

# Contribution to the knowledge of Oriental Phasmatodea I: A taxonomic study of the genus *Parasinophasma* (Phasmatodea: Necrosiinae)

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## Abstract

This paper provides a taxonomic study for the phasmid genus *Parasinophasma* Chen & He, 2008; reports for the first time *Parasinophasma* from Hong Kong, China and Vietnam; describes six new species and two new subspecies: *P. bresseeli* sp. n., *P. constanti* sp. n., *P. laifanae* sp. n., *P. liui* sp. n., *P. luchunense luchunense* sp. n. and subsp. n., *P. luchunense xingyuei* subsp. n. and *P. sparsigranulatum* sp. n.; proposes one new combination: *Parasinophasma bouvieri* (Redtenbacher, 1908) comb. n. transferred from *Orthonecrosia* Kirby, 1904; and gives a checklist of known species and a revised key to species.

## Key words

China, new nomenclature, new taxa, stick insects, Vietnam

## Introduction

The Phasmatodea genus *Parasinophasma* Chen & He, 2008, is a Chinese endemic genus principally distributed in eastern to south-western regions, including Fujian, Guangdong, Guangxi, Guizhou, Hainan, Henan, Jiangxi, Sichuan, Yunnan and Zhejiang, China (Chen and He 2008, Hennemann et al. 2008, Ho 2015, 2016). The type species of *Parasinophasma* is *Micadina henanensis* Bi & Wang, 1998 (= *Parasinophasma henanense*). Historically, after Chen and He (2001) noticed the invalidity of '*Euphasma* Chen and He, 2001', which is preoccupied by *Euphasma* Redtenbacher, 1906, a generic name '*Parasinophasma*' was used intending to replace '*Euphasma*' (Chen et al. 2006). However, there is no statement for the replacement of '*Euphasma*' in Chen et al. (2006) until '*Parasinophasma*' is formally described and stated in the monograph of Chinese Phasmatodea (Chen and He 2008). Therefore, the publication year of *Parasinophasma* should not be in '2001' (Chen and He 2008: 152) or '2006' (Hennemann et al. 2008: 20, Ho 2015: 329, 2016: 322) and should be in '2008'.

Ho (2015) recently provided a taxonomic review of *Parasinophasma* with the descriptions of three new species, including *P. maculatum* Ho, 2015, *P. tianmushanense* Ho, 2015 and *P. unicolor* Ho, 2015, and a taxonomic key to all known species. The author of this study conducted further collecting trips to various localities in China and examined various Vietnamese phasmid collections that resulted in the identifications of six new species, two new sub-

species and one new combination. *Parasinophasma* is recorded for the first time in Hong Kong, China and Vietnam. After these additions, 14 species and two subspecies are attributed to *Parasinophasma*. This study aims to provide a revision of *Parasinophasma* with descriptions of new taxa, a proposal of a new nomenclature and a revised key to species, with the goal of improving our knowledge on the poorly described Oriental Phasmatodea.

## Material and methods

The specimens of *Parasinophasma laifanae* sp. n. and *P. luchunense luchunense* sp. n. and subsp. n. were collected directly by hand by the present author at night due to their nocturnal behavior. A hand torch was used to spot them on plants. The specimens were dried and pinned after collecting. No food plant fed upon by the collected species was observed. Other taxa are from collections deposited in China Agricultural University, Beijing, China (CAU) and the Royal Belgian Institute of Natural Sciences, Brussels, Belgium (RBINS). The type specimens of new taxa were deposited in CAU, RBINS, and the Hong Kong Entomological Society collection, Hong Kong, China (HKES). Morphological terms follow Bragg (2001), Zompro (2004) and Bradler (2009). The descriptions of coloration are based on dried specimens. The specimens of eggs of *P. laifanae* sp. n. were naturally laid by an adult female. Ootaxonomic terminology refers to Clark (1976a, b, 1979, 1988, 1998), Clark-Sellick (1997) and Zompro (2004). Measurements are given in millimeters (mm), with min-max values if appropriate. The sequence of species is in alphabetical order.

## Results

### Taxonomy

#### *Parasinophasma* Chen & He, 2008

= *Euphasma* Chen & He, 2001

[Preoccupied by *Euphasma* Redtenbacher, 1906]

*Subsequent literature*.—Chen et al. 2006: 98. Chen and He 2008: 152. Hennemann et al. 2008: 20. Ho 2015: 329, 2016: 322.

*Type species.*—*Micadina henanensis* Bi & Wang, 1998: 12 (= *Parasinophasma henanense*), by original designation.

*Description.*—Body greenish or grayish brown; cylindrical, slender and elongate, unarmed. Female distinctly more robust and slender than male. Head oval or oblong, smooth. Vertex with three ocelli or lacking ocelli. Occiput distinctly or weakly convex. Antennae filiform and long. Thorax with granules of irregular sizes. Mesonotum slender and elongate. Abdomen cylindrical, usually smooth. Anal segment distinctly or weakly emarginated posteriorly. Supranal segment indistinct. Male ninth tergum elongate, longer than eighth tergum. Female gonapophyses rarely exposed. Cerci tapering posteriorly, straight or weakly curved in female; cerci tapering posteriorly, straight or distinctly curved in male, also with or lacking spine-like appendage. Male vomer small and almost symmetric, distinctly or weakly emarginated apically. Legs unarmed, slender and long. Tegmina oval. Alae maculated, shorter than or longer than mesonotum.

*Distribution.*—China and Vietnam.

*Notes.*—Currently 14 species and two subspecies are recognized. This genus is reported for the first time from Hong Kong.

*Species included.*—

1. *Parasinophasma bouvieri* (Redtenbacher, 1908: 553), comb. n. [Vietnam (Tonkin/North Vietnam)].
2. *Parasinophasma bresseeli* sp. n. [Vietnam (Vinh Phuc)].
3. *Parasinophasma constanti* sp. n. [Vietnam (Cao Bang and Lao Cai)].
4. *Parasinophasma fanjingshanense* Chen & He, in Chen et al. 2006: 98, fig. 8. [China (Guangxi, Guizhou, Hubei, Jiangxi, Zhejiang and Chongqing)].
5. *Parasinophasma guangdongense* Chen & He, 2008: 154, fig. 122. [China (Guangdong)].
6. *Parasinophasma hainanense* Chen & He, 2008: 155, fig. 123. [China (Hainan)].
7. *Parasinophasma henanense* (Bi & Wang, 1998: 12, figs 7–8). [China (Guangxi, Guizhou, Henan, Hunan, Jiangxi, Sichuan and Zhejiang)].
8. *Parasinophasma laifanae* sp. n. [China (Hong Kong)].
9. *Parasinophasma liui* sp. n. [Vietnam (Thua Thien Hue)].
- 10.1. *Parasinophasma luchunense luchunense* sp. n. and subsp. n. [China (Yunnan)].
- 10.2. *Parasinophasma luchunense xingyuei* subsp. n. [Vietnam (Lao Cai)].
11. *Parasinophasma maculatum* Ho, 2015: 331, figs 1a, 2a–b. [China (Yunnan)].
12. *Parasinophasma sparsigranulatum* sp. n. [Vietnam (Lam Dong)].
13. *Parasinophasma tianmushanense* Ho, 2015: 332, figs 1b–g, 2c–d, g. [China (Zhejiang)].
14. *Parasinophasma unicolor* Ho, 2015: 333, figs 2e–f, 2h–i. [China (Fujian)].

**Key to males of *Parasinophasma***

- 1 Anal abdominal segment longer than ninth abdominal tergum ..... *P. constanti* sp. n.
- Anal abdominal segment shorter than ninth abdominal tergum ... 2
- 2 Occiput of head weakly convex, nearly flattened ..... 3
- Occiput of head distinctly convex ..... 4

- 3 With ocelli between compound eyes ..... *P. liui* sp. n.
- Lacking ocelli between compound eyes ..... *P. unicolor* sp. n.
- 4 Alae short, posterior apices not surpassing fourth abdominal tergum ..... 5
- Alae long, posterior apices surpassing fourth abdominal tergum .... 6
- 5 Anal abdominal with a U-shaped emargination on posterior margin ..... *P. luchunense luchunense* sp. n. and subsp. n.
- Anal abdominal with a V-shaped emargination on posterior margin ..... *P. luchunense xingyuei* subsp. n.
- 6 With ocelli between compound eyes ..... 7
- Lacking ocelli between compound eyes ..... 8
- 7 Cerci flattened ..... *P. fanjingshanense*
- Cerci cylindrical ..... *P. hainanense*
- 8 Cerci with spine-like appendage ..... 9
- Cerci lacking spine-like appendage ..... 10
- 9 Base of cerci with spine-like appendage ..... *P. guangdongense*
- Middle area of cerci with spine-like appendage ..... *P. laifanae* sp. n.
- 10 Cerci straight ..... *P. bouvieri* comb. n.
- Cerci curved upwards in second half ..... 11
- 11 Ninth abdominal tergum lacking elongate posterolateral angles ..... *P. bresseeli* sp. n.
- Ninth abdominal tergum with elongate posterolateral angles ..... 12
- 12 Posterior apices of alae not reaching sixth abdominal tergum ..... *P. tianmushanense*
- Posterior apices of alae reaching seventh abdominal tergum ..... *P. henanense*

