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Contribution to the knowledge of Chinese Phasmatodea XIII: New taxa of Pharnaciini (Phasmatodea: Phasmatidae: Clitumninae) from China

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ABSTRACT

One new genus, four new species, and one new subspecies from Pharnaciini Günther, 1953 of China are described. They are namely, *Neophryganistria* **gen. nov.**, *Neophryganistria guangdongensis* **sp. nov.**, *Neophryganistria jinpingensis* **sp. nov.**, *Neophryganistria yunnanensis* **sp. nov.**, *Phryganistria laikuenae* **sp. nov.**, and *Neophryganistria heusii damingshanensis* **subsp. nov.** Seven new combinations are proposed (all species transferred from *Phryganistria* Stål, 1875): *Neophryganistria fruhstorferi* (Brunner von Wattenwyl, 1907) **comb. nov.**, *Neophryganistria grandis* (Rehn, 1906) **comb. nov.**, *Neophryganistria guangxiensis* (Chen & He, 2008) **comb. nov.**, *Neophryganistria heusii* (Hennemann & Conle, 1997) **comb. nov.**, *Neophryganistria heusii yentuensis* (Bresseel & Constant, 2014) **comb. nov.**, *Neophryganistria longzhouensis* (Chen & He, 2008) **comb. nov.**, and *Neophryganistria tamdaoensis* (Bresseel & Constant, 2014) **comb. nov.** *Neophryganistria heusii yentuensis* **comb. nov.** is recorded for the first time in China. A list of the genera and a key to the genera of Pharnaciini in China is provided. A list of the species and subspecies and a key to the species and subspecies of *Neophryganistria* **gen. nov.** in China is also provided.

Key words: stick insects, China, taxonomy, new genus, new species, new subspecies, new record

中國螳目之新知XIII：中國彪螳族新分類群（螳目：螳科：克螳亞科）

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摘要：本文記述中國彪螳族一新屬、四新種及一新亞種：新佛螳屬 *Neophryganistria* **gen. nov.**、廣東新佛螳 *Neophryganistria guangdongensis* **sp. nov.**、金平新佛螳 *Neophryganistria jinpingensis* **sp. nov.**、雲南新佛螳 *Neophryganistria yunnanensis* **sp. nov.**、麗娟佛螳 *Phryganistria laikuenae* **sp. nov.**及異色新佛螳 大明山亞種 *Neophryganistria heusii damingshanensis* **subsp. nov.**；建立七新組合：弗氏新佛螳 *Neophryganistria fruhstorferi* (Brunner von Wattenwyl, 1907) **comb. nov.**、大新佛螳 *Neophryganistria grandis* (Rehn, 1906) **comb. nov.**、廣西新佛螳 *Neophryganistria guangxiensis* (Chen & He, 2008) **comb. nov.**、異色新佛螳 *Neophryganistria heusii* (Hennemann & Conle, 1997) **comb. nov.**、異色新佛螳 黑胸亞種 *Neophryganistria heusii yentuensis* (Bresseel & Constant, 2014) **comb. nov.**、龍州新佛螳 *Neophryganistria longzhouensis* (Chen & He, 2008) **comb. nov.** 及三島新佛螳 *Neophryganistria tamdaoensis* (Bresseel & Constant,

2014) **comb. nov.**；報告一新紀錄亞種：異色新佛螳 黑胸亞種 *Neophryganistria heusii yentuensis* **comb. nov.**；以及制定彪螳族及新佛螳屬的名錄及分類檢索表。

關鍵字：竹節蟲，中國，分類，新屬，新種，新亞種，新紀錄

INTRODUCTION

In China, the earliest known Chinese literature regarding large-sized stick insects belonging to the tribe Pharnaciini Günther, 1953 was reported by Cai (1987), who recorded *Tirachoidea westwoodii* (Wood-Mason, 1875) for the first time in his list of Chinese phasmids. After 1987, several new taxa were discovered and described in the tribe, including one new species of *Tirachoidea* Brunner von Wattenwyl, 1893 [*T. jianfenglingensis* (Bi, 1994)], two new species of *Phryganistria* Stål, 1875 [*P. guangxiensis* Chen & He, 2008 and *P. longzhouensis* Chen & He, 2008], and a new genus, *Baculonistria* Hennemann & Conle, 2008 (Bi, 1994; Chen and He, 2008; Hennemann and Conle, 2008) with three species. Therefore, at present, three large-sized stick insect genera are known in the tribe Pharnaciini from China: *Baculonistria*, *Phryganistria*, and *Tirachoidea*.

This study is the thirteenth in the series on the contributions to the knowledge of Chinese Phasmatodea. The previous contributions I-XII contain descriptions of 101 new taxa (11 new genera, 77 new species, and 13 new subspecies) and suggestions of 26 new nomenclatures (25 new combinations and one new synonym) from the subfamilies Clitumninae, Dataminae, Necrosiinae, Lonchodinae, and Xeroderinae of China (Ho, 2013-2022).

This paper describes six new taxa which include one new genus, four new species, and one new subspecies, and proposes seven new combinations. It also reports a new record of Pharnaciini in China. After these changes, this increases to fauna to: four genera, 12 species, and two subspecies known in the Pharnaciini of China (Brock et al., 2023).

MATERIALS & METHODS

Morphological terms are based on Bragg (2001), Hennemann and Conle (2008), and Brock and Büscher (2022). Ootaxonomic description refers to Clark (1976a, 1976b, 1979), Sellick (1988, 1997, 1998; = Clark, J.T.), and Zompro (2004). Measurements are provided in millimetres (mm). The type specimens of the new taxa

are deposited at the Hong Kong Entomological Society, Hong Kong, China (HKES).

A recent phylogenetic study conducted by Bank and Bradler (2022) identified a potentially new taxonomic arrangement for Pharnaciini. The study revealed a clade consisting of Lonchodidae (Lonchodinae + Necrosciinae), (Pharnaciinae + *Prosentoria*), and ((Palophidae + Cladomorphinae) + (Stephanacridini + *Xenophasmina* + Lanceocercata)). The taxonomic treatment in this study is largely based on Hennemann and Conle (2008), Bradler and Buckley (2018), and (Brock et al., 2023). Consequently, Pharnaciini shows closer affinities to Clitumnini Brunner von Wattenwyl, 1893, and Medaurini Hennemann & Conle, 2008 and is retained in Clitumninae.

RESULTS

Phasmatidae Leach, 1815

Clitumninae Brunner von Wattenwyl, 1893

Pharnaciini Günther, 1953

Pharnaciini Günther, 1953: 555; Brock, 1999: 131; Bragg, 2001: 376; Otte and Brock, 2005: 32; Chen and He, 2008: 345; Hennemann and Conle, 2008: 66; Mandal and Yadav, 2010: 32; Bradler and Buckley, 2018: 296; Seow-Choen, 2021: 723.

