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Contents

Cover photograph: *Eristalinus obliquus* male, photo by Kelvin Wu Ka-Lun.

Contribution to the knowledge of Chinese Phasmatodea XII: Four new species of *Interphasma* Chen & He, 2008 from Yunnan, China (Phasmatidae: Clitumninae: Medaurini)

George Ho Wai-Chun

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

ABSTRACT

Four new species of *Interphasma* Chen & He, 2008 are described from Yunnan, China. They are namely, *Interphasma indistinctum* **sp. nov.**, *Interphasma pusillum* **sp. nov.**, *Interphasma robustum* **sp. nov.** and *Interphasma yunnanense* **sp. nov.** A checklist of the species and a key to the species of *Interphasma* in Yunnan are provided.

Key words: Stick insects, *Interphasma*, China, new species

中國蜫目之新知XII：中國雲南介蜫屬四新種（蜫科：克蜫亞科：莫蜫族）

何維俊
香港九龍中央郵政信箱73749號

摘要：本文記述中國介蜫屬四新種：弱脊介蜫 *Interphasma indistinctum* **sp. nov.**、小介蜫 *Interphasma pusillum* **sp. nov.**、粗介蜫 *Interphasma robustum* **sp. nov.** 及雲南介蜫 *Interphasma yunnanense* **sp. nov.**；並編制了雲南介蜫屬名錄及分種檢索表。

關鍵字：竹節蟲，介蜫屬，中國，新種

INTRODUCTION

The genus *Interphasma* Chen & He, 2008 is the most speciose genus in the tribe Medaurini Hennemann & Conle, 2008 (Chen and He, 2008; Ho, 2017a). This genus is easily characterised by the small size and the unarmed body and legs from other genera in the tribe. Currently, 18 species and two subspecies are recognised in this genus (Chen and He, 2008; Chen and Zhang, 2008; Xu et al., 2010; Ho and Shi, 2013; Ho, 2017a, 2020a; Li et al., 2021; Brock et al., 2022).

This study is the twelfth of the series on the Contribution to the knowledge of Chinese Phasmatodea. The previous contributions I–XI contain descriptions of 97 new taxa (11 new genera, 73 new species and 13 new subspecies) and suggestions of 26 new nomenclatures (25 new combinations and one new synonym) from the subfamilies Clitumninae, Dataminae, Necrosciinae, Lonchodinae and Xeroderinae (Ho, 2013a, 2013b, 2016, 2017a, 2017b, 2020b, 2021a, 2021b, 2021c, 2021d, 2021e). This paper is a supplementary to Ho (2017a) and four new Chinese *Interphasma* species are described following collecting trips by the author. After these additions, 22 species and two subspecies are currently attributed to the genus *Interphasma*.

MATERIALS & METHODS

The morphological terms follow Bragg (2001), Zompro (2004) and Bradler (2009). Ootaxonomic descriptions refer to Clark (1976a, 1976b, 1979), Sellick (1988, 1997, 1998; = Clark, J.T.) and Zompro (2004). Measurements are given in millimetres (mm). The types are deposited in Hong Kong Entomological Society, Hong Kong, China (HKES) and Shanghai Entomological Museum, Chinese Academy of Sciences, Shanghai, China (SEM).

RESULTS

Phasmatidae Gray, 1835

Clitumninae Brunner von Wattenwyl, 1893

Medaurini Hennemann & Conle, 2008

Interphasma Chen & He, 2008

Type-species: *Interphasma lushanense* Chen & He, 2008: 329, by original designation.

Description: Small to medium-sized Medaurini. Apterous. Body unarmed in both sexes, slender in male and robust in female; rough, with sparse and small granulations which may be absent in the male of some species. Head oblong. Occiput flat. Antennae distinctly segmented, shorter than profemora. Thorax slender. Abdomen cylindrical. Seventh sternum with distinct praeopercular organ in most species in female. Anal segment tectiform in female, distinctly dilated into two semi-tergites in male. Supra-anal plate small or indistinct in female. Cerci short. Legs slender and unarmed. Profemora curved basally.

Description: China (Gansu, Guangxi, Guizhou, Jiangxi, Shaanxi, Sichuan, Xinjiang and Yunnan) and Vietnam.

Notes: A total of eight species and two subspecies are currently known in Yunnan. A checklist of the species and a key to the species of *Interphasma* in Yunnan are provided.

Species included in Yunnan, China:

1.1. *Interphasma elongatum elongatum* Ho, 2017 長臀介蜫 長臀亞種

1.2. *Interphasma elongatum parvum* Ho, 2017 長臀介蜫 短小亞種

2. *Interphasma huanglianshanense* Ho, 2017 黃連山介蜫

3. *Interphasma indistinctum* **sp. nov.** 弱脊介螽
4. *Interphasma marginatum* Chen & Zhang, 2008 黑緣介螽
5. *Interphasma nigrolineatum* Chen & He, 2008 黑條介螽
6. *Interphasma pusillum* **sp. nov.** 小介螽
7. *Interphasma robustum* **sp. nov.** 粗介螽
8. *Interphasma yunnanense* **sp. nov.** 雲南介螽

Key to the species of *Interphasma* from Yunnan, China:

Male:

1. Anal abdominal segment with pointed apices in lateral view. **2**
- Anal abdominal segment with obtuse apices in lateral view. **6**

2. Poculum with a strongly elevated median hump. . . . . . . *I. nigrolineatum*
- Poculum with a weakly elevated median hump. **3**

3. Body slender and long. . *I. indistinctum* **sp. nov.**
- Body robust and short. **4**

4. Apices of cerci surpassing middle area of anal abdominal segment. . *I. huanglianshanense*
- Apices of cerci not surpassing middle area of anal abdominal segment. . . . **5**

5. Body slender, body length longer than 50 mm. . . . . *I. elongatum elongatum*
- Body robust, body length shorter than 50 mm. . . . . *I. elongatum parvum*

6. Large size, body length longer than 40 mm. . . . . *I. marginatum*
- Small size, body length shorter than 40 mm. **7**

7. Upper margin of semi anal abdominal segments moderately curved downwards in lateral view. . . . . *I. yunnanense* **sp. nov.**
- Upper margin of semi anal abdominal segments strongly curved downwards in lateral view. . **8**

8. Body length shorter than 32 mm, body comparatively slender. . . *I. pusillum* **sp. nov.**
- Body length longer than 32 mm, body comparatively robust. . . . *I. robustum* **sp. nov.**

Female:

1. Seventh abdominal sternum lacking noticeable praeopercular organ. . . . **2**
- Seventh abdominal sternum with distinct praeopercular organ. . . . **3**

2. Body slender, body length longer than 50 mm. . . . . *I. elongatum elongatum*
- Body robust, body length shorter than 50 mm. . . . . *I. elongatum parvum*

3. Posteromedian area of seventh abdominal sternum with cylindrical praeopercular organ. . **4**
- Posteromedian area of seventh abdominal sternum with dorsoventrally flattened praeopercular organ.**5**

4. Seventh abdominal sternum with short praeopercular organ, posterior apex not reaching anterior area of eighth tergum. . *I. marginatum*
- Seventh abdominal sternum with long praeopercular organ, posterior apex reaching anterior area of eighth tergum. . . . *I. indistinctum* **sp. nov.**

5. Body length shorter than 40 mm. . . . . *I. pusillum* **sp. nov.**
- Body length longer than 40 mm. . . **6**

6. Posteromedian area of seventh abdominal sternum with apically rounded praeopercular organ. . . . . *I. robustum* **sp. nov.**
- Posteromedian area of seventh abdominal sternum with apically pointed praeopercular organ. . . . . *I. huanglianshanense*

***Interphasma indistinctum* sp. nov.** (Figs. 1-4, 25-28, 41)

Types: Holotype, ♂, 2000m, Kunming, Yunnan, China, 30 May 2018, George Ho Wai-Chun (HKES); Paratypes: 2♂, 1♀, same data as holotype ♂ (HKES); 1♂, 2000m, Kunming, Yunnan, China, 5 June 2018, George Ho Wai-Chun (HKES); 3♂, 1 immature ♀, 2000m, Kunming, Yunnan, China, 23 June 2019, George Ho Wai-Chun (HKES).

Differentiation: *Interphasma indistinctum* **sp. nov.** is closely related to *I. lizipingense* Ho & Shi, 2013, but differs in the numbers of antennal segments (male with 21 segments and female with 16 segments) and indistinct longitudinal carinae on the abdomen in both sexes, the sparsely granulated thorax and the distinctly curved upper margin of semi anal abdominal segments in the male and the minutely notched posterior margin of anal abdominal segment and thick-built and horn-like praeopercular organ on the posteromedian area of seventh abdominal sternum in the female.

Description of male (Figs. 1-2, 25, 27): Small size. Body slender and slim. General colour of body brown and legs brown with small blackish markings.