**Key to females of *Parasinophasma***

- 1 Alae short, posterior apices not surpassing third abdominal tergum .... 2
- Alae long, posterior apices surpassing third abdominal tergum ..... 3
- 2 Occiput of head distinctly convex ..... *P. constanti* sp. n.
- Occiput of head weakly convex, nearly flattened ..... *P. luchunense luchunense* sp. n. and subsp. n.
- 3 Occiput of head weakly convex, nearly flattened ..... 4
- Occiput of head distinctly convex and elevated ..... 6
- 4 Body robust and stout ..... *P. unicolor*
- Body slender and elongate ..... 5
- 5 With ocelli between compound eyes ..... *P. liui* sp. n.
- Lacking ocelli between compound eyes ..... *P. sparsigranulatum* sp. n.
- 6 Occiput of head with four black longitudinal stripes ..... *P. fanjingshanense*
- Occiput of head lacking black longitudinal stripes ..... 7
- 7 Posterior apex of subgenital plate not reaching posterior margin of ninth abdominal tergum ..... *P. tianmushanense*
- Posterior apex of subgenital plate surpassing posterior margin of ninth abdominal tergum ..... 8
- 8 Profemora lacking maculations ..... 9
- Profemora with maculations ..... 10
- 9 Seventh abdominal sternum lacking noticeable praeopercular organ ..... *P. henanense*
- Seventh abdominal sternum with tubercle-like praeopercular organ posteromedially ..... *P. laifanae* sp. n.
- 10 Mesonotum densely granulated ..... *P. maculatum*
- Mesonotum sparsely granulated ..... *P. bresseeli* sp. n.

***Parasinophasma bouvieri* (Redtenbacher, 1908), comb. n.**

*Type material.*—Holotype ♂, Cho Moi, Tonkin (North Vietnam), III.1896, M. Roget (MNHN) [assessed by photos downloaded from Phasmida Species File Online (Brock et al. 2016)].

*Distribution.*—Vietnam (Tonkin/North Vietnam).

*Notes.*—This species is transferred from *Orthonecrosia*.

*Parasinophasma bresseeli* sp. n.

<http://zoobank.org/08169C61-6762-4DE6-A8F1-9B3129266A16>

Figs 1–4, 28–35

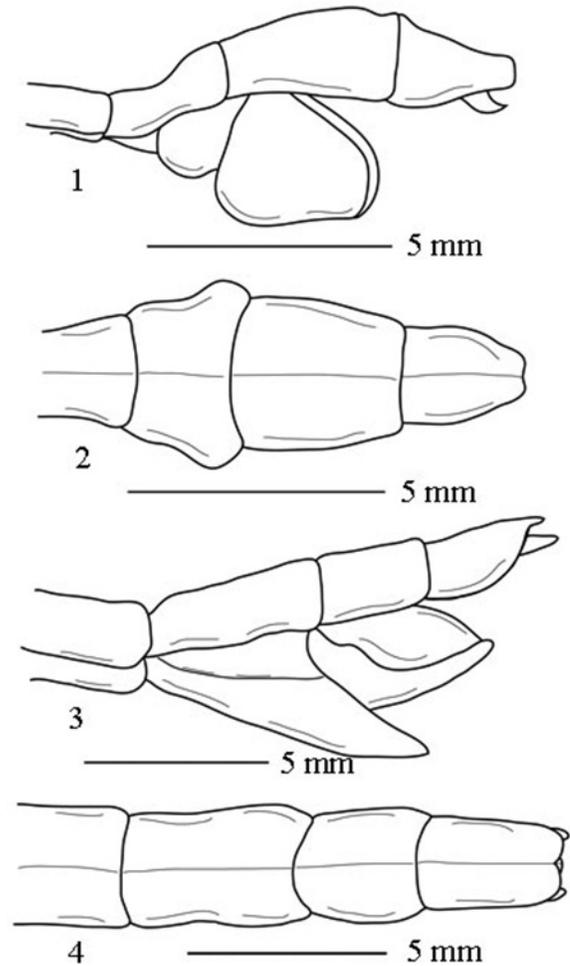
*Type material.*—Holotype ♂, 21° 31' N, 105° 33' E, Tam Dao National Park, Vietnam, 25–30.VII.2011, Joachim Bresseel and Jerome Constant (RBINS); Paratypes 2♂ and 3♀, 21° 31' N, 105° 33' E, Tam Dao National Park, Vietnam, 25–30.VII.2011, Joachim Constant and Jerome Bresseel (RBINS).

*Diagnosis.*—*Parasinophasma bresseeli* sp. n. is closely related to *P. henanense* (Bi & Wang, 1998), but can be separated by its large and bulky body in both sexes, lack of elongate posterolateral angles on the ninth abdominal tergum in males and sparsely granulated mesonotum in females.

*Description.*—Male (Figs 1–2, 28–30, 34): Medium-sized. Smaller and more slender than female. Head oblong, longer than wide, longer than head. Lacking granulation. Vertex flat, lacking ocelli. Occiput convex, with distinct median and lateral longitudinal furrows. Compound eyes big and rounded, length about one-and-a-half times that of genae. Antennae filiform, reaching fifth abdominal tergum, densely covered with short bristles; scapus flattened basally, longer than pedicellus; third segment as long as scapus. Pronotum lacking granulation, rectangular, longer than wide, shorter than head; anterior margin curved inwards, posterior margin rounded, transverse and longitudinal sulci crossing before middle point. Mesonotum sparsely granulated, shorter than combined length of pronotum, metanotum and median segment, moderately expanded posteriorly, median longitudinal line distinct. Mesopleurae and mesosternum with inconspicuous small granules. Metapleurae and metasternum lacking granulation. Abdomen lacking granulation. Parallel-sided from second to seventh tergites. Eighth tergum gently expanded posteriorly. Ninth tergum swollen, gently constricted posteriorly, longer than eighth tergum, lacking posterolateral angles. Anal segment roughly as long as eighth tergum, tapering posteriorly, with a small indistinct notch on posterior margin. Poculum cup-shaped, posterior margin rounded and reaching anterior margin of anal segment. Cerci short, tapering posteriorly, apices pointed, curved upwards and not surpassing posterior margin of anal segment. Legs sparsely covered with short bristles. Unarmed. Profemora curved basally, longer than combined length of pronotum and mesonotum. All tibiae roughly as long as corresponding femora. Tegmina oval, longer than or as long as head, posterior margin rounded. Alae long, posterior apices reaching posterior margin of sixth or seventh abdominal tergum.

*Coloration:* Head brown with blackish brown longitudinal stripes. Antennae dark brown. Thorax black, with brown longitudinal stripes. Abdomen black with brownish yellow maculations. Legs orange brown. Tegmina blackish brown, with yellowish brown veins. Costal region of alae blackish brown, with yellowish brown veins, anal segment uniformly gray.

*Female* (Figs 3–4, 31–33, 35): Medium-sized. Body elongate and slender, distinctly larger and more robust than male. Head oblong, longer than wide, lacking granulation. Vertex flat, lacking ocelli. Occiput conically convex, with distinct median and lateral



Figs 1–4. *Parasinophasma bresseeli* sp. n. 1. ♂, apex of abdomen, lateral view; 2. ♂, apex of abdomen, dorsal view; 3. ♀, apex of abdomen, lateral view; 4. ♀, apex of abdomen, dorsal view.

longitudinal furrows. Compound eyes small and rounded, length about three times that of genae. Antennae filiform, reaching third abdominal tergum, densely covered with short bristles; scapus flattened basally, shorter than third segment, longer than pedicellus. Pronotum lacking granulation, rectangular, longer than wide, shorter than head; anterior margin curved inwards, posterior margin rounded, transverse and longitudinal sulci crossing before middle point. Mesonotum sparsely covered with a few small black granules; as long as combined length of metanotum and median segment, parallel-sided, median longitudinal line distinct. Mesopleurae with a few small black granules marginally. Mesosternum sparsely and inconspicuously covered with minute granules. Metapleurae and metasternum lacking granulation. Abdomen cylindrical, tapering posteriorly, lacking granulation. Seventh tergum shorter than combined length of eighth and ninth tergites. Seventh sternum with an indistinct crest-like praeopercular organ posteromedially. Eighth tergum longer than ninth tergum. Anal segment longer than ninth tergum, with a small notch on posterior margin. Supra-anal plate small, posterior margin rounded. Subgenital plate scoop-shaped, apex reaching anterior area of anal segment. Gonapophyses not distinctly exposed, apex reaching anterior area of anal segment. Cerci short, cylindrical, apices pointed and surpassing posterior margin of anal segment. Legs sparsely

covered with short bristles. Unarmed. Profemora curved basally, as long as combined length of pronotum and mesonotum. All tibiae roughly as long as corresponding femora. Tegmina oval, longer than or as long as head, posterior margin rounded. Alae long, posterior apices reaching middle area of sixth abdominal tergum.