Type-genus: *Pharnacia* Stål, 1877, first used by Günther, 1953: 555.

Diagnosis: According to the diagnostic features provided by Hennemann and Conle (2008: 62, 66), Pharnaciini Günther, 1953 is closely related to Clitumnini Brunner von Wattenwyl, 1893, but can be separated by the larger size, the slender and robust body, the longer and filiform antennae, the elongate antennomeres, the non-dilated laterally scapus and the presence of more distinct and enlarged armature on femora and tibiae in both sexes. Additionally, Pharnaciini exhibits an oval egg capsule with a stalked capitulum in its eggs.

Description: As in Hennemann and Conle (2008: 81).

Distribution: As in Hennemann and Conle (2008: 81).

Notes: Hennemann and Conle (2008) conducted a comprehensive review of the taxonomy of Pharnaciini, which provided various important information, including detailed descriptions, a taxonomic catalogue, illustrations, distribution maps, and measurements. The Pharnaciini is composed of five known genera: *Baculonistria* Hennemann & Conle, 2008, *Pharnacia* Stål, 1877 (= *Lobophasma* Günther, 1935), *Phobaeticus* Brunner von Wattenwyl, 1907 (= *Baculolonga* Hennemann & Conle, 1997a; = *Nearchus* Redtenbacher, 1908), *Phryganistria* Stål, 1875, and *Tirachoidea* Brunner von Wattenwyl, 1893. Notably *Phryganistria* exhibits a high species diversity, with

eight species and two subspecies (Chen and He, 2008; Hennemann and Conle, 2008; Bresseel and Constant, 2014; Brock et al., 2023). *Phryganistria* can be divided into two distinct species groups. In this paper, a new genus, *Neophryganistria* **gen. nov.**, is established to accommodate nine species and three subspecies, and is placed in Pharnaciini. This new genus shares a close relationship with *Phryganistria*, but can be distinguished by the length of the metanotum, the length of the median segment, the formation of armature on the legs, and the thickness of the femora in both males and females. A detailed diagnosis of *Neophryganistria* **gen. nov.** is provided in the relevant section of the generic diagnosis.

Currently, in China, the Pharnaciini is represented by four genera, 12 species, and two subspecies. A list of the genera and a key to the genera of Chinese Pharnaciini are included.

Genera included in China:

1. *Baculonistria* Hennemann & Conle, 2008 足刺螞屬 [Type-species: *Baculum album* Chen & He, 1990 (= *Phobaeticus sichuanensis* Cai & Liu, 1993), by original designation]
2. *Neophryganistria* **gen. nov.** 新佛螞屬 [Type-species: *Neophryganistria guangdongensis* **sp. nov.**, by present designation]
3. *Phryganistria* Stål, 1875 佛螞屬 [Type-species: *Bacteria sarmentosa* Westwood, 1848 (= *Bacteria virgea* Westwood, 1848), by subsequent designation of Kirby, 1904: 358]
4. *Tirachoidea* Brunner von Wattenwyl, 1893 巨樹螞屬 [Type-species: *Phibalosoma cantori* Westwood, 1859, by subsequent designation of Kirby, 1904: 359]

Key to the genera of Pharnaciini from China:

Females:

1. Median segment more than one-half length of metanotum. *Tirachoidea*
- Median segment as long as or less than one-half length of metanotum. 2
2. Vertex of head with a pair of short horns. *Baculonistria*
- Vertex of head unarmed. 3
3. Operculum short, boat-shaped, posterior margin not surpassing or just surpassing posterior margin of anal segment. *Neophryganistria* **gen. nov.**
- Operculum long, lanceolate, posterior margin distinctly surpassing posterior margin of anal segment. *Phryganistria*

Males:

1. Fully alate. *Tirachoidea*
- Apterous. 2

2. Vertex of head with a pair of short horns. *Baculonistria*
 - Vertex of head unarmed. 3
3. Anteroventral and posteroventral carinae of mesofemora and metafemora with a subapical spine. *Neophryganistria* **gen. nov.**
 - Anteroventral and posteroventral carinae of mesofemora and metafemora lacking subapical spine. *Phryganistria*

***Neophryganistria* gen. nov.**

Type-species: *Neophryganistria guangdongensis* sp. nov., by present designation.

Diagnosis: *Neophryganistria* **gen. nov.** is related to *Phryganistria* Stål, 1875, but can be separated by the comparatively long metanotum (more than one-half length of the mesonotum), the comparatively short median segment (one-fourth length or less than one-third length of the metanotum) and the thick-built femora (thicker than corresponding tibiae) in both sexes, the parallel-sided third to sixth abdominal tergites, the comparatively short boat-shaped operculum and the serrated or spinose medioventral carina of mesofemora and metafemora in the female, also the comparatively short semi-tergites and the presence of subapical spines on the anteroventral and posteroventral carinae of mesofemora and metafemora in the male. *Neophryganistria* **gen. nov.** is similar to *Baculonistria* Hennemann & Conle, 2008, but can be easily separated by the slenderer body, the unarmed head and the absence of a subapical spine on the medioventral carina of mesofemora and metafemora in both sexes. Additionally, *Neophryganistria* **gen. nov.** can be differentiated from *Pharnacia* Stål, 1877, *Phobaeticus* Brunner von Wattenwyl, 1907, and *Tirachoidea* Brunner von Wattenwyl, 1893 by the short median segment (less than one-half length of the metanotum) in both sexes.

Description: Large size. Apterous. Dull colouration. Body slender, long, cylindrical, female more robust and longer than male; smooth and unarmed. Head oval, unarmed. Occiput weakly convex. Antennae filiform. Thorax smooth and unarmed. Pronotum rectangular, longer than wide. Mesonotum elongate, longer than combined length of metanotum and median segment. Metanotum more than one-half length of mesonotum. Abdomen cylindrical, smooth, tapering posteriorly. Median segment short, rectangular, longer than wide, about one-fourth length or less than one-third length of metanotum. Lateral margins of third to sixth abdominal tergites parallel-sided. Female anal segment with a distinct emargination on posterior margin. Male anal segment dilated into two elongate semi-tergites, tapering posteriorly. Female seventh sternum with distinct preopercular organ posteromedially, formed by a pair of thick and long horn-like structures. Female operculum short, boat-shaped, posterior margin rounded and just surpassing or reaching posterior margin of anal segment. Male poculum small, cup-

shaped, with median hump. Supra-anal plate small and distinct in female, indistinct in male. Cerci usually short and small in female (except *Neophryganistria tamdaoensis* **comb. nov.** with enlarged cerci), male with longer cerci. Legs very long and slender, femora distinctly or weakly thicker than corresponding tibiae. Anterodorsal and posteroventral carinae of profemora serrated in female, anterodorsal and/or posteroventral carina serrated in male. Anterodorsal, posterodorsal, anteroventral and posteroventral carinae of mesofemora and metafemora serrated in both sexes, dorsal carinae with fewer and smaller serrations than ventral carinae, medioventral carina serrated or spinose, male with subapical spines on posteroventral and medioventral carinae. Anterodorsal, posterodorsal, anteroventral and posteroventral carinae of mesotibiae and metatibiae serrated or spinose in both sexes. Dorsal carina of mesobasitarsi and metabasitarsi raised in female, not raised in male. Egg capsule oval, posterior pole pointed. Micropylar plate oval. Operculum with stalked capitulum.