Head: Oval, longer than pronotum, with a few small granules. Vertex with two indistinct elevations between compound eyes. Occiput flat, median longitudinal furrow distinct, lateral furrows indistinct. Genae with a blackish postocular band. Compound eyes small and rounded, its length about four times that of genae. Antennae short, reaching subapical area of profemora, with 21 segments; scapus flattened and constricted at base, median longitudinal carina indistinct, shorter than combined length of pedicellus and third segment, longer than third segment; pedicellus shorter than third segment.

Thorax: Sparsely covered with a few small granules. Pronotum rectangular, longer than wide, anterior margin gently curved inwards, posterior margin nearly truncate, transverse and longitudinal sulci crossing at middle point. Mesonotum broadly emarginated medially, with small pits along lateral margins. Metanotum longer than median segment, with small pits along lateral margins.

Abdomen: With small and sparse granules, also with indistinct median and lateral longitudinal carinae. Median segment trapezoidal, gently expanded posteriorly. Parallel-sided from second to seventh tergites. Eighth tergum gently expanded posteriorly. Second to seventh tergites with a few small pits along lateral margins. Eighth tergum longer than ninth tergum. Anal segment elongated posteriorly, longer than eighth tergum, dilated into two semi-tergites, moderately tapering posteriorly, apices pointed in lateral view. Inner margins of semi-

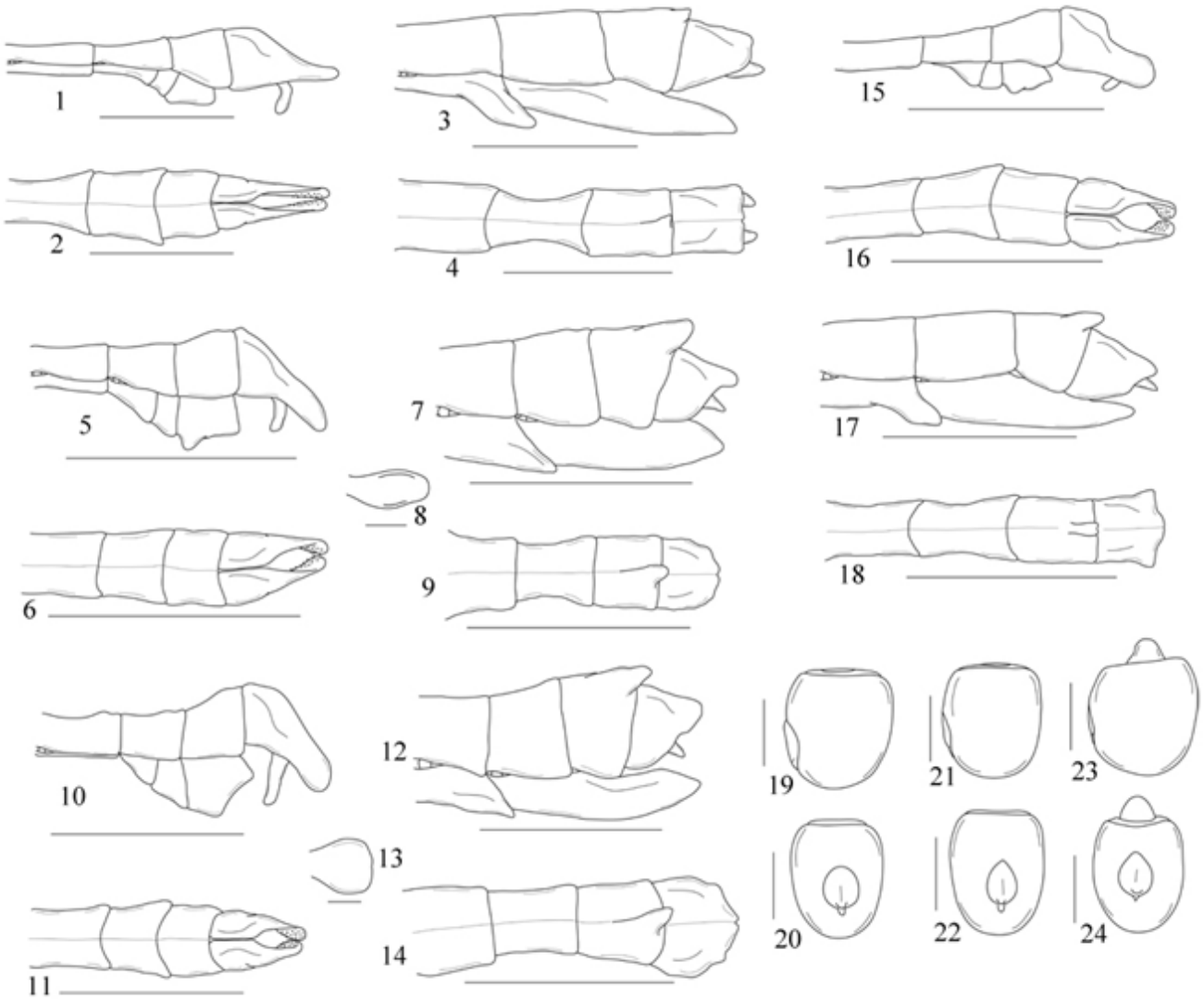

Figure 1-24. *Interphasma* spp. 1. *Interphasma indistinctum* **sp. nov.**, male, apex of abdomen, lateral view. 2. *Interphasma indistinctum* **sp. nov.**, male, apex of abdomen, dorsal view. 3. *Interphasma indistinctum* **sp. nov.**, female, apex of abdomen, lateral view. 4. *Interphasma indistinctum* **sp. nov.**, female, apex of abdomen, dorsal view. 5. *Interphasma pusillum* **sp. nov.**, male, apex of abdomen, lateral view. 6. *Interphasma pusillum* **sp. nov.**, male, apex of abdomen, dorsal view. 7. *Interphasma pusillum* **sp. nov.**, female, apex of abdomen, lateral view. 8. *Interphasma pusillum* **sp. nov.**, female, praeopercular organ, ventral view. 9. *Interphasma pusillum* **sp. nov.**, female, apex of abdomen, dorsal view. 10. *Interphasma robustum* **sp. nov.**, male, apex of abdomen, lateral view. 11. *Interphasma robustum* **sp. nov.**, male, apex of abdomen, dorsal view. 12. *Interphasma robustum* **sp. nov.**, female, apex of abdomen, lateral view. 13. *Interphasma robustum* **sp. nov.**, female, praeopercular organ, ventral view. 14. *Interphasma robustum* **sp. nov.**, female, apex of abdomen, dorsal view. 15. *Interphasma yunnanense* **sp. nov.**, male, apex of abdomen, lateral view. 16. *Interphasma yunnanense* **sp. nov.**, male, apex of abdomen, dorsal view. 17. *Interphasma yunnanense* **sp. nov.**, female, apex of abdomen, lateral view. 18. *Interphasma yunnanense* **sp. nov.**, female, apex of abdomen, dorsal view. 19. *Interphasma pusillum* **sp. nov.**, egg, lateral view. 20. *Interphasma pusillum* **sp. nov.**, egg, dorsal view. 21. *Interphasma robustum* **sp. nov.**, egg, lateral view. 22. *Interphasma robustum* **sp. nov.**, egg, dorsal view. 23. *Interphasma yunnanense* **sp. nov.**, egg, lateral view. 24. *Interphasma yunnanense* **sp. nov.**, egg, dorsal view. Scale bars: apex of abdomen = 5 mm; egg = 1 mm. Drawings by author.

tergites weakly curved inwards in dorsal view, with minute teeth; upper margin gently curved downwards in lateral view, lower margin weakly curved upwards in lateral view. Poculum cup-shaped, with a small elevation medially, posterior margin rounded and reaching anterior area of anal segment. Cerci short, flattened, curved inwards, apices swollen and rounded.

Legs: Very slender and long. Unarmed. All femora thicker than corresponding tibiae. Profemora curved basally.

Description of female (Figs. 3-4, 26, 28): Small size. Body slender, distinctly larger and more robust than male. General colour of body brown and legs brown with small blackish markings.

Head: Oval, longer than pronotum. Sparsely covered with small granules and interspersed with a few enlarged granules. Occiput moderately convex, with distinct median longitudinal furrow, lateral furrows and posterior swellings indistinct. Genae with an inconspicuous blackish postocular band. Compound eyes oval, its length about four times that of genae. Antennae with short bristles, reaching middle area of profemora, with 16 segments; scapus dorsoventrally flattened, basally constricted, distinctly carinate mediolongitudinally, longer than third segment; pedicellus shorter than third segment.

Thorax: Rough, wrinkled, covered with small granules and interspersed with a few enlarged granules. Pronotum trapezoidal, gently expanded posteriorly, anterior margin curved inwards, posterior margin truncate, transverse and longitudinal sulci just crossing after middle point. Mesonotum gently expanded posteriorly, median longitudinal line distinct. Metanotum longer than median segment.

Abdomen: Cylindrical, gradually tapering posteriorly. Covered with small granules and interspersed with a few enlarged granules, also with indistinct median and lateral longitudinal carinae. Median segment wider than long. Seventh sternum with a horn-like praeopercular organ on posteromedian area, distinctly elongated posteriorly, tapering apically, apex pointed. Eighth tergum longer than ninth tergum. Ninth tergum with a small crest posteromedially. Anal segment shorter than ninth tergum, with a minute notch posteromedially. Supra-anal plate indistinct. Subgenital plate scoop-shaped, mediolongitudinally carinate, posterior margin pointed and reaching posterior area of anal segment. Cerci short, apices pointed and surpassing posterior margin of anal segment.