Coloration: General color of body brown. Head brown with black maculations. Antennae dark brown. Legs generally brown to greenish brown, profemora with darker maculations, mesofemora and metafemora uniformly colored. Tegmina and costal region of alae brown with grayish brown maculations. Anal region of alae gray with pale white spots.

**Measurements.**—(mm) Holotype ♂, Body length: 69, head: 3.5, antennae: lost, pronotum: 3, mesonotum: 9, metanotum including median segment: 8.5, profemora: 14, mesofemora: 10, metafemora: 15, protibiae: 13, mesotibiae: 9.5, metatibiae: 15, tegmina: 4, alae: 35. Paratypes ♂, Body length: 61–62, head: 3.5, antennae: 42–47, pronotum: 3, mesonotum: 9, metanotum including median segment: 8.5, profemora: 15, mesofemora: 11–12, metafemora: 17, protibiae: 15, mesotibiae: 11, metatibiae: 17–18, tegmina: 3.5–4, alae: 34–36. Paratypes ♀, Body length: 78–87, head: 5–5.5, antennae: 42–43, pronotum: 4, mesonotum: 11–12, metanotum including median segment: 11–13, profemora: 15–16, mesofemora: 11, metafemora: 15–16, protibiae: 14–16, mesotibiae: 9–10, metatibiae: 14–16, tegmina: 5–6, alae: 43–44.

**Distribution.**—Vietnam.

**Notes.**—The antennae of the holotypic male are lost and its measurements are insufficiently provided.

**Etymology.**—It is named in honor of Joachim Bresseel (Brussels, Belgium) for his discovery of this new species.

*Parasinophasma constanti* sp. n.

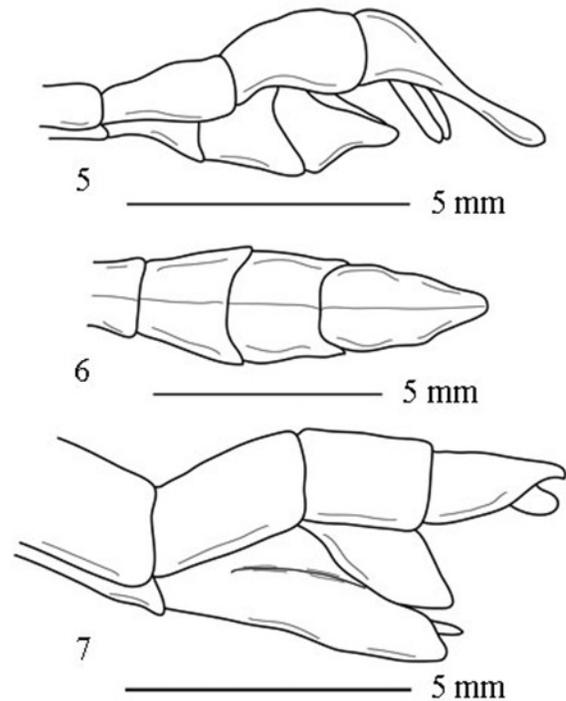
<http://zoobank.org/A8C86232-1C66-47BE-8C98-3586DFE064B5>

Figs 5–7, 36–43

**Type material.**—Holotype ♂, 22°36'N, 105°53'E, Pia Oac Mt. Nature Reserve, Vietnam, 4–6.VIII.2010, Jerome Constant and P. Limbourg (RBINS); Paratypes 1♂ and 1 subadult ♀, 22°36'N, 105°53'E, Pia Oac Mt. Nature Reserve, Vietnam, 4–6.VIII.2010, Jerome Constant and P. Limbourg (RBINS); 1♀, 22°21'00"N, 103°46'29"E, Hoang Lien National Park, Vietnam, 1–5.VII.2013, Joachim Bresseel and Jerome Constant (RBINS).

**Diagnosis.**—*Parasinophasma constanti* sp. n. is related to *P. luchunense luchunense* sp. n. and subsp. n., but can be separated by its posteriorly elongate anal abdominal segment in males and lack of noticeable praeopercular organs on the seventh abdominal sternum and short alae in females.

**Description.**—Male (Figs 5–6, 36–38, 42): Small size, smaller and more slender than female. Head oblong, longer than wide, lacking granulation. Vertex flat, lacking ocelli. Occiput convex, with distinct median and lateral longitudinal furrows. Compound eyes big and rounded, length about two times that of genae. Antennae filiform, reaching fourth abdominal tergum, densely covered with short bristles; scapus flattened basally, slightly longer than pedicellus; third segment as long as combined length of scapus and pedicellus. Pronotum lacking granulation, rectangular, longer



Figs 5–7. *Parasinophasma constanti* sp. n. 5. ♂, apex of abdomen, lateral view; 6. ♂, apex of abdomen, dorsal view; 7. ♀, apex of abdomen, lateral view.

than wide, shorter than head; anterior margin curved inwards, posterior margin rounded, transverse and longitudinal sulci crossing before middle point. Mesonotum densely granulated, with a short transverse carina near anterior area, both ends not reaching lateral margins; roughly as long as combined length of pronotum, metanotum and median segment, parallel-sided, median longitudinal line distinct. Mesopleurae, mesosternum, metapleurae and metasternum lacking granulation. Abdomen smooth, lacking granulation. Second to seventh tergites parallel-sided. Eighth tergum expanded posteriorly, slightly shorter than ninth tergum. Anal segment longer than ninth tergum, elongated and tapering posteriorly, apex obtuse. Poculum cup-shaped, tapering posteriorly, apex pointed and reaching anterior area of anal segment. Cerci cylindrical, straight, apices reaching middle area of anal segment. Legs sparsely covered with short bristles. Unarmed. Profemora indistinctly curved basally, shorter than combined length of head, pronotum and mesonotum. All tibiae roughly as long as corresponding femora. Tegmina small and oval, shorter than head, posterior margin truncate. Alae short, posterior apices reaching posterior margin of fifth abdominal tergum.

Coloration: General color of body yellowish brown. Antennae dark brown. Pronotum and mesonotum with a blackish mediolongitudinal stripe. Abdomen yellowish brown with blackish maculations. Legs generally black. Tegmina dark brown, with yellowish brown stripe on outer margin. Anal region of alae uniformly gray.

Female (Figs 7, 39–41, 43): Medium-sized. Distinctly larger than and more robust than male. Head oblong, longer than wide, lacking granulation. Vertex flat. Occiput conically convex, with distinct median and lateral longitudinal furrows. Compound eyes big and rounded, length about two-and-one-half times that of genae. Antennae filiform, reaching fourth abdominal tergum, sparsely covered with short bristles; scapus flattened basally, as long as third

segment, longer than pedicellus. Pronotum lacking granulation, rectangular, longer than wide, shorter than head; anterior margin curved inwards, posterior margin rounded, transverse and longitudinal sulci crossing before middle point. Mesonotum with a few small black granules; longer than combined length of pronotum, metanotum and median segment, parallel-sided, median longitudinal line distinct. Mesopleurae, metapleurae and metasternum lacking granulation. Mesosternum inconspicuously covered with a few minute granules. Abdomen cylindrical, tapering posteriorly, lacking granulation. Seventh tergum as long as combined length of eighth and ninth tergites. Seventh sternum lacking noticeable praeopercular organ. Eighth tergum slightly longer than ninth tergum. Anal segment as long as ninth tergum, with a deep V-shaped emargination on posterior margin. Supra-anal plate small. Subgenital plate scoop-shaped, apex reaching anterior area of anal segment. Gonapophyses exposed, apex reaching anterior area of anal segment. Cerci short, flattened, apices rounded and not surpassing posterior margin of anal segment. Legs sparsely covered with short bristles. Unarmed. Profemora distinctly curved basally, slightly longer than protibiae. Mesofemora slightly longer than mesotibiae, shorter than mesonotum. Tegmina oval, tapering anteriorly, posterior margin truncate, as long as pronotum. Alae short, posterior apices just reaching posterior margin of second abdominal tergum.

**Coloration:** General color of body brown. Legs brown with pale brown and black maculations. Tegmina brown. Alae brown with pale brown maculations.

