhongshan University), Guangzhou, China.
SIES: Shanghai Institute of Entomology, Chinese Academy of Sciences, Shanghai, China.
USNM: United States National Museum of Natural History, Washington DC.
GH: Private collection of George, W.C. Ho, Hong Kong, China.

Necroscia shukayi (Bi, Zhang & Lau, 2001) *comb. nov.*
(Figs 1-4)

Sipyloidea shukayi, Bi, Zhang & Lau, 2001: 256, figs. 1-2. [holotype male: Tsak Yue Wu, Sai Kung West Country Park, Hong Kong, China, 25.vii.1996, Chan Ping Wing (SIES); paratype female: Tsak Yue Wu, Sai Kung West Country Park, Hong Kong, China, 27.vii.1996, Chan Ping Wing (SIES)].

Sipyloidea shukayi, Hennemann, Conle & Zhang, 2008: 39. Chen & He, 2008: 175, fig. 141.
Necroscia sp., Brock & Seow-Choen, 2000: 131 [Identification based on photograph of a damaged male from Hong Kong at USNM collected in 1909].

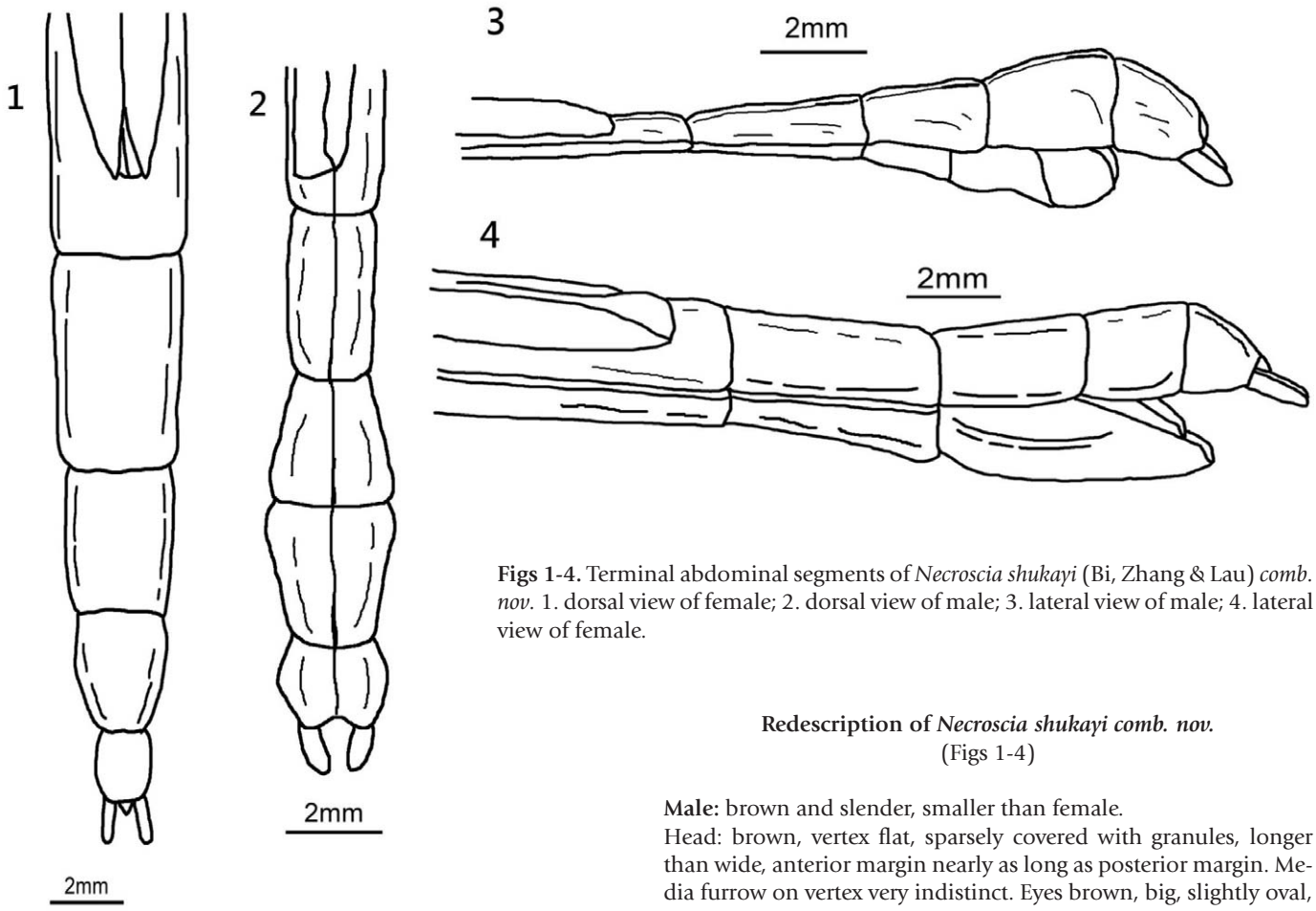
= *Necroscia ovata*, Chen & He, 2008: 113 & 398, fig. 78. [holotype male: Shenzhen, Guangdong Province, China, 9-14.vi.1987, Chen Yongjun (not traced in ICRI, should be in Beijing); paratype male: Longmen, Guangdong Province, China, 9-14.vi.1987, Chen Yongjun (ICRI); paratype male: Liannan, Guangdong Province, China, 16.vii.1994, Chen Zhenyao (ICRI)] ***syn. nov.***
Necroscia sp. (ovata), Xu, 2006: 61, fig. 7. [illustration of egg].