Legs: Slender and long. Unarmed. Femora thicker than corresponding tibiae. Profemora curved at base.

Measurements: See Table 1.

Distribution: China (Yunnan).

Notes: The measurements are only given to the adults.

Etymology: The specific epithet of this new species is derived from the indistinct longitudinal carinae on the abdomen in both sexes.

***Interphasma pusillum* sp. nov.** (Figs. 5-9, 19-20, 29-32, 41)

Types: Holotype, ♂, 2400m, Xinping, Yuxi, Yunnan, China, 24 June 2019, George Ho Wai-Chun (HKES); Paratypes, 9♂, 11♀, 47 eggs, same data as holotype ♂ (HKES).

Differentiation: *Interphasma pusillum* **sp. nov.** is the shortest and smallest *Interphasma*. It is closely related to *I. robustum* **sp. nov.**, but can be separated by its small size in both sexes, the comparatively slender body, the shorter cerci and the comparatively moderate curved downwards upper and lower margins of semi

	Holotype Male	Paratype Males	Paratype Female
Body	45.0	42.0-44.0	47.0
Head	2.5	2.5	3.5
Antennae	13.0	11.0	8.0
Pronotum	2.0	2.0	2.5
Mesonotum	9.0	8.0-9.0	10.0
Metanotum	4.5	4.0-4.5	6.0
Median segment	1.5	1.5	2.0
Cerci	1.0	1.0	1.0
Profemora	21.0	20.0-21.0	19.0
Mesofemora	14.0	12.0-13.5	12.0
Metafemora	19.0	16.0-18.0	17.0
Protibiae	25.0	20.0-23.0	21.0
Mesotibiae	15.0	13.0-14.5	13.0
Metatibiae	23.0	19.0-21.0	20.0

Table 1. Measurements of *Interphasma indistinctum* **sp. nov.**

anal abdominal segments in the male and the apically constricted and pointed praeopercular organ on the posteromedian area of seventh abdominal sternum in the female.

Description of male (Figs. 5-6, 29, 31): Small size. Body slender. General colour of body brown and legs brown with small blackish markings.

Head: Oval, as long as pronotum, with sparse and small granules. Vertex with two obscure elevations between compound eyes. Occiput flat, median longitudinal furrow distinct, lateral furrows indistinct. Compound eyes small and oval, its length about two-and-one-half times that of genae. Genae with a blackish postocular band. Antennae short, reaching subapical area of profemora, with 17 to 18 segments; scapus flattened and constricted at base, median longitudinal carina distinct, as long as third segment; pedicellus shorter than third segment.

Thorax: Sparsely covered with a very few small granules. Pronotum rectangular, longer than wide, anterior margin distinctly curved inwards, posterior margin truncate, transverse and longitudinal sulci crossing at middle point. Mesonotum broadly emarginated medially, longer than combined length of metanotum and median segment, with a few small pits along lateral margins. Metanotum longer than median segment, with a few small pits along lateral margins.

Abdomen: Sparsely covered with a very few granules. Median segment trapezoidal, expanded posteriorly. Second to seventh tergites parallel-sided, with a few small pits along lateral margins. Eighth tergum gently expanded posteriorly, as long as ninth tergum. Anal segment elongated posteriorly, longer than ninth tergum, dilated into two semi-tergites, tapering posteriorly, inner margins gently curved in dorsal view; apices obtuse in lateral view, with a few minute teeth. Semi-tergites with strongly curved downwards upper margin and lower margin in lateral view. Poculum cup-shaped, with a small elevation basally, posterior margin rounded and reaching anterior area of anal segment. Cerci flattened, with an indistinct elevation near base, distinctly curved inwards, apices rounded.

Legs: Slender and long. Unarmed, sparsely covered with short bristles. All femora thicker than corresponding tibiae. Profemora curved basally.

Description of female (Fig. 7-9, 30, 32): Small size. Body robust, distinctly more robust than male. General colour of body brown and legs brown with small blackish

Figures 25-28. *Interphasma indistinctum* **sp. nov.** 25. Male, habitus. 26. Female, habitus. 27. Male, head and thorax, dorsolateral view. 28. Female, head and thorax, dorsolateral view. Scale bars = 5 mm. Photos by author.

Figures 29-32. *Interphasma pusillum* **sp. nov.** 29. Male, habitus. 30. Female, habitus. 31. Male, head and thorax, dorsolateral view. 32. Female, head and thorax, dorsolateral view. Scale bars = 5 mm. Photos by author.

markings.

Head: Oval, longer than pronotum. Sparsely covered with small granules and interspersed with a few enlarged granules. Occiput moderately convex, with distinct median longitudinal furrow, lateral furrows and posterior swellings indistinct. Genae with an inconspicuous blackish postocular band. Compound eyes oval, its length about two times that of genae. Antennae short, with short bristles, reaching subapical area of profemora, with 13 to 14 segments; scapus dorsoventrally flattened, basally constricted, distinctly carinate mediolongitudinally, longer than third segment; pedicellus shorter than third segment.

Thorax: Rough, wrinkled, with small granules and interspersed with a few enlarged granules. Pronotum trapezoidal, gently expanded posteriorly, anterior margin curved inwards, posterior margin truncate, transverse and longitudinal sulci just crossing at middle point. Mesonotum gently expanded posteriorly, median longitudinal line distinct. Metanotum wider than long, longer than median segment.

Abdomen: Cylindrical, tapering posteriorly, with small granules and interspersed with a very few enlarged granules. Median segment wider than long. Seventh sternum with a dorsoventrally and basally flattened praeopercular organ on posteromedian area, elongated posteriorly, tapering apically, apex pointed and reaching anterior area of anal segment. Ninth tergum longer than eighth tergum, with a small crest posteromedially. Anal segment shorter than ninth tergum, posterior margin rounded, with a small notch medially. Supra-anal plate indistinct. Subgenital plate scoop-shaped, mediolongitudinally carinate, tapering posteriorly, apex pointed and reaching posterior margin of anal segment. Cerci short, flattened, tapering apically, apices pointed and not surpassing posterior margin of anal segment.

Legs: Slender and long. Unarmed. Femora thicker than corresponding tibiae. Profemora curved at base.

Measurements: See Table 2.

Description of egg (Figs. 19-20): Capsule brown, surface rough, densely punctuated; oval, posterior pole rounded. Micropylar plate oval, tapering and pointed apically. Micropylar cup placed at posterior margin of micropylar plate. Median line short, placed behind micropylar cup, about one-fifth length of micropylar plate. Operculum centrally depressed.

Measurements: Length, 1.6 mm; width, 1.3-1.4 mm; height, 1.0 mm.

Distribution: China (Yunnan).

Etymology: The specific epithet of this new species is derived from from the small size of both sexes.

***Interphasma robustum* sp. nov.** (Figs. 10-14, 21-22, 33-36, 41)

Types: Holotype, ♂, 2000m, Xinping, Yuxi, Yunnan, China, 23 June 2019, George Ho Wai-Chun (HKES); Paratypes, 2♀, 16 eggs, same data as holotype ♂ (HKES).

Differentiation: *Interphasma robustum* **sp. nov.** is similar to *I. huanglianshanense* Ho, 2017, but can be separated by the presence of a distinct median hump on poculum and the strongly curved downwards upper and lower margins of semi anal abdominal segments in the male and the absence of triangularly expanded posterolateral angles on seventh abdominal tergum and the rounded posterior margin of praeopercular organ on the posteromedian area of seventh abdominal sternum in the female.

Description of male (Figs. 10-11, 33, 35): Small size. Body slender and slim. General colour of body brown and legs brown with small blackish markings.

Head: Oval, as long as pronotum, with a few small

	Holotype Male	Paratype Males	Paratype Females
Body	31.0	28.0-31.0	27.0-31.0
Head	2.0	2.0	2.5-3.0
Antennae	7.0	7.0-8.0	5.0-6.0
Pronotum	2.0	2.0	2.0
Mesonotum	6.0	5.0-6.0	5.0-6.0
Metanotum	3.0	3.0	2.5-3.0
Median segment	1.5	1.0-1.5	1.0
Cerci	0.8	0.8	0.5
Profemora	14.0	12.0-14.0	9.5-11.5
Mesofemora	8.0	7.0-8.0	6.0-7.0
Metafemora	11.0	9.0-11.0	8.0-10.0
Protibiae	15.5	13.0-15.0	10.5-13.0
Mesotibiae	8.5	7.0-8.5	6.0-7.5
Metatibiae	13.0	10.5-13.0	8.0-11.0

Table 2. Measurements of *Interphasma pusillum* **sp. nov.**

granules. Vertex with two obscure elevations between compound eyes. Occiput flat, occipital furrows indistinct. Genae with a blackish postocular band. Compound eyes rounded, its length about two times that of genae. Antennae short, apices reaching subapical area of profemora, with 18 segments; scapus flattened and constricted basally, median longitudinal carina distinct, as long as combined length of pedicellus and third segment; pedicellus shorter than third segment.