Distribution: China, Laos, Myanmar and Vietnam.

Notes: Currently, a total of nine species and three subspecies are recognised in *Neophryganistria* **gen. nov.** Two species and one subspecies, *N. fruhstorferi* (Brunner von Wattenwyl, 1907: 184) **comb. nov.** [Myanmar], *N. tamdaoensis* (Bresseel & Constant, 2014: 15, figs. 5a-n, 6a-j, 7a-j, 10e-h) **comb. nov.** [Vietnam] and *N. heusii heusii* (Hennemann & Conle, 1997b: 505, figs. 1-5) **comb. nov.** [Vietnam], are transferred from *Phryganistria* Stål, 1875 and do not occur in China.

Seven species and two subspecies are currently known in China. A list of the species and subspecies and a key to the species and subspecies of *Neophryganistria* **gen. nov.** are included. The female of *N. guangxiensis* (Chen & He, 2008) **comb. nov.** is unknown and is not included in the key.

Etymology: The specific epithet of this new genus is derived from the words 'Neo' (= New) and 'phryganistria' referring to the close relationship with *Phryganistria* Stål, 1875.

Species included in China:

1. *Neophryganistria grandis* (Rehn, 1906: 279, figs. 1-2) **comb. nov.** 大新佛螳 [*Phryganistria*; China (Guangxi), Laos, Myanmar and Vietnam]
2. *Neophryganistria guangdongensis* sp. nov. 廣東新佛螳 [China (Guangdong)]
3. *Neophryganistria guangxiensis* (Chen & He, 2008: 337, figs. 308a-b) **comb. nov.** 廣西新佛螳 [*Phryganistria*; China (Guangxi)]
4. *Neophryganistria heusii* (Hennemann & Conle, 1997b: 505, figs. 1-5) **comb. nov.** 異色新佛螳 [*Phobaeticus*; China (Guangxi) and Vietnam]
- 4.1. *Neophryganistria heusii damingshanensis* subsp. nov. 異色新佛螳 大明山亞種 [China (Guangxi)]

4.2. *Neophryganistria heusii yentuensis* (Bresseel & Constant, 2014: 23, figs. 8a-n, 11a-b) **comb. nov.** 異色新佛螳 黑胸亞種 [*Phryganistria*; China (Guangxi) and Vietnam]

5. *Neophryganistria jinpingensis* **sp. nov.** 金平新佛螳 [China (Yunnan)]

6. *Neophryganistria longzhouensis* (Chen & He, 2008: 338, figs. 309a-d) **comb. nov.** 龍州新佛螳 [*Phryganistria*; China (Guangxi)]

7. *Neophryganistria yunnanensis* **sp. nov.** 雲南新佛螳 [China (Yunnan)]

Key to the species of *Neophryganistria* gen. nov. from China:

Females:

1. Dorsal carina of mesobasitarsi and metabasitarsi serrated, posterior margin of supra-anal plate pointed.. *N. yunnanensis* **sp. nov.**
 - Dorsal carina of mesobasitarsi and metabasitarsi unarmed, posterior margin of supra-anal plate rounded. **2**
2. Posterodorsal carina of profemora unarmed, posterior margin of operculum surpassing posterior margin of supra-anal plate. *N. jinpingensis* **sp. nov.**
 - Posterodorsal carina of profemora with a few small serrations, posterior margin of operculum not surpassing posterior margin of supra-anal plate. **3**
3. Median segment comparatively long, more than one-fourth length of metanotum. **4**
 - Median segment comparatively short, about one-fourth length of metanotum. **6**
4. Anterodorsal carina of protibiae unarmed. *N. grandis* **comb. nov.**
 - Anterodorsal carina of protibiae with serrations. **5**
5. Large size, body length longer than 260 mm, anterodorsal carina of protibiae with minute serrations. *N. guangdongensis* **sp. nov.**
 - Medium-sized, body length shorter than 260 mm, anterodorsal carina of protibiae with small serrations. *N. longzhouensis* **comb. nov.**
6. Body comparatively robust, preopercular organ not rounded laterally. *N. heusii damingshanensis* **subsp. nov.**
 - Body comparatively slender, preopercular organ rounded laterally. *N. heusii yentuensis* **comb. nov.**

Males:

1. Small size, body length shorter than 155 mm. *N. yunnanensis* **sp. nov.**
 - Medium to large size, body length longer than 155 mm. **2**
2. Profemora black to brownish black with brown base. **3**

- Profemora brown. **5**
- 3. Body comparatively slender. *N. guangdongensis* **sp. nov.**
 - Body comparatively robust. **4**
- 4. Posterior area of mesopleurae and metapleurae brown. *N. heusii damingshanensis* **subsp. nov.**
 - Posterior area of mesopleurae and metapleurae black. *N. heusii yentuensis* **comb. nov.**
- 5. Anterodorsal carina of profemora with less than 15 serrations. *N. longzhouensis* **comb. nov.**
 - Anterodorsal carina of profemora with more than 15 serrations. **6**
- 6. Anal segment almost as long as combined length of eighth and ninth tergites. *N. jinpingensis* **sp. nov.**
 - Anal segment distinctly shorter than combined length of eighth and ninth tergites. **7**
- 7. Anterodorsal carina of profemora sparsely serrated, with less than 20 serrations. *N. grandis* **comb. nov.**
 - Anterodorsal carina of profemora densely serrated, with more than 20 serrations. *N. guangxiensis* **comb. nov.**