Other material examined.—
Male: Yueyun, Shaoguan, Guangdong Province, China, 19.vii.2008, Ho Wai Chun (GH); female: Violet Hill, Hong Kong, 2008, Ho Wai Chun (GH); male: Tai Mo Shan, Hong Kong, 21.vi.2008, Ho Wai Chun (GH); female + 4 eggs: Sunset Peak, Lantau Island, Hong Kong, 30.vi.2008, Ho Wai Chun (GH); male: same data, (GH); male: Ma On Shan, Hong Kong, 3.vii.2008, Ho Wai Chun (GH); female: same data (GH); male: Shing Mun Country Park, Hong Kong, 12.ix.2008, Ho Wai Chun (GH).

Comments

Bi *et al.* 2001 distinguished their new species *Sipyloidea shukayi* from other similar species by small yellow granules on the mesonotum and metanotum (including median segment). However,

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Figs 1-4. Terminal abdominal segments of *Necroscia shukayi* (Bi, Zhang & Lau) *comb. nov.* 1. dorsal view of female; 2. dorsal view of male; 3. lateral view of male; 4. lateral view of female.

rearing the female of *Sipyloidea shukayi*, reveals that their eggs are bullet-like with a rhombus-shaped micropylar plate and that the posterior part of the capsule extends as a tongue. These eggs clearly belong to the genus *Necroscia* Audinet-Serville, 1838. In contrast, comparing the eggs with *Sipyloidea sipylus* (Westwood, 1859) [type species of *Sipyloidea* Brunner von Wattenwyl, 1893] from Hong Kong, the capsule of their eggs are oval and blunt at both ends; the micropylar plate is pear-shaped. Apparently, the egg of *Sipyloidea shukayi* is allied to *Necroscia* (Clark 1979, Sellick 1997). In addition, based on the morphology of the adult, the apex of the operculum is keratinized and the hind margin of the anal segment curved inward, which are characters of the genus *Necroscia* Audinet-Serville, 1838.

Brock and Seow-Choen (2000: 131) had already mentioned a *Necroscia* sp. from Hong Kong, but were unable to describe it due to its poor condition. I have examined a photograph of the specimen in USNM and consider it to belong to *N. shukayi* (Bi, Zhang & Lau) *comb. nov.*

The original description in Bi *et al.* 2001 is brief and without an illustration of the abdomen terminalia of both sexes. Hence, both sexes of *N. shukayi comb. nov.* were redescribed (based on original description, type and further nontype materials from Hong Kong and south China) and illustrated by the present author.