Thorax: Sparsely covered with a few small granules. Pronotum with rounded posterior margin, anterior margin curved inwards. Mesonotum slender and elongate, gently expanded posteriorly, lateral margins with a few small pits. Metanotum longer than median segment, with a few small pits along lateral margins.

Abdomen: Sparsely covered with a few granules. Median segment rectangular, wider than long. Parallel-sided from second to seventh tergites. Eighth tergum gently expanded posteriorly. Second to eighth tergites with a few small pits along lateral margins. Eighth tergum as long as than ninth tergum. Anal segment elongated posteriorly, longer than ninth tergum, dilated into two distinct semi-tergites, tapering posteriorly. Inner margins of semi-tergites curved inwards in dorsal view, apices rounded with a few minute teeth; upper and lower margins strongly curved downwards. Poculum cup-shaped, with a rounded hump basally, posterior margin rounded and reaching anterior area of anal segment. Cerci with an indistinct elevation near base, curved inwards, apices rounded and reaching middle area of semi-tergites.

Legs: Very slender and long. Distinctly unarmed, only sparsely covered with short bristles. All femora thicker than corresponding tibiae. Profemora curved basally.

Description of female (Fig. 12-14, 34, 36): Small size. Body robust, distinctly larger and more robust than male. General colour of body brown and legs brown with small blackish markings.

Head: Oval, longer than pronotum. Sparsely covered with small granules and interspersed with a few enlarged granules. Occiput moderately convex, with indistinct median longitudinal furrow, posterior swellings indistinct. Genae with a blackish postocular band. Compound eyes oval, its length about two times that of genae. Antennae with short bristles, reaching middle area of profemora, with 15 segments; scapus dorsoventrally flattened, basally constricted, distinctly carinate mediolongitudinally, longer than pedicellus; pedicellus shorter than third segment.

Thorax: Rough, densely covered with small granules and interspersed with a few enlarged granules. Pronotum trapezoidal, gently expanded posteriorly, anterior margin gently curved inwards, posterior margin truncate, transverse and longitudinal sulci just crossing

Figures 33-36. *Interphasma robustum* **sp. nov.** 33. Male, habitus. 34. Female, habitus. 35. Male, head and thorax, dorsolateral view. 36. Female, head and thorax, dorsolateral view. Scale bars = 5 mm. Photos by author.

Figures 37-40. *Interphasma yunnanense* **sp. nov.** 37. Male, habitus. 38. Female, habitus. 39. Male, head and thorax, dorsolateral view. 40. Female, head and thorax, dorsolateral view. Scale bars = 5 mm. Photos by author.

after middle point. Mesonotum gently expanded posteriorly, median longitudinal line distinct. Metanotum square sized, longer than median segment.

Abdomen: Cylindrical, gradually tapering posteriorly. Densely covered with small granules and interspersed with a few enlarged granules. Median segment wider than long. Seventh sternum with dorsoventrally flattened praeopercular organ on posteromedian area, posterior margin rounded. Eighth tergum almost as long as ninth tergum. Ninth tergum with a small crest posteromedially. Anal segment shorter than ninth tergum, with rounded posterior margin. Supra-anal plate indistinct. Subgenital plate scoop-shaped, mediolongitudinally carinate, tapering posteriorly, posterior margin pointed and reaching posterior area of anal segment. Cerci short, apices pointed and not surpassing posterior margin of anal segment.

Legs: Slender and long. Unarmed. All femora thicker than corresponding tibiae. Profemora curved at base.

Measurements: See Table 3.

Description of egg (Figs. 21-22): Capsule brown, surface rough, densely punctuated; oval, posterior pole rounded. Micropylar plate oval, rounded anteriorly. Micropylar cup placed at posterior margin of micropylar plate. Median line short, placed behind micropylar cup, about one-fifth length of micropylar plate. Operculum centrally depressed.

Measurements: Length, 1.6-1.7 mm; width, 1.4 mm; height, 1.4 mm.

Distribution: China (Yunnan).

Etymology: The specific epithet of this new species is derived from from the robust body of both sexes.

***Interphasma yunnanense* sp. nov.** (Figs. 15-18, 23-24, 37-41)

Types: Holotype, ♂, 2300m, Weishan, Dali, Yunnan, China, 3 June 2018, George Ho Wai-Chun (HKES); Paratypes, 9♂, 7♀, same data as holotype ♂ (HKES); 3♂, 4♀, 2450-2580m, Weibaoshan, Weishan, Dali, Yunnan, China, 7 July 2017, Bi Wen-Xuan (SEM); 10♂, 13♀, 11 eggs, 2000m, Nanjian, Dali, Yunnan, China, 2 June 2018, George Ho Wai-Chun (HKES).

Differentiation: *Interphasma yunnanense* **sp. nov.** is related to *I. robustum* **sp. nov.**, but can be separated by its slender and elongate body in both sexes, the straight lower margin of semi anal abdominal segments in the male and the apically blunt praeopercular organ on the posteromedian area of seventh abdominal sternum in the female.

Description of male (Figs. 15-16, 37, 39): Small size. Body slender and slim. General colour of body brown and legs brown with small and obscure blackish markings.

Head: Oval, longer than pronotum, with a few small granules. Vertex with two obscure elevations between compound eyes. Occiput flat, median longitudinal furrow distinct, lateral furrows indistinct. Genae with a black postocular band. Compound eyes small and rounded, its length about three times that of genae. Antennae short, reaching subapical area of profemora, with 17 to 18 segments; scapus flattened and constricted at base, median longitudinal carina distinct, shorter than third segment, longer pedicellus.

Thorax: Sparsely covered with a few small granules. Pronotum rectangular, longer than wide, anterior margin gently curved inwards, posterior margin truncate, transverse and longitudinal sulci crossing at middle point. Mesonotum gently expanded posteriorly after post-median area, with a few small pits along lateral

	Holotype Male	Paratype Females
Body	36.0	36.0-42.0
Head	2.0	3.5-4.0
Antennae	8.0	7.0
Pronotum	2.0	3.0
Mesonotum	7.0	7.5-8.5
Metanotum	4.0	3.0-4.0
Median segment	1.5	1.5-2.0
Cerci	1.0	0.5
Profemora	13.0	13.5-14.0
Mesofemora	8.0	8.0
Metafemora	11.0	10.0-11.0
Protibiae	14.0	13.5-16.0
Mesotibiae	8.0	8.5
Metatibiae	12.0	12.0-13.0

Table 3. Measurements of *Interphasma robustum* **sp. nov.**

margins. Metanotum longer than median segment, with a few small pits along lateral margins.

Abdomen: Covered with a few small granules. Median segment trapezoidal, gently expanded posteriorly. Parallel-sided from second to seventh tergites. Eighth tergum gently expanded posteriorly. Second to seventh tergites with a few small pits along lateral margins. Eighth tergum as long as ninth tergum. Anal segment elongated posteriorly, longer than ninth tergum, dilated into two semi-tergites, moderately tapering posteriorly, medially emarginated in lateral view. Inner margins of semi-tergites gently curved inwards in dorsal view, apices blunt, with a few minute teeth; lower margin straight in lateral view. Poculum cup-shaped, posterior margin rounded, reaching posterior area of ninth tergum. Cerci short, flattened, curved inwards, apices swollen and rounded.

Legs: Slender and long. Unarmed. All femora thicker than corresponding tibiae. Profemora curved basally.

Description of female (Fig. 17-18, 38, 40): Small size. Body slender, distinctly larger and more robust than male. General colour of body brown and legs brown with small blackish markings.

Head: Oval, longer than pronotum. Sparsely covered with small granules and interspersed with a few enlarged granules. Occiput moderately convex, with distinct median longitudinal furrow, lateral furrows and posterior swellings indistinct. Genae with an inconspicuous blackish postocular band. Compound eyes oval, its length about four times that of genae. Antennae with short bristles, reaching middle area of profemora, with 14 to 16 segments; scapus dorsoventrally flattened, basally constricted, distinctly carinate mediolongitudinally, longer than third segment; pedicellus shorter than third segment.

Thorax: Rough, wrinkled, covered with small granules and interspersed with a few enlarged granules. Pronotum trapezoidal, gently expanded posteriorly, anterior margin curved inwards, posterior margin truncate, transverse and longitudinal sulci just crossing at middle point. Mesonotum gently expanded posteriorly, median longitudinal line distinct. Metanotum longer than median segment.

Abdomen: Cylindrical, gradually tapering posteriorly. Rough, wrinkled, covered with small granules. Median segment wider than long. Seventh sternum with a short horn-like praeopercular organ on posteromedian area, gently elongated posteriorly, tapering apically, apex blunt. Eighth tergum longer than ninth tergum. Ninth tergum with a small crest posteromedially. Anal segment as long as ninth tergum, with an indistinct notch posteromedially, also with two lateral emarginations, posterolateral angles distinct and pointed. Supra-anal plate indistinct. Subgenital plate scoop-shaped, mediolongitudinally carinate, tapering posteriorly, posterior margin rounded and reaching posterior area of anal segment. Cerci short, apices pointed and not surpassing posterior margin of anal segment.