**Measurements.**—(mm) Holotype ♂, Body length: 44, head: 3, antennae: 32, pronotum: 2.5, mesonotum: 9, metanotum including median segment: 6, profemora: 12, mesofemora: 9, metafemora: 13, protibiae: 11, mesotibiae: 8, metatibiae: 13, tegmina: 2, alae: 17. Paratype ♂, Body length: 44, head: 3, antennae: 22, pronotum: 2.5, mesonotum: 9, metanotum including median segment: 6, profemora: 13, mesofemora: 9, metafemora: 13, protibiae: 11, mesotibiae: 8, metatibiae: 12, tegmina: 2, alae: 17. Paratype ♀, Body length: 66, head: 4, antennae: 38, pronotum: 3, mesonotum: 13, metanotum including median segment: 7, profemora: 15, mesofemora: 10, metafemora: lost, protibiae: 14, mesotibiae: 9, metatibiae: lost, tegmina: 3, alae: 11.

**Distribution.**—Vietnam.

**Notes.**—The hind legs of the adult paratypic female are lost and their measurements are insufficiently provided.

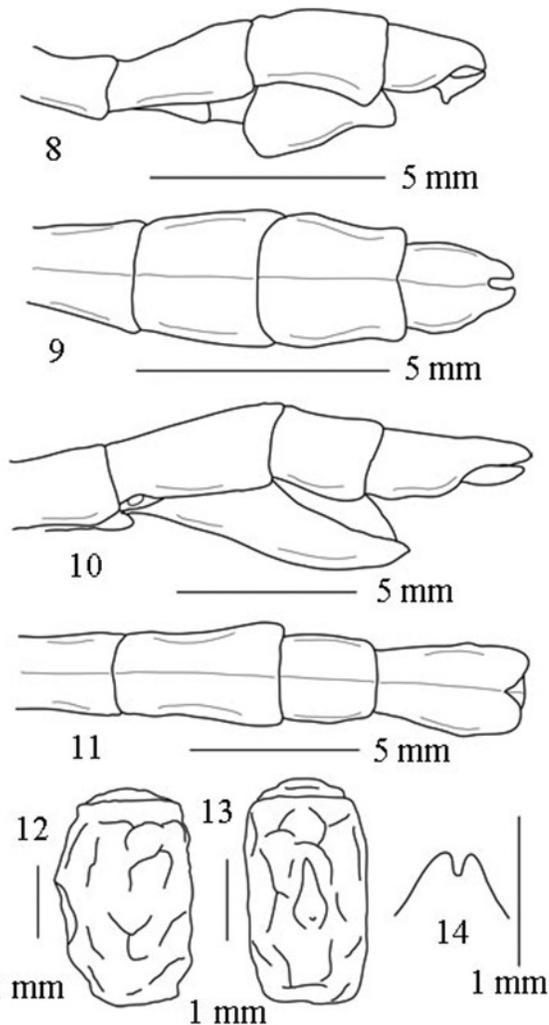
**Etymology.**—It is named in honor of Jérôme Constant (Brussels, Belgium) for his discovery of this new species.

***Parasinophasma laifanae* sp. n.**

<http://zoobank.org/5FC56E3D-2230-4EC5-A639-863553275CAD>

Figs 8–14, 44–51

**Type material.**—Holotype ♂, Fung Wong Shan, Lantau Island, Hong Kong, 20.VIII.2016, George Ho Wai-Chun (HKES); Paratypes 1♂ and 1♀, Fung Wong Shan, Lantau Island, Hong Kong, 20.VIII.2016, George Ho Wai-Chun (HKES); 5♂, 2♀ and 17 eggs (naturally laid by 1 paratype ♀), Fung Wong Shan, Lantau Island, Hong Kong, 16.IX.2016, George Ho Wai-Chun (HKES); 1♂, Fung Wong Shan, Lantau Island, Hong Kong, 4.VIII.2017, George Ho Wai-Chun (HKES); 2♂, 1♀ and 3 eggs (naturally laid by para-



**Figs 8–14.** *Parasinophasma laifanae* sp. n. 8. ♂, apex of abdomen, lateral view; 9. ♂, apex of abdomen, dorsal view; 10. ♀, apex of abdomen, lateral view; 11. ♀, apex of abdomen, dorsal view; 12. Egg, lateral view; 13. Egg, dorsal view; 14. ♂, vomer, ventral view.

type ♀), Fung Wong Shan, Lantau Island, Hong Kong, 7.IX.2017, George Ho Wai-Chun (HKES); 1♂, Fung Wong Shan, Lantau Island, Hong Kong, 9.X.2017, George Ho Wai-Chun (HKES); 1♂, Fung Wong Shan, Lantau Island, Hong Kong, 4.XI.2017, George Ho Wai-Chun (HKES).

**Diagnosis.**—*Parasinophasma laifanae* sp. n. is similar to *P. guangdongense* Chen & He, 2008, but can be distinguished by non-elongate ninth abdominal tergum and notched posterior margin on poculum in male. The female of *P. laifanae* sp. n. is similar to *P. henanense* (Bi & Wang, 1998), but can be easily separated by tubercle-like praeopercular organ on seventh abdominal sternum and basal elevations on anterodorsal, posterodorsal, anteroventral and posteroventral carinae of mesofemora and metafemora.

**Description.**—Male (Figs 8–9, 14, 44–46, 50): Medium-sized, more slender than female. Head oblong, longer than wide, lacking granulation. Vertex flat, lacking ocelli. Occiput distinctly convex, with distinct median and lateral longitudinal furrows. Compound eyes big and rounded, length about two times that

of genae. Antennae filiform, densely covered with short bristles; scapus flattened basally, longer than pedicellus; third segment almost as long as scapus. Pronotum with small and inconspicuous granulations, rectangular, longer than wide, shorter than head; anterior margin weakly curved inwards, nearly truncate, posterior margin rounded, transverse and longitudinal sulci crossing before middle point. Mesonotum sparsely covered with small granules, parallel-sided, median longitudinal carina distinct. Mesopleurae and mesosternum with small and inconspicuous granulation. Metapleurae and metasternum lacking granulation. Abdomen smooth, lacking granulation. Second to seventh tergites parallel-sided. Eighth tergum expanded posteriorly, as long as ninth tergum. Ninth tergum with distinct posterolateral angles. Anal segment shorter than ninth tergum, medially tapering posteriorly, posterior margin bifurcated. Epiproct small and indistinct, posterior margin truncate. Poculum cup-shaped, posterior margin notched and reaching anterior area of anal segment. Cerci with a small spine-like appendage near middle area; cylindrical, tapering posteriorly, apices curved inwards and reaching posterior margin of anal segment. Vomer minute, apical part fork-like, nearly symmetric, distinctly constricted apically, apex distinctly emarginated forming two slightly apically pointed lateral elevations, left elevation slightly larger than right elevation in anteroventral view. Legs sparsely covered with short bristles. Unarmed. Profemora distinctly curved basally. All tibiae roughly as long as corresponding femora. Tegmina small and oval, shorter than head, posterior margin truncate. Alae long, posterior apices reaching anterior margin of sixth abdominal tergum.

Coloration: General color of body brown. Scapus and pedicellus light brown, other antennal segments dark brown. Mesonotum marked with a black line on each side of lateral margins. Abdomen brown with blackish maculations. Profemora and protibiae dark brown with black maculations. Protarsi brown. Mesofemora, mesotibiae, mesotarsi, metafemora, metatibiae and metatarsi green with blackish apices. Tegmina light brown, with black and green maculations. Alae grayish brown with black maculations.

Female (Figs 10–11, 47–49, 51): Medium-sized. Body slender, distinctly larger and more robust than male. Head oblong, longer than wide, lacking granulation. Vertex flat. Occiput conically convex, with distinct median longitudinal furrow, lateral longitudinal furrows indistinct. Compound eyes rounded, length about three times that of genae. Antennae filiform, sparsely covered with short bristles; scapus flattened, longer than pedicellus; pedicellus as long as third segment. Pronotum with small and inconspicuous granulation, rectangular, longer than wide, shorter than head; anterior margin curved inwards, posterior margin rounded, transverse and longitudinal sulci crossing before middle point. Mesonotum covered with a few small black granules; roughly as long as combined length of metanotum and median segment, parallel-sided, median longitudinal line distinct, post-median area with a pair of obscurely elevated humps. Mesopleurae, mesosternum, metapleurae and metasternum sparsely covered with a few small granules. Abdomen cylindrical, lacking granulation. Second to sixth sternites with a small elevation posteromedially. Seventh sternum with distinct tubercle-like praeopercular organ posteromedially. Eighth tergum longer than anal segment. Ninth tergum shorter than eighth tergum. Anal segment longer than ninth tergum, with a small V-shaped emargination on posterior margin. Supra-anal plate small, posterior margin truncate. Subgenital plate scoop-shaped, apex pointed and reaching anterior area of anal segment. Gonapophyses not exposed, apex reaching posterior apex of subgenital plate. Cerci short, cylindrical, tapering apically and reach-

ing posterolateral angles of anal segment. Legs sparsely covered with short bristles. Unarmed. Profemora distinctly curved basally. Anterodorsal, posterodorsal, anteroventral and posteroventral carinae of mesofemora and metafemora weakly elevated basally. Tegmina oval, tapering anteriorly, posterior margin subtruncate, longer than pronotum. Alae long, posterior apices just reaching anterior margin of sixth abdominal tergum.