Redescription of *Necroscia shukayi comb. nov.*
(Figs 1-4)

Male: brown and slender, smaller than female.

Head: brown, vertex flat, sparsely covered with granules, longer than wide, anterior margin nearly as long as posterior margin. Media furrow on vertex very indistinct. Eyes brown, big, slightly oval, prominent, and longer than the scapus. Genae with two thin and light postocular brown stripes, with a blackish stripe between the two light-brown stripes. Antennae light brown and filiform, longer than forelegs, segments indistinct, first segment cylindrical, longer than wide; second segment shorter than first; the third segment filiform, slightly longer than first segment.

Thorax: brown, with yellowish granules. Pronotum longer than wide and longer than head, both sides parallel, sparsely covered with granules, with a distinct transverse and longitudinal sulcus. The longitudinal sulcus not reaching to the hind margin. Prosternum sparsely covered with granules. Mesonotum wider beyond, with distinct median longitudinal carina and densely covered with granules. Mesosternum and mesopleurum also covered with granules. Combined length of metanotum and median segment shorter than mesonotum, dorsal surface blackish. Metapleurum brown with granules. Median segment longer than metanotum.

Abdomen: brown, except dorsal surface of second to fourth tergite blackish; smooth and slender. Second to fifth tergites nearly equal in length, parallel sided. Eighth tergite broadens behind. Ninth tergite longer than eighth tergite and longer than anal segment. The hind margin of anal segment strongly curved inward and rounded, with setae. Subgential plate smooth, tapering beyond, hind margin rounded, not projecting beyond hind margin of the ninth tergite. Cerci brown, long, densely covered with setae, exceeding the hind margin of anal segment. Apices blunt, slightly curved inward.

Wing: forewings oblong, longer than half of combined length of metanotum and median segment, but not projecting beyond the hind margin of metanotum. Hindwings long, reaching to the sixth tergite.

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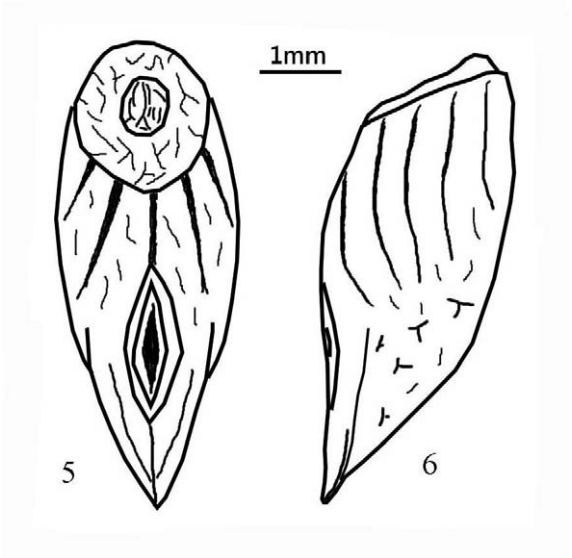
Table 1. Measurement [mm] of *Necroscia shukayi* (Bi, Zhang & Lau) *comb. nov.* from different localities througout Hong Kong and Guangdong Province, China.

	Hong Kong			Guangdong	
	Tai Mo Shan	Shing Mun Country Park	Sunset Peak	Nanling, Yueyun	Wutungshan, Shenzhen*
Body length	60.5	63	69	70	63
Head	2.8	2.8	3.2	3	-
Antennae	lost	55	63	70	-
Pronotum	3	3	3.2	3	4
Mesonotum	10.5	10.5	11.5	13.5	11
Metanotum (including median segment)	7.5	8	9	9	7
Femora: fore	20	22	22	25	18.5
Femora: mid	13	14	15	17	14
Femora: hind	19	22	22	24	21
Tibiae: fore	20	23	23	26.5	-
Tibiae: mid	13	14	14.5	17.5	-
Tibiae: hind	21	23	23	27	-
Forewing	6	6	6.2	6.2	-
Hindwing	33	33	36.5	33	-
Attitude (meters)	850	280	300	-	-

* Measurement of holotype is based on the description by Chen & He (2008:113).