Legs: Slender and long. Unarmed. Femora thicker than corresponding tibiae. Profemora curved at base.

Measurements: See Table 4.

Description of egg (Figs. 23-24): Capsule brownish gray, surface rough, densely granulated; oval, posterior pole rounded. Micropylar plate oval, tapering and pointed apically. Micropylar cup placed at posterior margin of micropylar plate. Median line short, placed behind micropylar cup, about one-fourth length of micropylar plate. Operculum centrally elevated with an apically blunt and closed capitulum.

Measurements: Length, 1.6 mm; width, 1.4 mm; height, 1.4 mm.

	Holotype Male	Paratype Males	Paratype Females
Body	37.0	32.0-39.0	34.0-44.0
Head	2.5	2.0-2.5	2.5-3.5
Antennae	11.0	8.0-12.0	6.0-8.0
Pronotum	2.0	2.0	2.0-2.5
Mesonotum	7.5	6.5-8.5	6.5-9.0
Metanotum	4.0	3.5-4.0	3.0-4.5
Median segment	1.0	1.0	1.0-2.0
Cerci	0.8	0.8	0.5
Profemora	15.0	13.0-17.0	11.0-17.0
Mesofemora	9.0	8.0-10.0	7.0-10.0
Metafemora	13.0	12.0-14.5	10.0-14.0
Protibiae	16.0	15.0-20.0	12.0-19.0
Mesotibiae	10.0	9.0-12.0	7.0-12.0
Metatibiae	14.0	13.0-17.5	10.5-16.0

Table 4. Measurements of *Interphasma pusillum* **sp. nov.**

Distribution: China (Yunnan).

Etymology: The specific epithet of this new species is derived from from the type locality, Yunnan, China.

CONCLUSION

In this study, four new species of *Interphasma* are described from Yunnan, China. A total of eight species and two subspecies are currently known in Yunnan (Fig. 41). *Interphasma* is principally restricted to China and there is only one species described from Vietnam (Chen and He, 2008; Ho, 2017a, 2020a). Yunnan and Sichuan are the provinces with high species diversity of *Interphasma* and eight and six species are found respectively (Table 5). The complex and discontinuous mountainous areas in Yunnan and Sichuan can stimulate speciation by geographic isolation. Further collecting specimens in various localities in Yunnan and Sichuan can discover more new taxa for the genus. Molecular study can help advance the understanding of their phylogenetic relationship.

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REFERENCES

Bradler, S., 2009. Die Phylogenie der Stab- und Gespenstschrecken (Insecta: Phasmatodea). *Species, Phylogeny and Evolution* 2: 3-139.

Bragg, P.E., 2001. *Phasmids of Borneo*. Natural History Publications (Borneo), Kota Kinabalu. 772pp.

Brock, P.D., Büscher, T. and Baker, E., 2022. *Phasmida Species File Online*. *Version 5.0/5.0*. Available from http://phasmida.speciesfile.org/HomePage/Phasmida/HomePage.aspx, accessed on 1 October 2022.

Brunner von Wattenwyl, K., 1893. Révision du Système des Orthoptères et description des espèces rapportées par M. Leonardo Fea de Birmanie. *Annali del Museo Civico di storia naturale Giacomo Doria, Genova* (2)13(33): 1-230.

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

Chen, S.C. and Zhang, P.Y., 2008. Five new species of stick insect from Yunnan Province and description of male *Cnipsomorpha colorantis* (Chen & He) (Phasmatodea: Heteronemiidae, Phasmatidae). *Entomotaxonomia* 30(4): 245-254.

Clark, J.T., 1976a. The capitulum of phasmid eggs (Insecta: Phasmida). *Zoological Journal of the Linnean Society, London* 59: 365-375.

Clark, J.T., 1976b. The eggs of stick insects (Phasmida) - a review with descriptions of the eggs of eleven species. *Systematic Entomology* 1: 95-105.

Clark, J.T., 1979. A key to the eggs of stick and leaf insects (Phasmida). *Systematic Entomology* 4: 325-331.

Gray, G.R., 1835. *Synopsis of the Species of Insects belonging to the Family of Phasmidae*. Longman, Rees, Orme, Brown, Green and Longman, London. 48pp.

Hennemann, F.H. and Conle, O.V., 2008. Revision of Oriental Phasmatodea: The tribe Pharnaciini Günther, 1953, including the description of the world's longest insect, and a survey of the family Phasmatidae Gray, 1835 with keys to the subfamilies and tribes (Phasmatodea: "Anareolatae": Phasmatidae). *Zootaxa* 1906: 1-316.

Ho, G.W.C., 2013a. Contribution to the knowledge of Chinese Phasmatodea I: A review of Neohiraseini (Phasmatodea: Phasmatidae: Lonchodinae) from Hainan Province, China, with descriptions of one new genus, five new species and three new subspecies, and redescriptions of *Pseudocentema* Chen, He & Li and *Qiongphasma* Chen, He & Li. *Zootaxa* 3620(3): 404-428.

Ho, G.W.C., 2013b. Contribution to the knowledge of Chinese Phasmatodea II: Review of the Dataminae Rehn & Rehn, 1939 (Phasmatodea: Heteropterygidae) of China, with descriptions of one new genus and four new species. *Zootaxa* 3669(3): 201-222.

Ho, G.W.C., 2016. Contribution to the knowledge of

Provinces	Number of species
Yunnan	8
Sichuan	6
Guizhou	2
Jiangxi	1
Guangxi	1
Shaanxi	1
Xinjiang	1
Gansu	1

Table 5. Comparison of Chinese provinces with the number of species of *Interphasma*.

Chinese Phasmatodea III: Catalogue of the phasmids of Hainan Island, China, with descriptions of one new genus, one new species and two new subspecies and proposals of three new combinations. *Zootaxa* 4150(3): 314-340.

Ho, G.W.C., 2017a. Contribution to the knowledge of Chinese Phasmatodea IV: Taxonomy on Medaurini (Phasmatodea: Phasmatidae: Clitumninae) of China. *Zootaxa* 4365(5): 501-546.

Ho, G.W.C., 2017b. Contribution to the knowledge of Chinese Phasmatodea V: New taxa and new nomenclatures of the subfamilies Necrosciinae (Diapheromeridae) and Lonchodinae (Phasmatidae) from the Phasmatodea of China. *Zootaxa* 4368(1): 1-72.

Ho, G.W.C., 2020a. New taxa of Clitumninae from Vietnam (Phasmatodea: Phasmatidae). *Zoological Systematics* 45(2): 104-117.

Ho, G.W.C., 2020b. Contribution to the knowledge of Chinese Phasmatodea VI: New taxa and new nomenclature of the subfamily Necrosciinae from the Phasmatodea of China. *Hong Kong Entomological Bulletin* 12(2): 3-28.