Coloration: General color of body grayish brown. Legs grayish brown with black maculations. Tegmina and alae grayish brown with pale brown and black maculations. Anal region of alae gray, with brown spots.

*Measurements.*—(mm) Holotype ♂, Body length: 68, head: 4, antennae: 50, pronotum: 3, mesonotum: 10.5, metanotum including median segment: 10, profemora: 18.5, mesofemora: 12, metafemora: 18, protibiae: 17, mesotibiae: 10.5, metatibiae: 17, tegmina: 4, alae: 34. Paratypes ♂, Body length: 64–72, head: 4, antennae: 48–52, pronotum: 3, mesonotum: 10–11, metanotum including median segment: 9–10, profemora: 18–20, mesofemora: 11.5–12, metafemora: 16.5–19.5, protibiae: 17–19, mesotibiae: 10–11, metatibiae: 17–18, tegmina: 4, alae: 33–35. Paratypes ♀, Body length: 87–92, head: 6, antennae: 45–47, pronotum: 4, mesonotum: 12–14, metanotum including median segment: 12–13, profemora: 18, mesofemora: 10–11, metafemora: 15–16, protibiae: 16–17, mesotibiae: 8.5–9, metatibiae: 14–15, tegmina: 6, alae: 42–44.

Eggs (Figs 12–13): Capsule black with minute granulations, strongly carinate; oval, tapering posteriorly, posterior pole rounded. Micropylar plate oval, anterior apex pointed, posterior apex rounded. Micropylar cup placed at posterior apex of micropylar plate. Median line short, about one-fourth of the length of micropylar plate, placed after micropylar cup. Operculum black with minute granulations, gently convex medially, marginally thickened.

*Measurements.*—(mm) Length: 3, width: 1.4, height: 1.6.

*Distribution.*—Hong Kong.

*Habitats.*—This species inhabits the middle level of evergreen broadleaf forests.

*Etymology.*—This new species is named in honor of Lee Lai-Fan (the co-discoverer of this new species from Hong Kong) for her constant support during the author's phasmid research.

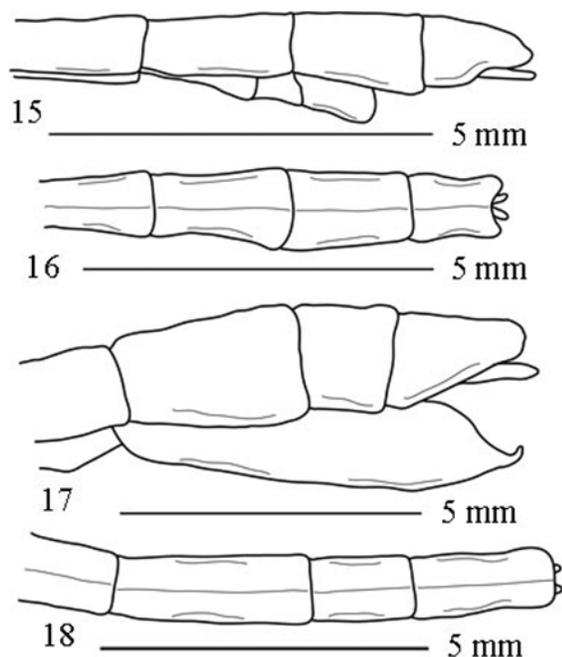
*Parasinophasma liui* sp. n.

<http://zoobank.org/E5A8FC13-A0AD-451A-9C84-25782AAC8E1B>

Figs 15–18, 52–59

*Type material.*—Holotype ♂, Bach Ma, Phu Loc, Thua Thien Hue Province, Vietnam, 27.IX.2011, Liu Xing-Yue (CAU); Paratypes 1♀, Bach Ma, Phu Loc, Thua Thien Hue Province, Vietnam, 27.IX.2011, Liu Xing-Yue (CAU); 1♂, Quang Nam Province, Vietnam, 6.V.2012, unknown collector (HKES).

*Diagnosis.*—The general appearance of *Parasinophasma liui* is slightly different from other members in the genus, but the characters of grayish brown coloration, elongate body and weakly elevated occiput of the head in both sexes, indistinctly elongate ninth abdominal tergum in male and non-exposed gonapophyses in female match with *Parasinophasma*. *P. liui* sp. n. is similar to



Figs 15–18. *Parasinophasma liui* sp. n. 15. ♂, apex of abdomen, lateral view; 16. ♂, apex of abdomen, dorsal view; 17. ♀, apex of abdomen, lateral view; 18. ♀, apex of abdomen, dorsal view.

*P. fanjingshanense* Chen & He, 2006, but can be distinguished by more slender and elongate body and oblong head in both sexes, non-granulated mesonotum in male and weakly convex occiput of head and elongate mesonotum in female.

**Description.**—Male (Figs 15–16, 52–54, 58): Medium-sized. Body very slender and slim. Head smooth, lacking granulation. Oblong, longer than wide, distinctly longer than and broader than pronotum. Vertex flat, with three distinct ocelli of equal size between compound eyes. Occiput weakly convex, median and lateral longitudinal furrows distinct. Compound eyes rounded, length about one-and-a-half times that of genae. Antennae filiform and long, sparsely covered with short bristles; scapus slightly flattened at base, longer than pedicellus, roughly as long as third segment. Pronotum lacking granulation, shorter than head, anterior margin incurved, posterior margin truncate, transverse and longitudinal sulci crossing before middle area. Mesonotum slender and elongate, longer than combined length of head, pronotum, metanotum and median segment, parallel-sided, median longitudinal line indistinct, lacking granulation. Mesopleurae, mesosternum, metapleurae and metasternum lacking granulation. Abdomen parallel-sided, very slender. Ninth tergum slightly longer than eighth tergum. Anal segment shorter than eighth tergum, with a small notch on posterior margin. Poculum small and short, cup-shaped, posterior margin rounded and reaching middle area of ninth tergum. Cerci cylindrical and straight, tapering posteriorly, apices pointed and surpassing posterior margin of anal segment. Legs sparsely covered with short bristles. Unarmed. Femora roughly as long as corresponding tibiae. Profemora curved at base, longer than combined length of head, pronotum and mesonotum. Protibiae longer than mesotibiae, shorter than metatibiae. Tegmina oval, as long as pronotum, posterior margin truncate. Alae longer than profemora, posterior apices reaching anterior area of fifth abdominal tergum.

Coloration: Dull coloration, body generally light brown. Head light brown with six faint blackish or grayish-brown longitudinal bands segregated by five light brown longitudinal stripes. Genae with a black postocular stripe. Antennae light brown. Pronotum light brown. Mesonotum, mesosternum, mesopleurae, metapleurae and metasternum light brown, with pale white and blackish brown maculations. Abdomen and legs light brown. Tegmina and alae brown with blackish brown maculations.

Female (Figs 17–18, 55–57, 59): Large size. Body slender and slim, distinctly larger and more robust than male. Head oblong, longer than wide, lacking granulation. Vertex flat, with three prominent ocelli between compound eyes, anterior ocellus smaller than two posterior ocelli. Occiput weakly convex, with distinct median and lateral longitudinal furrows. Compound eyes rounded, length about two-and-one-half times that of genae. Antennae filiform, sparsely covered with short bristles; scapus slightly flattened basally, longer than pedicellus; pedicellus as long as third segment. Pronotum lacking granulation, rectangular, longer than wide, shorter than head; anterior margin curved inwards, posterior margin rounded, transverse and longitudinal sulci crossing before middle point. Mesonotum with very few small black granules on the lateral margins; longer than combined length of pronotum, metanotum and median segment, median longitudinal line distinct. Mesopleurae, mesosternum, metapleurae and metasternum lacking granulation. Abdomen cylindrical, lacking granulation. Seventh sternum with weakly raised hump-like praeopercular organ posteromedially. Anal segment shorter than eighth tergum, longer than ninth tergum, with a small indistinct notch on posterior margin. Supranal plate indistinct. Subgenital plate scoop-shaped, apex pointed and reaching posterior area of anal segment. Gonapophyses not exposed. Cerci short, straight, cylindrical, apices pointed and just surpassing posterior margin of anal segment. Legs sparsely covered with short bristles. Unarmed. Femora roughly as long as corresponding tibiae. Profemora distinctly curved basally. Tegmina oval, tapering anteriorly, posterior margin rounded, longer than pronotum. Alae long, posterior apices reaching anterior area of fifth abdominal tergum.