Pre-anal region brown, wings grayish-brown with pale spots.
Legs: with mottled spots, smooth, without any serrations. Forelegs and hindlegs very slender and long, longer than abdomen. Forefemora curved basally, nearly as long as hindfemora. Midfemora shorter than forefemora and hindfemora.

Female: similar to male, robust and grayish brown or brown.
Head: longer than wide and flat, sparsely set with granules. Genae with light brown postocular stripes. Eyes oval and prominent. Antennae filiform, longer than forelegs, the first segment cylindrical; the third segment longer than first segment.
Thorax: pronotum flattened, longer than wide, both sides parallel; sparsely covered with irregular small granules, with transverse and longitudinal sulcus. Mesonotum long and cylindrical, wider beyond, granules concentrated on anterior and posterior areas. Median longitudinal carina distinct, with granules along the carina. Metanotum shorter than median segment, dorsal surface blackish. Lateral carina with a row of granules. Lateral and ventral surface of mesonotum covered with granules. Lateral and ventral surface of metanotum with granules.
Abdomen: cylindrical, almost parallel from second to seventh tergites. Dorsal surface of second to fifth tergites blackish. Eighth tergite expanded behind, longer than the ninth tergite and longer than anal segment. The apex of anal segment pointed and acute. Supra-anal plate indistinct. Operculum boat shaped, with lateral carina. Apex blunt and curved, not projecting beyond the hind margin of anal segment. Ovipositor not exposed beyond the operculum, curved at hind margin. Cerci brown, short and straight; apices blunt, exceeding the hind margin of anal segment.
Wings: forewings oval and short, reaching to the middle of metanotum. Hindwings long, brown, projecting beyond the halfway length of abdomen, reaching to the sixth tergite.
Legs: similar to male. Forefemora longer than head, pronotum and mesonotum together, basally curved. Midfemora shorter than forefemora and hindfemora.



Figs 5, 6. Egg of *Necroscia shukayi* (Bi, Zhang & Lau) *comb. nov.*, 5. Dorsal view; 6. Lateral view.

Description of egg.— (Figs 5, 6). The capsule is light brown and bullet-shaped. The middle part is widest and it is narrower towards the posterior end. Length 5.5 mm, width 2 mm, height 1.6 mm. Operculum flat without capitulum. Diameter 2 mm. Central area with a short ridge, (length of the ridge near 1 mm) which is surrounded with wrinkles. Opercular collar thick and smooth. Capsule covered with curved wrinkles. Micropylar plate rhomboidal. Posterior part extends as tongue with a ridge on dorsal surface, apex acute.

Distribution.— Currently known from Hong Kong and several locations in Guangdong Province, China (Fig. 7).

Note.— This species feeds on *Litsea rotundifolia* (Lauraceae) in the wild and in captivity as well. It is mostly found in woodland, at altitudes of 50-1100 m.

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Table 2: Egg differentiation between genera of *Necroscia* Audinet-Serville, 1838 and *Sipyloidea* Brunner von Wattenwyl, 1893.

	Egg structure	
	Capsule	Micropylar plate
Necroscia (Serville, 1838)	Bullet-shaped, posterior part extends as tongue, apex pointed	Rhomboidal
Sipyloidea (Brunner von Wattenwyl, 1893)	Oval, posterior part rounded and blunt, never tongue-shaped	Pear-shaped

Conclusion

Phasmida (commonly known as stick and leaf insect) are poorly known insects in Hong Kong. While recent works have gone some way to identifying the fauna, additional work is necessary on the biology and taxonomy of stick insects in order to learn more about their ecology, behavior, foodplant preferences and to identify undescribed taxa.