Ho, G.W.C., 2021a. Contribution to the knowledge

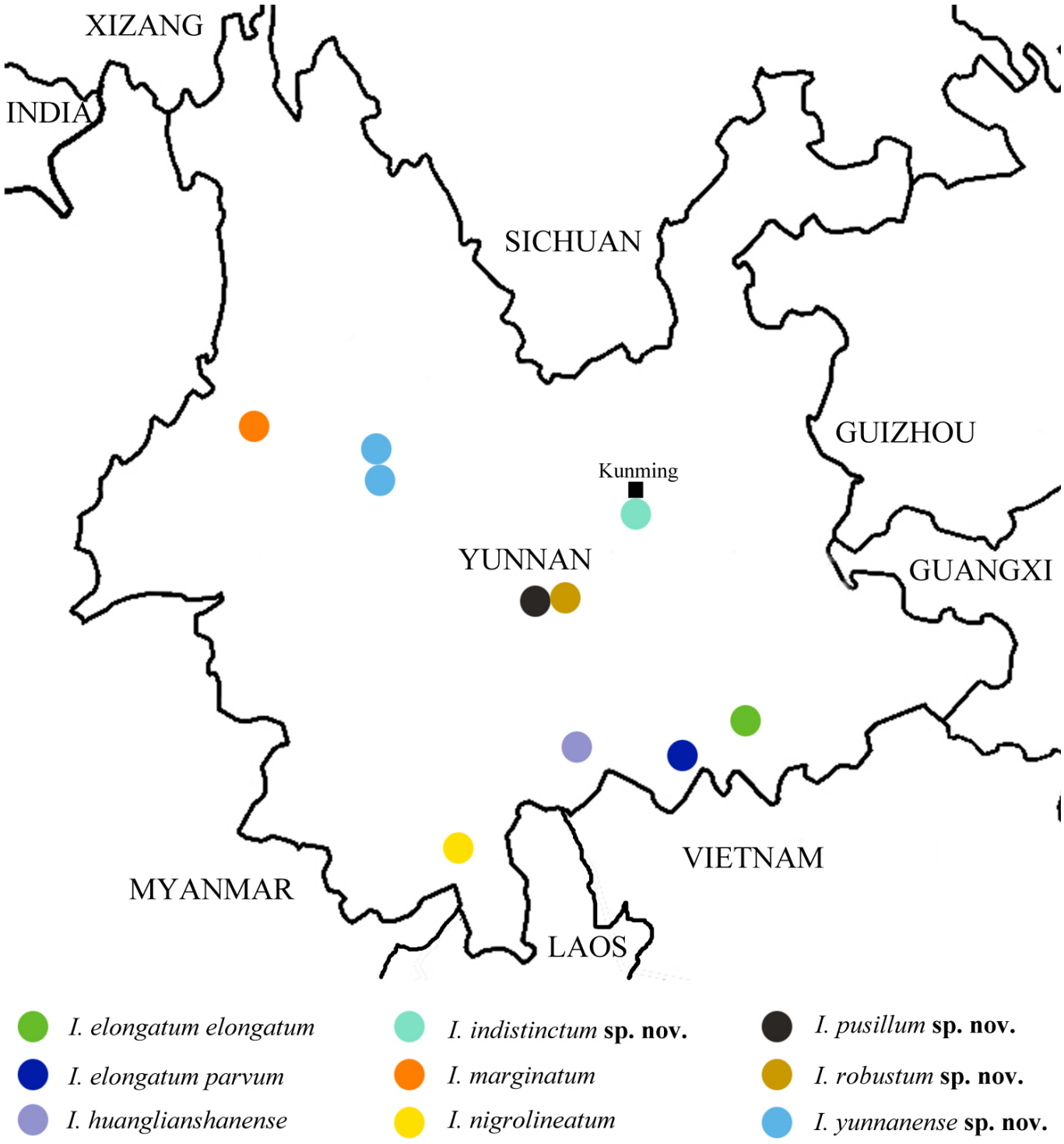

Figure 41. Distribution of *Interphasma* spp. in Yunnan, China. Drawing by author.

of Chinese Phasmatodea VII: A new genus for two new species of Medaurini from China (Phasmatidae: Clitumninae). *Hong Kong Entomological Bulletin* 13(1): 3-11.

Ho, G.W.C., 2021b. Contribution to the knowledge of Chinese Phasmatodea VIII: Four new species of *Carausius* Stål, 1875 from China (Lonchodidae: Lonchodinae). *Hong Kong Entomological Bulletin* 13(1): 12-21.

Ho, G.W.C., 2021c. Contribution to the knowledge of Chinese Phasmatodea IX: First report of Xeroderinae (Phasmatodea: Phasmatidae) from China. *Zoological Systematics* 45(2): 104-117.

Ho, G.W.C. 2021d. Contribution to the knowledge of Chinese Phasmatodea X: Eight new species of *Cnipsomorpha* from China (Phasmatidae: Clitumninae: Medaurini). *Zootaxa* 5026(1): 102-126.

Ho, G.W.C. 2021e. Contribution to the knowledge of Chinese Phasmatodea XI: New taxa and new nomenclature of Medaurini (Phasmatidae: Clitumninae) from China. *Zoological Systematics* 46(3): 234-239.

Ho, G.W.C. and Shi, F.M., 2013. A new species of the genus *Interphasma* Chen & He, 2008 (Phasmida: Clitumninae: Medaurini) from Sichuan, China. *Zootaxa* 3734(4): 492-496.

Li, B.L., Shi, F.M. and Wang, H.J., 2021. Stick insects of the genus *Interphasma* Chen et He, 2008 (Phasmida: Phasmatidae) from China. *Far Eastern Entomologist* 422: 24-32.

Sellick, J.T.C., 1988. The capitula of phasmid eggs: an update with a review of the current state of phasmid ootaxonomy. *Zoological Journal of the Linnean Society, London* 93: 273-282.

Sellick, J.T.C., 1997. The range of egg capsule morphology within the Phasmatodea and its relevance to the taxonomy of the order. *Italian Journal of Zoology* 64: 97-104.

Sellick, J.T.C., 1998. The micropylar plate of the eggs of Phasmida, with a survey of the range of plate form within the order. *Systematic Entomology* 23: 203-228.

Xu, F.L., Yang, M.F. and Guo, G.H., 2010. A new species of the genus *Interphasma* from China (Phasmatodea, Phasmatidae). *Acta Zootaxonomica Sinica* 35(2): 395-397.

Zompro, O., 2004. Revision of the genera of the Areolatae, including the status of *Timema* and *Agathemera* (Insecta, Phasmatodea). *Abhandlungen des Naturwissenschaftlichen Vereins Hamburg (NF)* 37: 1-327.

The hoverfly genus *Eristalinus* Rondani, 1845 (Diptera: Syrphidae) in Hong Kong (Part 1)

Kelvin Wu Ka-Lun

Tsuen Wan, N.T., Hong Kong.
Email: kelvinklwu@gmail.com

ABSTRACT

The hoverfly genus *Eristalinus* Rondani, 1845 in Hong Kong was studied. Literature on the local hoverfly fauna and a total of 406 observation records from both the author and iNaturalist were reviewed. Ten species were found to occur in Hong Kong, two of which have not previously been reported. A brief account of the morphology and ecology for each of these species was given.

Key words: *Eristalinus*, Syrphidae, Hong Kong

INTRODUCTION

The genus *Eristalinus* Rondani, 1845 is the most speciose among all hoverfly genera in Hong Kong. About one-sixth of the sixty-plus species mentioned in the literature belongs to this genus. It is characterized by maculation on the compound eyes, in the form of either apparently random spots or organized bands, plus a sinuate radial vein R4+5 on the wings. The latter is a common characteristic for the tribe Eristalini (Stubbs and Falk, 2002; Huang and Cheng, 2012), under the subfamily Eristalinae. The genus was erected by Rondani in 1845 as a subgenus of *Myathropa* (Evenhuis and Pape, 2022). He later changed the name to a secondary proposed usage in 1857 as a subgenus of *Eristalis*, with the first species assigned to it being *E. sepulchralis* (Linnaeus 1758) (O'Hara et al., 2011). In the following century, many species now assigned to this genus were often put under *Eristalis* (e.g. Nayar, 1968). Other generic names, e.g. *Lathyrophthalmus* Mik, 1897, *Eristalodes* Mik, 1897 or *Merodonoides* Curran, 1931, were created for various species with eye spots. Following Evenhuis and Pape (2022), all related taxa are now put under the genus *Eristalinus*, while others are either synonymized (e.g. *Lathyrophthalmus*) or treated as subgenera (e.g. *Eristalodes* and *Merodonoides*).

According to Thompson (2003), there are 100 species under *Eristalinus*, occurring naturally in the Palaearctic, Afrotropical and Oriental realms, as well as New Guinea and being introduced into the New World and the Australasian realms. A total of 87 out of 99 *Eristalinus* species listed in Evenhuis and Pape (2022) are stated as valid. Of these, 24 species have been recorded from the Oriental region where Hong Kong is located, and 11 in the Palaearctic realm (seven of these also occur in the Oriental), 18 in the Australasian realm (seven also in the Oriental) and 53 in the Afrotropical realm (three also in the Oriental). Only three species occur in the New World, one of which also occurs in the Oriental realm.

The taxonomy and the biology of *Eristalinus* species in Hong Kong has not been studied in detail. A few species were misidentified in the published literature, while the correct placement of scientific names for some other species is still debated (Ghorpadé, 2019). The present paper describes the Hong Kong *Eristalinus* species reported or observed to date and gives a brief account on their morphology and ecology.

MATERIALS & METHODS

Published records of hoverflies that occur in Hong Kong were collated and reviewed. These include publications from Hong Kong by expert (e.g. Lau, 2019) and amateur entomologists, faunal listings of Chinese regions (e.g. Huang and Cheng, 2012) and of the Oriental realm and other related academic journal articles on hoverfly distribution.

Hong Kong hoverfly records in the online observation database iNaturalist were gathered through the sorting and downloading functions of the website (iNaturalist, 2022). These were reviewed and tabulated to form a database of observation records, together with the author's personal records between 2006 and 2022. Only iNaturalist records with clear photos that allow unambiguous identification of species were used, otherwise the record was discarded. Each record was reviewed and an identity based on the initial checklist assigned, since the initial identity in the record may be incorrect. The date and the geographical location of each record were included in the database for further study. Where only an approximate location was specified, the geographical information of that particular record was discarded and not included in related analyses. Behaviours such as mating, oviposition and flower visiting were recorded.

The original species descriptions of the local hoverfly fauna were retrieved as much as possible to confirm the authenticity of the occurrence of the species in Hong Kong. Regional hoverfly accounts for nearby regions such as mainland China (Huang and Cheng, 2012), Taiwan (Steenis et al., 2021), Japan (Shiraki, 1930), India (Ghorpadé, 2019) and the Oriental region as a whole (e.g. Brunetti, 1908) were reviewed to facilitate species identification.

RESULTS

Literature review

Hong Kong hoverfly records in recent decades are mainly reported in books on the local insect fauna.