Coloration: Dull coloration, body generally brown. Genae with blackish maculations. Antennae and pronotum brown. Mesonotum, mesosternum, mesopleurae, metapleurae, metasternum, abdomen and legs brown, with blackish brown maculations. Tegmina and alae brown with blackish brown maculations.

**Measurements.**—(mm) Holotype ♂, Body length: 62, head: 2.5, antennae: 51, pronotum: 2, mesonotum: 11, metanotum including median segment: 6, profemora: 16, mesofemora: 10, metafemora: 16, protibiae: 16, mesotibiae: 10, metatibiae: 18, tegmina: 1.5, alae: 28. Paratype ♂, Body length: 69, head: 2.5, antennae: 59, pronotum: 2, mesonotum: 12, metanotum including median segment: 8, profemora: 18, mesofemora: 12, metafemora: 18.5, protibiae: 17.5, mesotibiae: 11, metatibiae: 20, tegmina: 2, alae: 32. Paratype ♀, Body length: 100, head: 5, antennae: 56, pronotum: 3, mesonotum: 17, metanotum including median segment: 12, profemora: 18, mesofemora: 13, metafemora: 19, protibiae: 17, mesotibiae: 12, metatibiae: 20, tegmina: 4.5, alae: 48.

**Distribution.**—Vietnam.

**Etymology.**—It is named in honor of Liu Xing-Yue (Beijing, China) for his discovery of this new species.

*Parasinophasma luchunense luchunense* sp. n. and subsp. n.

<http://zoobank.org/4DDA211B-65A2-4CDC-928A-3811EFB8C4C5>

Figs 19–23, 60–67

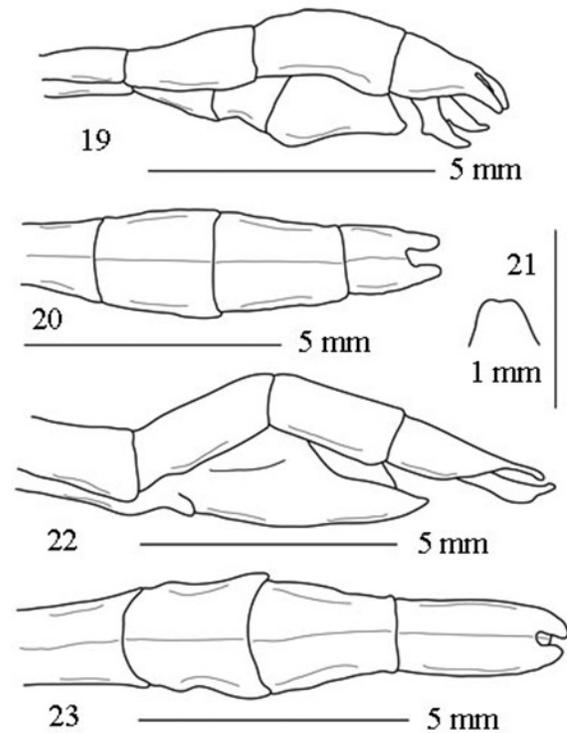
**Type material.**—Holotype ♂, 1300–1400m, Huanglianshan, Luchun, Yunnan Province, China, 6.IX.2016, George Ho Wai-Chun (HKES); Paratypes 2♂ and 2♀ (including 1 subadult), 1300–1400m, Huanglianshan, Luchun, Yunnan Province, China, 6.IX.2016, George Ho Wai-Chun (HKES).

**Diagnosis.**—*Parasinophasma luchunense* sp. n. and subsp. n. is distinctive from all other species in having a deep posterior emargination on anal abdominal segment in both sexes, spine-like appendage near the base of cerci in male and dorsoventrally flattened praeopercular organ on seventh abdominal sternum and short alae in female.

**Description.**—Male (Figs 19–21, 60–62, 66): Medium-sized. Body slender and slim. Head smooth, lacking granulation. Oblong, longer than wide, distinctly longer than and broader than pronotum. Vertex flat, lacking ocelli. Occiput gently convex, median and lateral longitudinal furrows distinct. Compound eyes rounded, length about two-and-one-half times that of genae. Antennae filiform and long, densely covered with short bristles, reaching seventh abdominal tergum; scapus flattened at base, longer than pedicellus, as long as third segment. Pronotum lacking granulation, shorter than head, anterior margin weakly curved inwards, posterior margin truncate, transverse and longitudinal sulci crossing before middle area. Mesonotum slender and elongate, longer than combined length of head, pronotum, metanotum and median segment, parallel-sided, median longitudinal line indistinct, sparsely covered with small granules. Mesopleurae, mesosternum, metapleurae and metasternum lacking granulation. Abdomen parallel-sided. Ninth tergum swollen and elongate, longer than eighth tergum. Anal segment shorter than ninth tergum, with a deep V-shaped emargination on posterior margin. Poculum cup-shaped, posterior margin broad and truncate. Cerci with a small spine-like appendage near base; cylindrical, tapering posteriorly, apices pointed and curved upwards, not surpassing posterior margin of anal segment. Vomer minute, almost symmetric, gently constricted apically, apex weakly emarginated forming two indistinct lateral elevations in anteroventral view. Legs sparsely covered with short bristles. Unarmed. Profemora curved at base, longer than combined length of head, pronotum and mesonotum. Protibiae longer than mesotibiae and as long as metatibiae. Tegmina oval, as long as pronotum, posterior margin rounded. Alae short, shorter than profemora, posterior apices reaching middle area of fourth abdominal tergum.

**Coloration:** Dull coloration, body generally greenish brown. Head greenish brown. Genae with two faint black postocular stripes. Antennae dark brown. Pronotum brown, with three short blackish brown stripes behind transverse sulcus. Mesonotum greenish brown, with a narrow black longitudinal stripe along lateral margins. Mesosternum, mesopleurae, metapleurae and metasternum brown. Abdomen brown with black maculations. Forelegs brown, midlegs and hindlegs green. Tegmina and alae brown with blackish maculations. Anal region of alae gray.

**Female** (Figs 22–23, 63–65, 67): Medium-sized. Body slender, distinctly more robust than male. Head oblong, longer than wide, lacking granulation. Vertex flat. Occiput gently convex, with indistinct median and lateral longitudinal furrows. Compound eyes rounded, length about four times that of genae. Antennae filiform, sparsely covered with short bristles; scapus flattened basally,



Figs 19–23. *Parasinophasma luchunense luchunense* sp. n. and subsp. n. 19. ♂, apex of abdomen, lateral view; 20. ♂, apex of abdomen, dorsal view; 21. ♂, vomer, ventral view; 22. ♀, apex of abdomen, lateral view; 23. ♀, apex of abdomen, dorsal view.

longer than pedicellus; pedicellus as long as third segment. Pronotum lacking granulation, rectangular, longer than wide, shorter than head; anterior margin incurved, posterior margin rounded, transverse and longitudinal sulci crossing before middle point. Mesonotum covered with a few small black granules; longer than combined length of pronotum, metanotum and median segment, parallel-sided, median longitudinal line indistinct. Mesopleurae, mesosternum, metapleurae and metasternum lacking granulation. Abdomen cylindrical, lacking granulation. Seventh sternum with dorsoventrally flattened praeopercular organ posteromedially, posterior margin obtuse. Eighth tergum longer than ninth tergum. Anal segment as long as ninth tergum, with a deep U-shaped emargination on posterior margin. Supra-anal plate small, posterior margin rounded, not surpassing posterolateral angles of anal segment. Subgenital plate scoop-shaped, apex pointed and not reaching middle area of anal segment. Gonapophyses not exposed. Cerci short, flattened, just surpassing posterolateral angles of anal segment. Legs sparsely covered with short bristles. Unarmed. Profemora distinctly curved basally. Mesofemora longer than mesotibiae, shorter than mesonotum. Tegmina oval, posterior margin rounded, as long as pronotum. Alae short, posterior apices only reaching posterior area of third abdominal tergum.

**Coloration:** General color of body greenish brown. Forelegs brown with black maculations, midlegs and hindlegs green. Tegmina and alae brown with blackish maculations. Anal region of alae light brown with gray spots.

**Measurements.**—(mm) Holotype ♂, Body length: 57, head: 3, antennae: 51, pronotum: 2, mesonotum: 13, metanotum including median segment: 5.5, profemora: 18, mesofemora: 11, metafemora: 17,

protibiae: 18, mesotibiae: 11, metatibiae: 17, tegmina: 2, alae: 13. Paratypes ♂, Body length: 57–58, head: 3, antennae: 50–53, pronotum: 2, mesonotum: 12.5–13, metanotum including median segment: 5.5, profemora: 17–17.5, mesofemora: 10.5–11, metafemora: 15.5, protibiae: 17–17.5, mesotibiae: 10.5, metatibiae: 16, tegmina: 2, alae: 12–13. Paratype ♀, Body length: 67, head: 4, antennae: 41, pronotum: 3, mesonotum: 14, metanotum including median segment: 7.5, profemora: 14, mesofemora: 9, metafemora: 14, protibiae: 13, mesotibiae: 8, metatibiae: 13, tegmina: 2.5, alae: 14.