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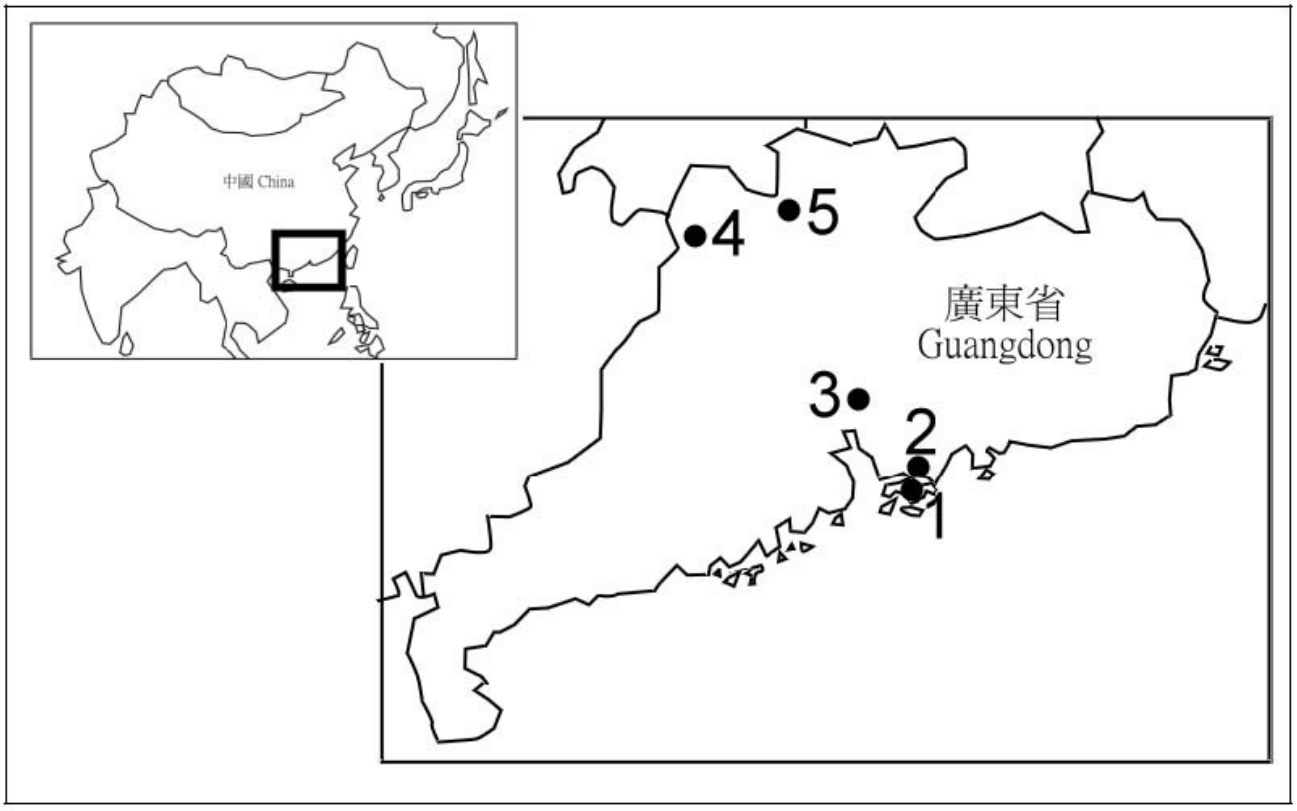


Fig. 7. Geographical distribution of *Necroscia shukayi* (Bi, Zhang & Lau) *comb. nov.* in south China. 1, Hong Kong; 2, Wutungshan, Shenzhen; 3, Nangunshan, Guangzhou; 4, Daolunshan, Linnan; 5, Nanling, Yueyun.

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