There are hardly any mentions of hoverfly specimens collected in Hong Kong in the academic literature. In the first comprehensive book on Hong Kong insects, Hill et al. (1982) recorded *Eristalis* spp., *Syrphus* spp. and *Eristalinus* sp. as the only representatives of Hong Kong Syrphidae. This book was later re-published in 1985 in both Chinese and English versions, with colour illustrations added (Hill, 1985), but only *Eristalis* sp. and *Eristalinus* sp. were included. The photo captioned as the former is likely to be *Phytomia zonata*, and the latter is *Eristalinus arvorum*.

Yiu (2005) illustrated three hoverfly species, including *Eristalinus arvorum* (identified as *Eristalinus quinquestriatus* in the book). These are the first records of Hong Kong hoverflies identified to species level. In the following year, Yiu (2006) published another comprehensive book on the Hong Kong insect fauna, with species accounts of 13 hoverfly species including the three in Yiu (2005). Three of them belonged to *Eristalinus* spp., namely *E. arvorum*, *E. quinquestriatus* and *E. tarsalis*, the last being a misidentification (see discussion below). Fang (2006) gave species accounts of two hoverfly species, including *E. quinquestriatus* (identified as *Eristalinus* sp. in the book). In the first book specifically on the dipteran suborder Brachycera from Hong Kong, Wu (2010) gave a brief account of the Syrphidae and its three subfamilies (Syrphinae, Milesiinae and Microdontinae). Twenty-one species of hoverflies were illustrated, including two *Eristalinus* spp. that had previously been recorded (*E. arvorum* and *E. quinquestriatus*).

Huang and Cheng (2012) published the first comprehensive national account of Chinese hoverflies. The distribution of each species inside China was described in terms of provinces. Hong Kong, being a Special Administrative Region, was treated as a counterpart of the other provinces, and thus occurrence in Hong Kong was explicitly mentioned instead of being part of the adjoining Guangdong province. A total of nine species were mentioned from Hong Kong, including four *Eristalinus* spp., namely *E. arvorum*, *E. obliquus*, *E. quinquelineatus* and *E. laetus*. The latter three had not previously been mentioned in local publications Two of these four species records (*E. arvorum* and *E. quinquelineatus*) were from specimens collected in December 1932, while the sources of the remaining two were not mentioned. There was no mention of where the specimens were deposited. Neither of two earlier publications on Chinese Diptera (Xue and Chao, 1996) and on the hoverflies of the Qinling-Bashan region of China (Huo et al., 2003) mentioned the presence of hoverfly species in Hong Kong.

Yiu et al. (2014) illustrated 1,985 species of Hong Kong insects, of which 28 were hoverflies, including five *Eristalinus* spp. Two species, *E. quinquelineatus* and *E. quinquestriatus*, had previously been reported. New Hong Kong records included *E. paria* (a misidentification, see discussion in Part 2), *E. rufus* and *E. tarsalis*.

The Checklist of Insects of Hong Kong by Lau (2019) listed 9,060 species of insects. It included synonyms of each listed species and known host plants, and provided a very comprehensive basis for further studies. A total of 56 hoverfly species were listed, of which nine species belonged to *Eristalinus*.

Table 1 summarizes the Hong Kong *Eristalinus* species recorded in some key publications mentioned above.

Review of observation records

A total of 2,009 hoverfly observation records in Hong Kong between 2006 and 2022, including 1,607 records from iNaturalist and 402 records from the author's personal observation, were collated. Of these, 406 records were *Eristalinus* spp. Despite the fact that the majority of records were made haphazardly, some interesting phenomena can be seen in the statistics.

The humid spring months appear to be the prime time for hoverfly adults, with the maximum number of species recorded in April (55 species), followed by March and May (47 and 46 species respectively). The autumn / early winter months from October to December is another period when more species have been recorded,

Species	Authority	Yiu (2006)	Wu (2010)	Huang and Cheng (2012)	Yiu et al. (2014)	Lau (2019)
E. arvorum	(Fabricius, 1787)	✓	✓	✓		✓
E. laetus	(Wiedemann, 1830)			✓		
E. megacephalus	(Rossi, 1794)					✓
E. multifarius	(Walker, 1852)					✓
E. obliquus	(Wiedemann, 1824)			✓		✓
E. paria	(Bigot, 1880)				✓	✓
E. quinqueslineatus	(Fabricius, 1781)			✓	✓	
E. quinquestriatus	(Fabricius, 1794)	✓	✓		✓	✓
E. rufus	Goot, 1964				✓	✓
E. sepulchralis	(Linnaeus, 1759)					✓
E. tarsalis	(Macquart, 1855)	✓			✓	✓

Table 1. Hong Kong *Eristalinus* species recorded in selected publications.

with 37 species for each month. The lowest number of species were recorded in both late winter (January and February) and late summer (August and September), with 30 to 32 species in each of these months. As a comparison, most *Eristalinus* spp. have been recorded all year round, except for those species only recorded a handful of times. An overall comparison will be given in Part 2 of this article.

The total number of all hoverfly observations for each month also shows some interesting patterns. Observation records from October to December outnumbered all other months except the most species-rich month of April. The number of records in these periods is nearly double those of other months, which tally around 110 to 130 records. This pattern is disproportionate when considering the number of species recorded in each respective period. Records of the three commonest *Eristalinus* spp., i.e. *E. arvorum*, *E. megacephalus* / *E. quinquelineatus* (both names have been applied to the same species by different authors, see discussion in Part 2) and *E. quinquestriatus* demonstrated similar patterns with peak numbers in autumn and winter.

At least two *Eristalinus* species observed by the author have not been reported in the previous literature. A handful of observation records for one of the species were present in iNaturalist. Morphologically they are distinctly different from other species in Hong Kong. Details will be discussed in Part 2.

DISCUSSION

Table 2 lists the Hong Kong *Eristalinus* spp. recorded in the literature that are considered valid: it is noticeable that the Hong Kong species listed in the literature are either widely distributed in the Old World or in the Oriental realm (some also occur in Palaearctic / Australasian realms). One exception is *E. quinquelineatus*, which is listed as an Afrotropical-only species, but this may result from a confusion in the scientific names (discussed in Part 2). No other Afrotropical or New World species are known to occur in Hong Kong. Three species listed in the literature are considered synonyms in Evenhuis and Pape (2022): *E. laetus* (= *E. megacephalus*), *E. multifarius* (= *E. fasciatus*) and *E. rufus* (= *E. flavus*).

Together with the observation records from the author and iNaturalist, there are 10 *Eristalinus* species recorded in Hong Kong to date. Some may be different morphs of the same species and are not counted separately. These 10 species are divided into the following four categories:

(1) Species with known identity
(2) Species with uncertain placement of names
(3) Species unidentified
(4) Species not yet observed in the field by the author

A brief account of each species is given in the subsequent discussion, arranged in the order of the above four categories. Reference is made to the original descriptions and photos of the type specimens (if available), as well as articles on the genus (e.g. Hervé-Bazin, 1923) either to confirm the species designation for Category 1 and 2 or search for the identity of the unknown species of Category 3. I focus here on Category 1 species, while the remaining categories will be dealt with in Part 2.

Category 1: *Eristalinus* species with known identity

***Eristalinus arvorum* (Fabricius, 1787)** (Figs. 1-2)

This is by far the most widespread and common *Eristalinus* species in Hong Kong. Adults are recorded throughout the year, usually in open habitats on shrubs, grassland and flowering trees. The five creamy yellow bands on the scutum are of similar width, reaching the posterior edge. The abdomens of males are orange-yellow with brownish bands at the posterior edges of tergites, sometimes with a longitudinal brown vitta in the middle. There is also a pair of small, elongated orange-yellow marks on tergite 4. The abdomen of females are brownish in background, with a creamy yellow transverse band on each of the tergites from segment

Species	Authority	Distribution					
		OR	PA	AU	AF	NE	NT
E. arvorum	(Fabricius, 1787)	✓	✓	✓	✓		
E. flavus	(Sack, 1926)	✓					
E. megacephalus	(Rossi, 1794)	✓	✓	✓	✓		
E. obliquus	(Wiedemann, 1824)	✓		✓			
E. quinquestriatus	(Fabricius, 1794)	✓	✓	✓			
E. sepulchralis	(Linnaeus, 1758)	✓	✓				
E. tarsalis	(Macquart, 1855)	✓	✓				
E. paria	(Bigot, 1880)	✓		✓			
E. quinquelineatus	(Fabricius, 1781)				✓		
E. fasciatus	(Macquart 1834)	✓			✓		

Table 2. Literature-recorded Hong Kong *Eristalinus* species considered valid by Evenhuis and Pape (2022) and their zoogeographical distribution. Distribution: OR – Oriental; PA – Palaearctic; AU – Australasian; AF – Afrotropical; NE – Nearctic; NT – Neotropical.

2 to segment 4, and a pair of oblique, elliptical creamy yellow spots on tergite 5. The femora are orange-brown, while the tibiae and the tarsi are creamy yellow, with the terminal tarsomere brownish black and the tarsal claws creamy yellow.