*Habitats*.—This species is found in evergreen broadleaf forests between 1300 and 1400 meters above sea level.

*Distribution*.—China.

*Notes*.—The specimen of the subadult female is not in good condition. Therefore, the descriptions, illustrations and measurements of females are only given for the adults.

*Etymology*.—This new species is named after the type locality, Luchun (Yunnan, China).

*Parasinophasma luchunense xingyuei* subsp. n.

<http://zoobank.org/DCAB9182-59C3-456B-9C14-F04A1B19F014>  
Figs 24–25, 68

*Type material*.—Holotype: ♂, Xeo My Ty, Sa Pa, Lao Cai Province, Vietnam, 17.IX.2011, Liu Xing-Yue (CAU).

*Diagnosis*.—*Parasinophasma luchunense xingyuei* subsp. n. is closely related to *P. luchunense luchunense* sp. n. and subsp. n., but can be separated by its slightly larger size, deep V-shaped emargination on the posterior margin of anal abdominal segment and longer alae.

*Description*.—Male (Figs 24–25, 68): Medium-sized. General structure resembles the nominate race but comparatively larger. Head and thorax as in nominate race. Abdomen as in nominate race, but anal segment with deeply V-shaped emargination on posterior margin. Posterior margin of poculum not reaching anterior margin of anal segment. Cerci as in nominate race. Legs as in nominate race. Tegmina as in nominate race. Alae short, shorter than profemora, posterior apices reaching middle area of fourth abdominal tergum.

*Coloration*: Dull coloration, body generally brown. Head brown, with four faint longitudinal bands segregated by five light brown longitudinal stripes. Genae with two black postocular stripes. Antennae dark brown. Pronotum brown, with two short blackish brown longitudinal stripes behind transverse sulcus. Mesonotum brown, darker than pronotum, with a narrow black longitudinal stripe along lateral margins. Mesosternum dark brown. Mesopleurae, metapleurae and metasternum brown. Abdomen brown with black maculations. Legs greenish brown. Tegmina and alae dark brown.

*Measurements*.—(mm) Holotype ♂, Body length: 60, head: 3, antennae: 57, pronotum: 2.5, mesonotum: 13.5, metanotum including median segment: 6, profemora: 20, mesofemora: 13, metafemora: 18, protibiae: 19, mesotibiae: 12, metatibiae: 19, tegmina: 2.5, alae: 17.

*Distribution*.—Vietnam.

*Notes*.—The female is unknown.

*Etymology*.—This species is named in honor of Liu Xing-Yue (Beijing, China) for his discovery of this new subspecies.

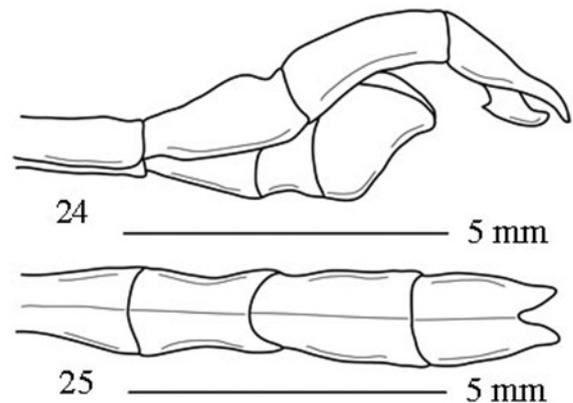
*Parasinophasma sparsigranulatum* sp. n.

<http://zoobank.org/C74BEA4E-4ADA-45AB-83DF-DD0C823565B0>  
Figs 26–27, 69–71

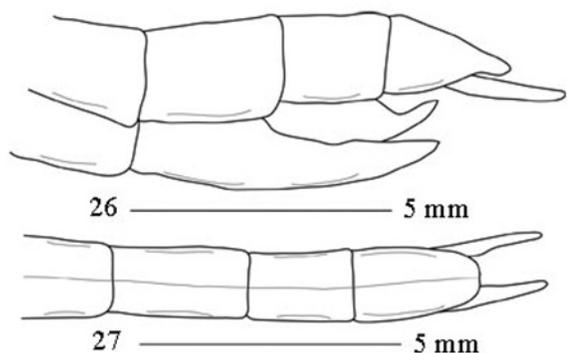
*Type material*.—Holotype: ♀, Giang Ly, Lac Duong, Lam Dong Province, Vietnam, 12.V.2012, Liu Xing-Yue (CAU).

*Diagnosis*.—*Parasinophasma sparsigranulatum* sp. n. is readily separated from all other species by its small size, slender body, very sparse granulations on mesonotum and lack of a noticeable praepoculum organ on the seventh abdominal sternum.

*Description*.—Female (Figs 26–27, 69–71): Small size. Body slender. Head oval, gently constricted anteriorly, lacking granulation. Vertex flat, lacking ocellus. Occiput weakly convex, with distinct median and lateral longitudinal furrows. Compound eyes oval, length about two times that of genae. Antennae filiform, incomplete, apices not surpassing apices of protarsi, sparsely covered with short bristles; scapus flattened basally, longer than pedicellus, as long as third segment. Pronotum with sparse granulations, rectangular, longer than



Figs 24–25. *Parasinophasma luchunense xingyuei* subsp. n. 24. ♂, apex of abdomen, lateral view; 25. ♂, apex of abdomen, dorsal view.



Figs 26–27. *Parasinophasma sparsigranulatum* sp. n. 26. ♀, apex of abdomen, lateral view; 27. ♀, apex of abdomen, dorsal view.



Figs 28–43. *Parasinophasma* spp. 28. *P. bresseeli* sp. n.: ♂, habitus; 29. *P. bresseeli* sp. n.: ♂, apex of abdomen, lateral view; 30. *P. bresseeli* sp. n.: ♂, apex of abdomen, dorsal view; 31. *P. bresseeli* sp. n.: ♀, habitus; 32. *P. bresseeli* sp. n.: ♀, apex of abdomen, lateral view; 33. *P. bresseeli* sp. n.: ♀, apex of abdomen, dorsal view; 34. *P. bresseeli* sp. n.: ♂, head and thorax, dorsolateral view; 35. *P. bresseeli* sp. n.: ♀, head and thorax, dorsolateral view; 36. *P. constanti* sp. n.: ♂, habitus; 37. *P. constanti* sp. n.: ♂, apex of abdomen, lateral view; 38. *P. constanti* sp. n.: ♂, apex of abdomen, dorsal view; 39. *P. constanti* sp. n.: ♀, habitus; 40. *P. constanti* sp. n.: ♀, apex of abdomen, lateral view; 41. *P. constanti* sp. n.: ♀, apex of abdomen, dorsal view; 42. *P. constanti* sp. n.: ♂, head and thorax, dorsolateral view; 43. *P. constanti* sp. n.: ♀, head and thorax, dorsolateral view.

wide, shorter than head; anterior margin truncate, posterior margin rounded, transverse and longitudinal sulci just crossing before middle point. Mesonotum covered with very sparse granules, parallel-sided, longer than combined length of pronotum, metanotum and

median segment, median longitudinal carina distinct. Mesopleurae with sparse granulations. Mesosternum, metapleurae and metasternum lacking granulations. Abdomen cylindrical, smooth. Seventh sternum lacking noticeable praeopercular organ. Eighth tergum



Figs 44–59. *Parasinophasma* spp. 44. *P. laifanae* sp. n.: ♂, habitus; 45. *P. laifanae* sp. n.: ♂, apex of abdomen, lateral view; 46. *P. laifanae* sp. n.: ♂, apex of abdomen, dorsal view; 47. *P. laifanae* sp. n.: ♀, habitus; 48. *P. laifanae* sp. n.: ♀, apex of abdomen, lateral view; 49. *P. laifanae* sp. n.: ♀, apex of abdomen, dorsal view; 50. *P. laifanae* sp. n.: ♂, head and thorax, dorsolateral view; 51. *P. laifanae* sp. n.: ♀, head and thorax, dorsolateral view; 52. *P. liui* sp. n.: ♂, habitus; 53. *P. liui* sp. n.: ♂, apex of abdomen, lateral view; 54. *P. liui* sp. n.: ♂, apex of abdomen, dorsal view; 55. *P. liui* sp. n.: ♀, habitus; 56. *P. liui* sp. n.: ♀, apex of abdomen, lateral view; 57. *P. liui* sp. n.: ♀, apex of abdomen, dorsal view; 58. *P. liui* sp. n.: ♂, head and thorax, dorsolateral view; 59. *P. liui* sp. n.: ♀, head and thorax, dorsolateral view.

longer than ninth tergum. Anal segment almost as long as eighth tergum, with a minute and indistinct emargination on posterior margin. Supra-anal plate indistinct. Subgenital plate scoop-shaped, tapering posteriorly, apex pointed and reaching middle area of anal segment. Gonapophyses not exposed. Cerci long and straight, flattened, tapering posteriorly, apices pointed and surpassing posterior margin of anal segment. Legs sparsely covered with short bristles. Unarmed. All femora as long as corresponding tibiae. Profemora distinctly curved basally. Mesofemora longer than mesotibiae, shorter than mesonotum. Tegmina oval, posterior margin rounded, longer than pronotum. Alae short, posterior apices reaching anterior area of sixth abdominal tergum.