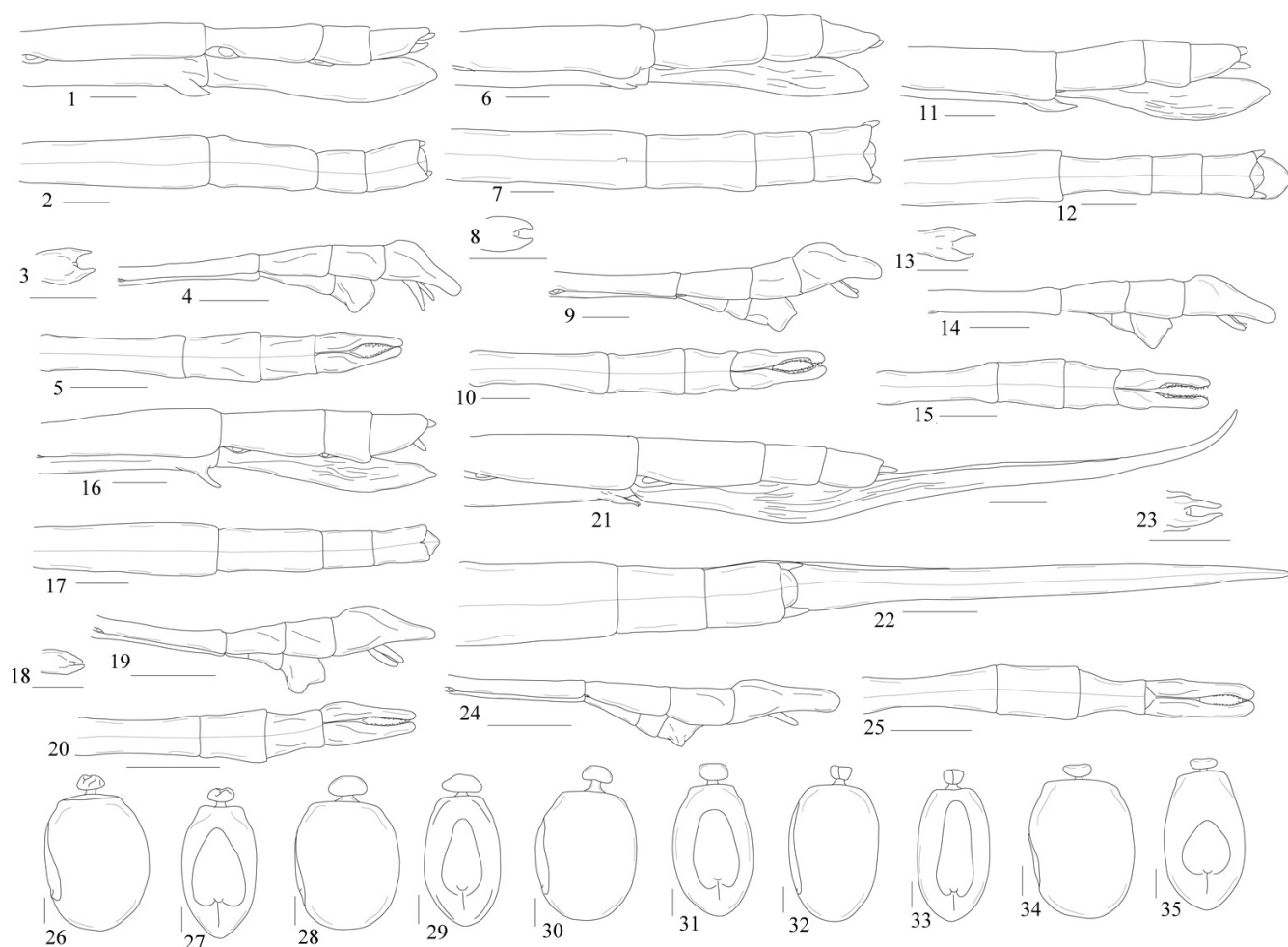
Neophryganistria guangdongensis **sp. nov.** (Figs. 1-5, 26-27, 36-39, 58)

Types: Holotype, ♀, Ruyuan, Guangdong, China, 15 August 2012, George Ho Wai-Chun (HKES); Paratypes, 1♀, 60 eggs (laid by holotype and paratype), same data as holotype (HKES); 2♀, 2♂, 83 eggs (laid by paratypes), Heishiding, Fengkai, Guangdong, China, 25-27 July 2011, George Ho Wai-Chun (HKES).

Diagnosis: *Neophryganistria guangdongensis* **sp. nov.** is related to *N. longzhouensis* (Chen & He, 2008) **comb. nov.**, but can be separated by the comparatively slenderer body in both sexes, the larger size and the presence of minute serrations on the anterodorsal carina of protibiae in the female and the less thick-built femora and the sparsely serrated posteroventral carina of profemora in the male.

Description of female (Figs. 1-3, 36, 38, 58): Large size. General colouration of body and legs brown. Body elongate and very slender, surface glossy, lacking granulation and unarmed.

Head: Oval, moderately constricted posteriorly, longer than wide, longer than pronotum. Occiput moderately convex, with indistinct median and lateral longitudinal furrows, posterior margin with distinct small swellings. Compound eyes rounded and small, its lengths about four times length of genae. Antennae filiform, longer than mesonotum, apices surpassing apices of profemora; scapus dorsoventrally flattened, slightly constricted basally, as long as combined length of pedicellus and



Figures 1-35. *Neophryganistria* gen. nov. spp. & *Phryganistria laikuenae* sp. nov. 1. *Neophryganistria guangdongensis* gen. nov. & sp. nov., female, apex of abdomen, lateral view. 2. *Neophryganistria guangdongensis* gen. nov. & sp. nov., female, apex of abdomen, dorsal view. 3. *Neophryganistria guangdongensis* gen. nov. & sp. nov., female, preopercular organ, ventral view. 4. *Neophryganistria guangdongensis* gen. nov. & sp. nov., male, apex of abdomen, lateral view. 5. *Neophryganistria guangdongensis* gen. nov. & sp. nov., male, apex of abdomen, dorsal view. 6. *Neophryganistria heusii damingshanensis* gen. nov. & subsp. nov., female, apex of abdomen, lateral view. 7. *Neophryganistria heusii damingshanensis* gen. nov. & subsp. nov., female, apex of abdomen, dorsal view. 8. *Neophryganistria heusii damingshanensis* gen. nov. & subsp. nov., female, preopercular organ, ventral view. 9. *Neophryganistria heusii damingshanensis* gen. nov. & subsp. nov., male, apex of abdomen, lateral view. 10. *Neophryganistria heusii damingshanensis* gen. nov. & subsp. nov., male, apex of abdomen, dorsal view. 11. *Neophryganistria jingpingensis* gen. nov. & sp. nov., female, apex of abdomen, lateral view. 12. *Neophryganistria jingpingensis* gen. nov. & sp. nov., female, apex of abdomen, dorsal view. 13. *Neophryganistria jingpingensis* gen. nov. & sp. nov., female, preopercular organ, ventral view. 14. *Neophryganistria jingpingensis* gen. nov. & sp. nov., male, apex of abdomen, lateral view. 15. *Neophryganistria jingpingensis* gen. nov. & sp. nov., male, apex of abdomen, dorsal view. 16. *Neophryganistria yunnanensis* gen. nov. & sp. nov., female, apex of abdomen, lateral view. 17. *Neophryganistria yunnanensis* gen. nov. & sp. nov., female, apex of abdomen, dorsal view. 18. *Neophryganistria yunnanensis* gen. nov. & sp. nov., female, preopercular organ, ventral view. 19. *Neophryganistria yunnanensis* gen. nov. & sp. nov., male, apex of abdomen, lateral view. 20. *Neophryganistria yunnanensis* gen. nov. & sp. nov., male, apex of abdomen, dorsal view. 21. *Phryganistria laikuenae* sp. nov., female, apex of abdomen, lateral view. 22. *Phryganistria laikuenae* sp. nov., female, apex of abdomen, dorsal view. 23. *Phryganistria laikuenae* sp. nov., female, preopercular organ, ventral view. 24. *Phryganistria laikuenae* sp. nov., male, apex of abdomen, lateral view. 25. *Phryganistria laikuenae* sp. nov., male, apex of abdomen, dorsal view. 26. *Neophryganistria guangdongensis* gen. nov. & sp. nov., egg, lateral view. 27. *Neophryganistria guangdongensis* gen. nov. & sp. nov., egg, dorsal view. 28. *Neophryganistria heusii damingshanensis* gen. nov. & subsp. nov., egg, lateral view. 29. *Neophryganistria heusii damingshanensis* gen. nov. & subsp. nov., egg, dorsal view. 30. *Neophryganistria jingpingensis* gen. nov. & sp. nov., egg, lateral view. 31. *Neophryganistria jingpingensis* gen. nov. & sp. nov., egg, dorsal view. 32. *Neophryganistria yunnanensis* gen. nov. & sp. nov., egg, lateral view. 33. *Neophryganistria yunnanensis* gen. nov. & sp. nov., egg, dorsal view. 34. *Phryganistria laikuenae* sp. nov., egg, lateral view. 35. *Phryganistria laikuenae* sp. nov., egg, dorsal view. Scale bars: apex of abdomen & preopercular organ = 5 mm; egg = 1 mm. Drawings by author.