Distribution (from Evenhuis and Pape, 2022): Entire SE Asia; Australia (Queensland), Hawaii, Marianas, Micronesia; China, Japan; Seychelles.

***Eristalinus flavus* (Sack, 1926)** (Figs. 3-4)

This species was formerly known as *Eristalinus rufus* Goot 1964 in Hong Kong publications, but the name *rufus* is treated as a synonym of *Eristalinus flavus* by Evenhuis and Pape (2022). It has a distinctively lighter shade than other *Eristalinus* species in Hong Kong. The typical stripe patterns on the scutum of this species appears to be very faint. The tergites are predominantly yellowish orange with thin, black spots on the lateral one-third portion of the posterior edges. The legs are yellowish orange similar to the tergites, with about one-third of the end portion of the femora and tibiae black. Adults are recorded in spring / early summer and autumn.

Distribution (from Evenhuis and Pape, 2022): Indonesia to Philippines & Micronesia.

***Eristalinus obliquus* (Wiedemann, 1824)** (Figs. 5-6)

This is an uncommon species, mostly observed on vegetation at the boundary of swamps or ponds. It is recorded in Hong Kong from March to December. Females are readily recognizable by the three pairs of comma-like, creamy yellow spots on tergites 3 to 5, on top of nearly semi-circular black bands at the posterior edge of tergites. The black bands extend to the anterior end medially in the form of narrow vittae. The remainder of the tergites are orange. The abdomen of males is predominantly yellowish orange with the pair of characteristic comma-like creamy yellow spots on tergite 4. This looks like the males of *Eristalinus arvorum*, but can be distinguished by the shape of the spots and the narrower central creamy yellow stripe on the scutum. The legs are brown, except that the femora and the hind tibiae are black. Visits to mature spores of the fern *Cyclosorus interruptus* by females of *Eristalinus obliquus* have been observed (Rainbow Li, pers. comm.), perhaps indicating spore consumption for egg development, but more observation is required to confirm whether the hoverflies actually consume the spores.

Distribution (from Evenhuis and Pape, 2022): Southern Oriental Region; New Guinea, Kei Islands.

***Eristalinus quinquestriatus* (Fabricius, 1794)** (Figs. 7-8)

This is a common species found throughout the year, but more commonly observed during autumn and winter. It is characterized by chevron-like creamy yellow narrow bands in the middle of the tergites, with the most frontal one on tergite 2 (females) or tergite 3 (males) much shorter than the other bands. The femora and tibiae are black, except for the basal one-third of the tibiae being creamy yellow. The posterior edge of the tergites has an inverted T-shape black band on tergites 2 and 3, with the horizonal stroke thinner than the vertical median longitudinal stroke. In females this black band becomes triangular on tergites 2 and 3. The background of tergite 4 is brownish black. The remaining parts of the tergites are orange. The tarsi are brownish yellow except the apical tarsomeres, which are black. The tarsal claws are brownish yellow.

Figures 9 and 10 illustrate an unknown *Eristalinus* sp. with very similar patterns of creamy yellow bands on the tergites, but the bands are narrower and the remaining parts darker than *E. quinquestriatus*. It is regarded as *E. tarsalis* in Yiu (2006), but this name should be applied to another species that also occurs in Hong Kong. It has been recorded in winter and early spring. It may possibly be a “melanic” form of *E. quinquestriatus* that spends the larval stage in cold weather, a situation not uncommon in hoverflies (Huo et al., 2003). Further study of specimens would be required to confirm the identity.

Distribution (from Evenhuis and Pape, 2022): Throughout Oriental Region; Buru; China, Japan.

***Eristalinus tarsalis* (Macquart, 1855)** (Figs. 11-12)

This species was only recorded in Sha Lo Tung in November for two consecutive years in 2012 and 2013. The body is largely black (including the scutum, tergites and legs) and covered with whitish hairs, except for the two pairs of creamy white fasciae on tergites 3 and 4, the creamy white basal one-fourth of the tibiae, and two thin white lines sometimes visible on the scutum.

Distribution (from Evenhuis and Pape, 2022): China, Taiwan, India, Nepal, Japan.

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REFERENCES

Brunetti, E., 1908. IX.—Notes on Oriental Syrphidae with descriptions of new species. Part 1. *Records of the Indian Museum* 2: 49-96.

Evenhuis, N.L. and Pape, T., 2022. *Systema Dipterorum*, *Version 3.9*. Available from http://diptera.org, accessed on 6 September 2022.

Fang, H.J., 2006. *Amazing Insect World*. Photographic Guide Series to Hong Kong Nature (8). HK Discovery

Limited.

Ghorpadé, K., 2019. Hover-flies (Diptera: Syrphidae) recorded from “Dravidia”, or central and peninsular India and Sri Lanka An annotated checklist and bibliography. *Indian Insects, Diversity and Science*. CRC Press: 325-388.

Hervé-Bazin, J., 1923. Etudes sur les “*Lathyrophthalmus*” (Diptera, Syrphidae) d’extreme-Orient. *Annales des Sciences Naturelles* 6: 125-152.

Hill, D.S., 1985. *Hong Kong Insects Volume 2*. Urban Council, Hong Kong Government.

Hill, D.S., Hore, P. and Thornton, I.W.B., 1982. *Insects of Hong Kong*. Hong Kong University Press.

Huang, C.M. and Cheng, X.Y., 2012. *Fauna Sinica, Insecta Vol. 50, Diptera: Syrphidae*. Science Press, Beijing, China.

Huo, K.K., Ren, G.D. and Zheng, Z.M., 2003. *Fauna of Syrphidae from Mt. Qinling-Bashan in China (Insecta: Diptera)*. China Agricultural Scientech Press.

iNaturalist, 2022. Available from https://www.inaturalist.org, accessed on 27 March 2022.

Lau, C.S.K., 2019. *Checklist of Insects of Hong Kong*. Agriculture, Fisheries and Conservation Department, Hong Kong Government.

Nayar, J.L., 1968. Two new species of *Eristalis* from India (Diptera: Syrphidae). *The Pan-Pacific Entomologist* 44: 119-122.

O’Hara, J.E., Cerretti, P., Pape, T. and Evenhuis, N.L., 2011. Nomenclatural studies toward a world list of Diptera genus-group names. Part II: Camillo Rondani. *Zootaxa* 3141: 1-268.

Shiraki, T., 1930. Die Syrphiden des Japanischen Kaiserreichs, mit Berücksichtigung benachbarter Gebiete. *Memoirs of the Faculty of Science and Agriculture, Taihoku Imperial University* 1: 1-446.

Steenis, J. van, Wu, B.T.H., Ssymank, A. M., van Steenis, W., Skevington, J.H., Young, A.D., Palmer, C.J., van Zuijen, M.P., Lechner-Ssymank, B. and Shiao, S.F., 2021. Preliminary results of the 2016 International Taiwan expedition on Syrphidae (Diptera). *Formosan Entomologist* 41: 78-134.

Stubbs, A.E. and Falk, S.J., 2002. *British Hoverflies, 2nd Edition (Reprinted 2012)*. British Entomological and Natural History Society, UK. 469pp.

Thompson, F.C., 2003. *Austalis*, a new genus of flower flies (Diptera: Syrphidae) with revisionary notes on related genera. *Zootaxa* 246: 1-19.

Wu, K.K.L., 2010. *Cute as a Fly*. Popular Entomology Book Series Number 4. Hong Kong Entomological Society, Hong Kong. 128pp.

Xue, W.Q. and Chao, C.M., 1996. *Flies of China (Volume 1)*. Liaoning Science and Technology Press, China.

Yiu, V., 2005. *Insect Portfolio – Hong Kong Insects (Volume 2)*. Photographic guide series to Hong Kong nature (6). HK Discovery Limited.

Yiu, V., 2006. *Insecta Hongkongica*. Hong Kong Lepidopterists’ Society and HK Discovery Limited.

Yiu, V., Yip, C.H., Yam, E.L.Y. and Wu, K.K.L, 2014. A *Photographic Guide to Hong Kong Insects*. Hong Kong Entomological Society, Hong Kong. 714pp

Figure 1. *Eristalinus arvorum* male. Photo by author.

Figure 2. *Eristalinus arvorum* female. Photo by author.

Figure 3. *Eristalinus flavus* male. Photo by Cheung Che-Man.

Figure 4. *Eristalinus flavus* female. Photo by author.

Figure 5. *Eristalinus obliquus* male. Photo by author.

Figure 6. *Eristalinus obliquus* female. Photo by author.

Figure 7. *Eristalinus quinquestriatus* male. Photo by author.

Figure 8. *Eristalinus quinquestriatus* female. Photo by author.

Figure 9. Possibly melanic form of *Eristalinus quinquestriatus* male. Photo by Cheung Che-Man.

Figure 10. Possibly melanic form of *Eristalinus quinquestriatus* female. Photo by author.

Figure 11. *Eristalinus tarsalis* male. Photo by author.

Figure 12. *Eristalinus tarsalis* female. Photo by author.