Coloration: General color of body yellowish brown. Legs yellowish brown. Tegmina and alae yellowish brown with green posterior area. Alae yellowish brown with green posterior area, anal region pale white with brown veins.

*Measurements*.—(mm) Holotype ♀, Body length: 49, head: 3, antennae: 32 (incomplete), pronotum: 2.5, mesonotum: 10, metanotum including median segment: 6.5, profemora: 15.5, mesofemora: 10.5, metafemora: 14, protibiae: 15.5, mesotibiae: 9.5, metatibiae: 14, tegmina: 4.5, alae: 21.

*Distribution*.—Vietnam.



**Figs 60–71.** *Parasinophasma* spp. 60. *P. luchunense luchunense* sp. n. and subsp. n.: ♂, habitus; 61. *P. luchunense luchunense* sp. n. and subsp. n.: ♂, apex of abdomen, lateral view; 62. *P. luchunense luchunense* sp. n. and subsp. n.: ♂, apex of abdomen, dorsal view; 63. *P. luchunense luchunense* sp. n. and subsp. n.: ♀, habitus; 64. *P. luchunense luchunense* sp. n. and subsp. n.: ♀, apex of abdomen, lateral view; 65. *P. luchunense luchunense* sp. n. and subsp. n.: ♀, apex of abdomen, dorsal view; 66. *P. luchunense luchunense* sp. n. and subsp. n.: ♂, head and thorax, dorsolateral view; 67. *P. luchunense luchunense* sp. n. and subsp. n.: ♀, head and thorax, dorsolateral view; 68. *P. luchunense xingyueni* subsp. n.: ♂, habitus; 69. *P. sparsigranulatum* sp. n.: ♀, habitus; 70. *P. sparsigranulatum* sp. n.: ♀, apex of abdomen, lateral view; 71. *P. sparsigranulatum* sp. n.: ♀, apex of abdomen, dorsal view.

**Notes.**—The male is unknown. The description of the coloration is based on the dried specimen which is probably a green species in nature based on the green posterior area of the tegmina and alae.

**Etymology.**—The specific epithet of this new species is derived from the sparse granulations on the mesonotum.

### Discussion and conclusions

*Parasinophasma* Chen & He, 2008 is mainly distributed over China and Vietnam (Table 1). *Parasinophasma* is closely related to *Sinophasma* Günther, 1940, but can be separated by grayish or greenish-brown coloration, more slender and elongate body, elevated occiput of the head, and posteriorly emarginated anal abdominal segment. Recently, a new Necrosciinae genus, *Ovacephala* Seow-Choen, 2016, has been established based on two species, *O. extraordinaria* (Redtenbacher, 1908) and *P. parisae* Seow-Choen, 2016. Both of them occur in Borneo and *P. parisae* can also be

found in Peninsular Malaysia. However, *O. parisae*, which strongly resembles the females of *P. bresseeli* sp. n., *P. constanti* sp. n., *P. henanense* (Bi & Wang, 1998) and *P. laifanae* sp. n., should be a member of *Parasinophasma*. Therefore, further material of *O. parisae*, especially corresponding male and eggs produced by female, are needed to clarify its taxonomic status.

Currently, a total of 14 species and two subspecies are recognized from *Parasinophasma*. Nine species and one subspecies, *P. fanjingshanense* Chen & He, 2006, *P. guangdongense* Chen & He, 2008, *P. hainanense* Chen & He, 2008, *P. henanense* Bi & Wang, 1998, *P. laifanae* sp. n., *P. luchunense luchunense* sp. n. and subsp. n., *P. maculatum* Ho, 2015, *P. tianmushanense* Ho, 2015 and *P. unicolor* Ho, 2015, occur in China while other taxa, *P. bowieri* (Redtenbacher, 1908) comb. n., *P. bresseeli* sp. n., *P. constanti* sp. n., *P. liui* sp. n., *P. luchunense xingyuei* subsp. n., and *P. sparsigranulatum* sp. n., occur in Vietnam. The diversification of the species of *Parasinophasma* in China and Vietnam seems to relate to the extremely complex topography, where the discontinuous mountainous areas or isolated is-

Table 1. Distribution of *Parasinophasma* Chen & He, 2008.

Species	China													Vietnam						
	Fujian	Guangdong	Guangxi	Guizhou	Hainan	Henan	Hubei	Hunan	Jiangxi	Sichuan	Yunnan	Zhejiang	Chongqing	Hong Kong	Cao Bang	Lao Cai	Lam Dong	Thua Thien Hue	Tonkin (North Vietnam)	Vinh Phuc
<i>P. bouvieri</i>																			✓	
<i>P. bresseeli</i> sp. n.																				✓
<i>P. constanti</i> sp. n.															✓	✓				
<i>P. fanjingshanense</i>			✓	✓			✓		✓			✓	✓							
<i>P. guangdongense</i>		✓																		
<i>P. hainanense</i>					✓															
<i>P. henanense</i>			✓	✓		✓		✓	✓		✓									
<i>P. laifanae</i> sp. n.														✓						
<i>P. liui</i> sp. n.																		✓		
<i>P. luchunense luchunense</i> sp. n. and subsp. n.											✓									
<i>P. luchunense xingyuei</i> subsp. n.																✓				
<i>P. maculatum</i>											✓									
<i>P. sparsigranulatum</i> sp. n.																	✓			
<i>P. tianmushanense</i>												✓								
<i>P. unicolor</i>	✓																			

lands can stimulate speciation. Most taxa have been recorded from isolated localities, such as *P. hainanense* in Hainan Island, South China; *P. guangdongense* in Nanling mountainous area, Guangdong, South China; *P. liui* sp. n. in Thua Thien Hue, Central Vietnam; *P. unicolor* in Liangyeshan, Fujian, East China and *P. sparsigranulatum* sp. n. in Lam Dong, South Vietnam. Also, *P. luchunense xingyuei* subsp. n. in Lao Cai, North Vietnam is closely related to the nominate *P. luchunense luchunense* sp. n. and subsp. n. in Yunnan, Southwest China. Speciation of both taxa may be induced by the disconnection of different hills on the same mountainous range between southwestern China and northern Vietnam. By contrast, two taxa, *P. fanjingshanense* and *P. henanense*, are quite widely distributed over the central to southern mountainous range of continental China. Further collecting trips to various localities in China and Vietnam may discover more taxa for this genus. In addition, the discovery of *P. laifanae* sp. n. represents the first record of *Parasinophasma* from Hong Kong and the twentieth Phasmatodea species for the region (Ho 2013, 2017). The Vietnamese taxa also represent the first record of *Parasinophasma* from Vietnam.

A total of eight new taxa including six new species and two new subspecies are proposed in this study. The taxonomic status of some new taxa may need further verification. For example, the female of *P. luchunense xingyuei* subsp. n. and the male and egg of *P. sparsigranulatum* sp. n. are unknown. Also, the appearance of *P. liui* sp. n. looks slightly different from other taxa in the genus, but the grayish-brown coloration, elongate body and weakly elevated occiput of head in both sexes, indistinctly elongate ninth abdominal tergum in male and non-exposed gonapophyses in female match with *Parasinophasma*. Further specimens collected from the type-locality are needed to verify the taxonomic placement of these taxa.

The findings of this study also have significance regarding other proposed species and clades in the Phasmatodea. Redtenbacher (1908: 553) originally placed *P. bouvieri* (Redtenbacher, 1908) comb. n. in *Ocellata* Redtenbacher, 1908, which is a syno-

nym of *Orthonecrosia* Kirby, 1904, (Karny 1923: 242). Later, Otte and Brock (2005: 238) transferred it to *Orthonecrosia*. This species clearly shows the features of *Parasinophasma*, including the general greenish brown coloration, slender body and legs, swollen and elongate ninth abdominal tergum and greenish brown wings, and is transferred from *Orthonecrosia*.

Although there is no record of *Parasinophasma* outside of China and Vietnam, potential populations of the genus can possibly be found in other countries in the Indochinese area, such as Laos, Cambodia, Myanmar and Thailand. Further research should be conducted to contribute to our knowledge on the distribution pattern of these lesser known phasmids in the Oriental region.

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