third segment; pedicellus shorter than third segment.

Thorax: Pronotum rectangular, longer than wide, narrower than head, lateral margins weakly emarginated pre-medially, anterior margin thickened and weakly curved inwards, posterior margin rounded, transverse sulcus short and both ends not reaching lateral margins, transverse and longitudinal sulci crossing at middle area. Mesonotum slender and elongate, longer than combined length of metanotum and median segment, moderately expanded posteriorly; median longitudinal line indistinct. Metanotum slender, its lengths about three times length of median segment.

Abdomen: Cylindrical. Median longitudinal line indistinct. Median segment trapezoidal, gently expanded posteriorly, shorter than head. Third segment gently constricted posteriorly. Fourth tergum to anal segment almost parallel-sided. Seventh sternum with a distinct preopercular organ on posteromedian area, distinctly bifurcated, each arm elongated posteriorly, apices pointed and surpassing posterior margin of seventh sternum. Eighth tergum as long as combined length of ninth tergum and anal segment. Anal segment longer than ninth tergum, posterior margin broadly emarginated, posterolateral angles rounded. Supra-anal plate distinct, posterior margin rounded and not surpassing posterolateral angles. Operculum boat-shaped, tapering posteriorly, posterior margin rounded and reaching posterior margin of supra-anal plate, median longitudinal carina distinct after middle area. Cerci short and small, tapering posteriorly, apices blunt and distinctly projecting over posterior margin of supra-anal segment.

Legs: Very slender and long, armed with distinct small serrations. Femora not distinctly thicker than corresponding tibiae. Profemora distinctly curved basally, anterodorsal and posteroventral carinae sparsely serrated, posterodorsal carina with a very few small serrations, anteroventral carina unarmed. Anterodorsal and posterodorsal carinae of mesofemora and metafemora with a very few small serrations, anteroventral and posteroventral carinae sparsely serrated. Tibiae longer than corresponding femora. Anterodorsal and posteroventral carinae of protibiae sparsely serrated. Anterodorsal, posterodorsal, anteroventral, posteroventral and medioventral carinae

of mesotibiae and metatibiae sparsely serrated. Posterodorsal carina of mesotibiae and metatibiae also with an enlarged tooth pre-medially, apical area gently raised. Probasitarsi unarmed. All ventral carinae of mesobasitarsi and metabasitarsi unarmed, dorsal carina raised and unarmed.

Description of male (Figs. 4-5, 37, 39): Body slender and long, distinctly smaller than female, lacking granulation and unarmed. General colouration of body and legs brown.

Head: Oblong, longer than pronotum, gently tapering posteriorly behind compound eyes. Vertex and occiput weakly convex, with indistinct median and lateral longitudinal furrows, posterior margin with indistinct swellings. Compound eyes small and rounded, its length about four times of genae. Antennae filiform, apices surpassing apices of profemora; scapus flattened, as long as third segment, longer than pedicellus.

Thorax: Pronotum rectangular, longer than wide, anterior margin distinctly incurved, posterior margin rounded, transverse and longitudinal sulci crossing at middle point. Mesonotum elongate, longer than combined length of metanotum and median segment, broadly emarginated medially. Metanotum longer than median segment.

Abdomen: Slender and cylindrical. Median segment trapezoidal, gently expanded posteriorly. Eighth tergum gently expanded posteriorly, longer than ninth tergum. Anal segment longer than eighth tergum, dilated into two elongate semi-tergites, tapering posteriorly, apices obtuse and with minute dentations. Inner margin of semi-tergites weakly curved in dorsal view, upper margin moderately curved downwards in lateral view, lower margin weakly curved downwards after middle area in lateral view. Poculum small, cup-shaped, distinctly elevated medially, posterior margin pointed and reaching posterior area of ninth tergum. Cerci long, weakly incurved, apices obtuse and not exceeding posterior margin of anal segment.

Legs: Very slender and long, distinctly armed with small serrations. Femora not distinctly thicker than corresponding tibiae. Profemora curved basally, anterodorsal and posteroventral carinae sparsely



Figures 36-39. *Neophryganistria guangdongensis* gen. nov. & sp. nov. 36. Female, habitus. 37. Male, habitus. 38. Female, head and thorax, dorsolateral view. 39. Male, head and thorax, dorsolateral view. Scale bars = 10 mm. Photos by author.

serrated, other carinae unarmed. Anterodorsal and posterodorsal carinae of mesofemora and metafemora with a few small serrations, anteroventral and posteroventral carinae sparsely serrated and with a large subapical spine. Tibiae longer than corresponding femora. Protibiae unarmed. Anterodorsal and posterodorsal carinae of mesotibiae and metatibiae with a few small spine-like serrations, anteroventral, posteroventral and medioventral carinae sparsely armed with spine-like serrations. Ventral carinae of mesobasitarsi and metabasitarsi with a few small spines.

Measurements: See Table 1.

Description of egg (Figs. 26-27): Capsule greenish brown, smooth, oval, tapering posteriorly after post-median area, apex of posterior pole pointed. Micropylar plate oval, gently tapering anteriorly, anterior apex pointed. Micropylar cup placed near posterior margin of micropylar plate. Median line short, about one-fourth of micropylar plate. Operculum flat, with a mushroom-like stalked capitulum.

Measurements: Length, 5.0 mm; width, 3.0 mm; height, 4.0 mm.

Distribution: China (Guangdong).

Etymology: This new species is named after the type locality, Guangdong (China).

***Neophryganistria heusii damingshanensis* subsp. nov.** (Figs. 6-10, 28-29, 40-41, 44)

Types: Holotype, ♀, Damingshan, Wuming, Guangxi, China, 28 July 2012, George Ho Wai-Chun (HKES); Paratypes, 3♀, 2♂, 108 eggs (laid by holotype and paratypes), Damingshan, Wuming, Guangxi, China, 28-30 July 2012, George Ho Wai-Chun (HKES).

Diagnosis: *Neophryganistria heusii damingshanensis* subsp. nov. is similar to other two subspecies, *N. h.*

heusii (Hennemann & Conle, 1997) **comb. nov.** and *N. h. yentuensis* (Bresseel & Constant, 2014) **comb. nov.**, but can be separated by the smaller size and the shorter legs in both sexes, the comparatively thick-built body and the shape of preopercular organ on the posteromedian area of seventh abdominal sternum in the female and the blackish brown profemora and the brown mesopleurae and metapleurae in the male.

Description of female (Figs. 6-8, 40): Large size. General colouration of body and legs brown. Body elongate and very slender, surface glossy, lacking granulation and unarmed.

Head: Oval, moderately constricted posteriorly, longer than wide, longer than pronotum. Occiput moderately convex, with indistinct median and lateral longitudinal furrows, posterior margin with distinct small swellings. Compound eyes rounded and small, its lengths about five times length of genae. Antennae filiform, longer than mesonotum, apices surpassing apices of profemora; scapus dorsoventrally flattened, slightly constricted basally, as long as combined length of pedicellus and third segment; pedicellus shorter than third segment.

Thorax: Pronotum rectangular, longer than wide, narrower than head, lateral margins emarginated pre-medially, anterior margin thickened and curved inwards, posterior margin rounded, transverse sulcus short and both ends not reaching lateral margins, transverse and longitudinal sulci crossing at middle area. Mesonotum slender and elongate, longer than combined length of metanotum and median segment, moderately expanded posteriorly; median longitudinal line indistinct. Metanotum slender, its lengths about three-and-a-half times length of median segment.

Abdomen: Cylindrical. Median longitudinal line indistinct. Median segment trapezoidal, gently expanded posteriorly, shorter than head. Third to seventh tergites with a small and rounded elevation posteromedially. Third tergum gently constricted posteriorly. Seventh tergum with a small and rounded posterolateral angle.

	Holotype Female	Paratype Females	Paratype Males
Body	288.0	264.0-280.0	175.0-190.0
Head	13.0	12.0	7.0
Antennae	80.0	66.0-80.0	84.0-94.0
Pronotum	10.0	9.0	5.0-5.5
Mesonotum	62.0	56.0-62.0	38.0-42.0
Metanotum	32.0	31.0-35.0	23.0-25.0
Median Segment	10.0	9.0-10.0	7.0-7.5
Profemora	75.0	70.0	58.0
Mesofemora	60.0	53.0-54.0	44.0-48.0
Metafemora	68.0	59.0-64.0	53.0-56.0
Protibiae	100.0	90.0-99.0	81.0-84.0
Mesotibiae	65.0	55.0-62.0	51.0-57.0
Metatibiae	78.0	70.0-75.0	70.0-71.0

Table 1. Measurements of *Neophryganistria guangdongensis* gen. nov. & sp. nov.

Seventh sternum with a distinct preopercular organ on posteromedian area, lateral margins rounded, distinctly bifurcated posteriorly, each arm elongated posteriorly, apices pointed and almost reaching posterior margin of seventh sternum. Eighth tergum shorter than combined length of ninth tergum and anal segment. Anal segment longer than ninth tergum, posterior margin broadly emarginated, posterolateral angles rounded. Supra-anal plate distinct, posterior margin rounded and surpassing posterolateral angles of anal segment. Operculum boat-shaped, tapering posteriorly, posterior margin rounded, median longitudinal carina distinct after middle area. Cerci short and small, tapering posteriorly, apices blunt and distinctly projecting over posterior margin of supra-anal segment.

Legs: Very slender and long, armed with distinct small serrations. Femora distinctly thicker than corresponding tibiae. Profemora distinctly curved basally, anterodorsal and posteroventral carinae sparsely serrated, other carina unarmed. Anterodorsal and posterodorsal carinae of mesofemora and metafemora with a very few small serrations, anteroventral and posteroventral carinae sparsely serrated. Tibiae longer than corresponding femora. Posterodorsal and posteroventral carinae of protibiae sparsely serrated. Anterodorsal, posterodorsal, anteroventral, posteroventral and medioventral carinae of mesotibiae and metatibiae sparsely serrated. Posterodorsal carina of mesotibiae and metatibiae also with an enlarged tooth pre-medially, apical area gently raised. Anteroventral carina of probasitarsi with one to two minute serrations, other carinae unarmed. All ventral carinae of mesobasitarsi and metabasitarsi with a few minute serrations, dorsal carina raised and unarmed.

Description of male (Figs. 9-10, 41, 44): Body slender and long, distinctly smaller than female, lacking granulation and unarmed. General colouration of body and legs brown. Profemora blackish brown with brown base. Mesopleurae and metapleurae dark brown.

Head: Oblong, longer than pronotum, gently tapering posteriorly behind compound eyes. Vertex and occiput weakly convex, with indistinct median and lateral longitudinal furrows, posterior margin with indistinct swellings. Compound eyes small and rounded, its length about three times of genae. Antennae filiform, apices surpassing apices of profemora; scapus flattened as long as combined length of pedicellus and third segment; third segment longer than pedicellus.

Thorax: Pronotum rectangular, longer than wide, anterior margin distinctly incurved, posterior margin rounded, transverse and longitudinal sulci crossing at middle point. Mesonotum elongate, longer than combined length of metanotum and median segment, broadly emarginated medially. Metanotum shorter than mesonotum, longer than median segment.

Abdomen: Slender and cylindrical. Median segment trapezoidal, gently expanded posteriorly. Third to seventh tergites with a small elevation posteromedially. Eighth tergum gently expanded posteriorly, longer than ninth tergum. Anal segment longer than eighth tergum, dilated into two elongate semi-tergites, tapering posteriorly, apices obtuse and with minute dentations. Inner margin of semi-tergites weakly curved in dorsal view, upper margin moderately curved downwards after middle area in lateral view, lower margin weakly curved upwards in lateral view. Poculum small, cup-shaped, distinctly elevated medially, posterior margin pointed



Figures 40-45. *Neophryganistria* gen. nov. spp. 40. *Neophryganistria heusii damingshanensis* gen. nov. & subsp. nov., female, habitus. 41. *Neophryganistria heusii damingshanensis* gen. nov. & subsp. nov., male, habitus. 42. *Neophryganistria heusii yentuensis* gen. nov. & comb. nov., female, habitus. 43. *Neophryganistria heusii yentuensis* gen. nov. & comb. nov., male, habitus. 44. *Neophryganistria heusii damingshanensis* gen. nov. & subsp. nov., male, head and thorax, dorsolateral view. 45. *Neophryganistria heusii yentuensis* gen. nov. & comb. nov., male, head and thorax, dorsolateral view. Scale bars = 10 mm. Photos by author.

and reaching posterior area of ninth tergum. Cerci long, weakly incurved, apices obtuse and not exceeding posterior margin of anal segment.

Legs: Very slender and long, distinctly armed with small serrations. Femora distinctly thicker than corresponding tibiae. Profemora curved basally, anterodorsal carina sparsely serrated, posteroventral carina sparsely serrated or unarmed, other carinae unarmed. Anterodorsal and posterodorsal carinae of mesofemora and metafemora with a few small serrations, anteroventral and posteroventral carinae sparsely serrated and with a large spine subapically. Tibiae longer than corresponding femora. Posteroventral carina of protibiae with a very few minute spine-like serrations, other carinae unarmed. Anterodorsal and posterodorsal carinae of mesotibiae and metatibiae with a few small spine-like serrations, anteroventral, posteroventral and medioventral carinae sparsely armed with spine-like serrations. Ventral carinae of mesobasitarsi and metabasitarsi with a few small spines.

Measurements: See Table 2.

Description of egg (Figs. 28-29): Capsule dark brown, smooth, oval, tapering posteriorly after post-median area, apex of posterior pole pointed. Micropylar plate oval, gently tapering anteriorly, anterior apex rounded. Micropylar cup placed near posterior margin of micropylar plate. Median line short, about one-fourth of micropylar plate. Operculum flat, with a mushroom-like stalked capitulum.

Measurements: Length, 5.0 mm; width, 3.0 mm; height, 4.0 mm.

Distribution: China (Guangxi).

Etymology: This new subspecies is named after the type locality, Damingshan (Guangxi, China).

***Neophryganistria heusii yentuensis* (Bresseel & Constant, 2014) comb. nov.** (Figs. 42-43, 45)

	Holotype Female	Paratype Females	Paratype Males
Body	295.0	232.0-272.0	181.0-195.0
Head	13.0	11.0-12.0	7.0
Antennae	86.0	60.0-76.0	85.0-118.0
Pronotum	10.0	9.0-10.0	5.0-6.0
Mesonotum	60.0	48.0-58.0	41.0
Metanotum	36.0	28.0-34.0	25.0-27.0
Median Segment	9.5	9.0-10.0	7.0-8.0
Profemora	75.0	60.0-64.0	60.0-62.0
Mesofemora	55.0	44.0-47.0	43.0-45.0
Metafemora	65.0	53.0-56.0	54.0-55.0
Protibiae	100.0	72.0-88.0	83.0
Mesotibiae	65.0	50.0-52.0	47.0-50.0
Metatibiae	72.0	61.0-68.0	66.0-67.0

Table 2. Measurements of *Neophryganistria heusii damingshanensis* gen. nov. & subsp. nov.

Phryganistria heusii yentuensis Bresseel and Constant, 2014: 23, figs. 8a-n, 11a-b; Brock and Büscher, 2022: 555.

Types: Holotype, ♂, Tay Yen Tu Nature Reserve, Vietnam, 7-11 July 2013, Constant, J. & Bresseel, J. (RBINS); Paratypes, 7♀, 10♂, 20 eggs, same data as holotype (RBINS & VNMN).

Other material examined: 1♀, 6♂, Siwandashan, Shangsi, Guangxi, China, 17 July 2016, George Ho Wai-Chun (HKES).

Diagnosis: *Neophryganistria heusii yentuensis* comb. nov. is related to *N. heusii damingshanensis* subsp. nov., but can be separated by the stouter body size and the longer legs in the both sexes, the shape of preopercular organ on the posteromedian area of seventh abdominal sternum in the female and the black profemora and the black mesopleurae and metapleurae in the male.

Distribution: China (Guangxi) and Vietnam.

Notes: This subspecies is newly recorded from China (Figs. 42-43, 45).

***Neophryganistria jinpingensis* sp. nov.** (Figs. 11-15, 30-31, 46-49)

Types: Holotype, ♀, 1500m, Jinping, Honghe, Yunnan, China, 27 August 2019, George Ho Wai-Chun (HKES); Paratypes, 2♀, 2♂, 13 eggs (laid by holotype and paratypes), same data as holotype, George Ho Wai-Chun (HKES).

Diagnosis: *Neophryganistria jinpingensis* sp. nov. is similar to *N. yunnanensis* sp. nov., but can be separated by the longer size in both sexes, the longer operculum and the unarmed dorsal carina of mesobasitarsi and metabasitarsi in the female and the longer anal segment and the presence of minute spines on the posteroventral carina of protibiae in the male.

Description of female (Figs. 11-13, 46, 48): Large size. General colouration of body and legs brown. Body elongate and very slender, surface glossy, lacking granulation and unarmed.

Head: Oval, moderately constricted posteriorly, longer than wide, longer than pronotum. Occiput moderately convex, with indistinct median and lateral longitudinal furrows, posterior margin with indistinct small swellings. Compound eyes rounded and small, its lengths about five times length of genae. Antennae filiform, longer than mesonotum, apices just surpassing apices of profemora; scapus dorsoventrally flattened, slightly constricted basally, shorter than combined length of pedicellus and third segment; pedicellus shorter than third segment.

Thorax: Pronotum rectangular, longer than wide, narrower than head, lateral margins weakly emarginated pre-medially, anterior margin thickened and curved inwards, posterior margin rounded, transverse sulcus short and both ends not reaching lateral margins, transverse and longitudinal sulci crossing at middle area. Mesonotum slender and elongate, longer than combined length of metanotum and median segment, moderately expanded posteriorly; median longitudinal line indistinct. Metanotum slender, shorter than mesonotum, its lengths about four times length of median segment.

Abdomen: Cylindrical. Median longitudinal line indistinct. Median segment trapezoidal, gently expanded posteriorly, shorter than head. Third tergum to anal segment parallel-sided. Seventh sternum with a distinct preopercular organ on posteromedian area, distinctly bifurcated, each arm elongated posteriorly, apices pointed and reaching anterior area of operculum. Eighth tergum shorter than combined length of ninth tergum and anal segment. Anal segment as long as ninth tergum, posterior margin broadly emarginated, middle area with a small and shallow notch, posterolateral angles rounded. Supra-anal plate distinct, tapering posteriorly, posterior margin rounded and surpassing posterolateral angles. Operculum boat-shaped, tapering posteriorly, posterior margin rounded and distinctly surpassing posterior margin of supra-anal plate, median longitudinal carina distinct. Cerci short and small, tapering posteriorly, apices blunt and projecting over posterior margin of supra-anal segment.

Legs: Very slender and long, armed with distinct small serrations. Femora thicker than corresponding tibiae. Profemora distinctly curved basally, anterodorsal and posteroventral carinae sparsely serrated, other carinae unarmed. Anterodorsal, posterodorsal, anteroventral and posteroventral carinae of mesofemora and metafemora sparsely serrated, some serrations enlarged. Tibiae longer than corresponding femora. Anterodorsal and posteroventral carinae of protibiae sparsely serrated. Anterodorsal, posterodorsal, anteroventral, posteroventral and medioventral carinae of mesotibiae and metatibiae sparsely serrated. Posterodorsal carina of mesotibiae and metatibiae also with an enlarged tooth pre-medially, apical area gently raised. Posterodorsal carina of probasitarsi with a few minute serrations, other carinae unarmed. All ventral carinae of mesobasitarsi and metabasitarsi with a few minute serrations, dorsal carina raised and unarmed.

Description of male (Figs. 14-15, 47, 49): Body slender and long, distinctly smaller than female, lacking granulation and unarmed. General colouration of body and legs brown.

Head: Oval, as long as pronotum, gently tapering posteriorly behind compound eyes. Vertex and occiput weakly convex, with indistinct median and lateral longitudinal furrows, posterior margin with indistinct swellings. Compound eyes small and rounded, its length about three times of genae. Antennae long and filiform, apices surpassing apices of profemora; scapus flattened, almost as long as combined length of pedicellus and third segment; pedicellus shorter than third segment.

Thorax: Pronotum rectangular, longer than wide, anterior margin incurved, posterior margin rounded, transverse and longitudinal sulci crossing at middle point. Mesonotum elongate, longer than combined length of metanotum and median segment, broadly emarginated medially. Metanotum longer than median segment.

Abdomen: Slender and cylindrical. Median segment trapezoidal, gently expanded posteriorly. Eighth tergum gently expanded posteriorly, longer than ninth tergum. Anal segment longer than eighth tergum, almost longer than combined length of eighth and ninth tergites, dilated into two elongate semi-tergites, tapering posteriorly, apices obtuse and with minute dentations.



Figures 46-49. *Neophryganistria jinpingensis* gen. nov. & sp. nov. 46. Female, habitus. 47. Male, habitus. 48. Female, head and thorax, dorsolateral view. 49. Male, head and thorax, dorsolateral view. Scale bars = 10 mm. Photos by author.

Inner margin of semi-tergites weakly curved in dorsal view, upper margin moderately curved downwards after pre-median area in lateral view, lower margin weakly curved upwards in lateral view. Poculum small, cup-shaped, distinctly elevated medially, posterior margin pointed and reaching posterior area of ninth tergum. Cerci long, weakly incurved, apices obtuse and not exceeding posterior margin of anal segment.

Legs: Very slender and long, distinctly armed with small serrations. Femora thicker than corresponding tibiae. Profemora curved basally, anterodorsal carina sparsely serrated, other carinae unarmed. Anterodorsal, posterodorsal, anteroventral and posteroventral carinae of mesofemora and metafemora sparsely serrated, anteroventral and posteroventral carinae also with a large subapical spine. Tibiae longer than corresponding femora. Anterodorsal and posteroventral carinae of protibiae sparsely armed with minute spines, other carinae unarmed. Anterodorsal, posterodorsal, anteroventral, posteroventral and medioventral carinae of mesotibiae and metatibiae sparsely armed with spine-like serrations. Ventral carinae of mesobasitarsi and metabasitarsi with a few small spines.

Measurements: See Table 3.

Description of egg (Figs. 30-31): Capsule brown, smooth, oval, tapering posteriorly, posterior pole slightly pointed. Micropylar plate oblong, longer than width of capsule, gently tapering anteriorly, anterior apex rounded. Micropylar cup placed near posterior margin of micropylar plate. Median line short, about one-fifth of micropylar plate. Operculum flat, centrally with mushroom-like stalked capitulum.

Measurements: Length, 4.8 mm; width, 3.0 mm; height, 3.5 mm.

Distribution: China (Yunnan).

Etymology: This new species is named after the type locality, Jinping (Yunnan, China).

***Neophryganistria yunnanensis* sp. nov.** (Figs. 16-20, 32-33, 50-53)

Types: Holotype, ♀, 500-600m, Bubang, Mengla, Xishuangbanna, Yunnan, China, 8 September 2015, George Ho Wai-Chun (HKES); Paratypes, 2♂, 17 eggs (laid by holotype), same data as holotype (HKES).

Diagnosis: *Neophryganistria yunnanensis* sp. nov. is related to *N. grandis* (Rehn, 1906) **comb. nov.**, but can be separated by the more slender body in the both sexes, the long supra-anal plate, the shape of preopercular organ on posteromedian area of seventh sternum and the serrated posterodorsal carina of protibiae in the female, also the smaller size and less armatures on legs in the male.

Description of female (Figs. 16-18, 50, 52): Large size. General colouration of body and legs brown. Body elongate and very slender, surface glossy, lacking granulation and unarmed.

Head: Oval, moderately constricted posteriorly, longer than wide, almost as long as pronotum. Occiput moderately convex, with distinct median and lateral longitudinal furrows, posterior margin with distinct small swellings. Compound eyes rounded and small, its lengths about four times length of genae. Antennae filiform, longer than mesonotum, apices just surpassing apices of profemora; scapus dorsoventrally flattened, slightly constricted basally, as long as combined length of pedicellus and third segment; pedicellus shorter than third segment.

Thorax: Pronotum rectangular, longer than wide, narrower than head, lateral margins weakly emarginated pre-medially, anterior margin thickened and weakly curved inwards, posterior margin rounded, transverse sulcus short and both ends not reaching lateral margins, transverse and longitudinal sulci crossing at middle area. Mesonotum slender and elongate, longer than combined length of metanotum and median segment, moderately expanded posteriorly; median longitudinal

	Holotype Female	Paratype Females	Paratype Males
Body	228.0	225.0-226.0	158.0-214.0
Head	10.0	10.0	6.0-7.5
Antennae	66.0	58.0	75.0-97.0
Pronotum	7.5	75.0	4.5-6.0
Mesonotum	51.0	50.0	37.0-51.0
Metanotum	28.0	28.0	23.5-31.0
Median Segment	7.5	7.5	5.5-8.0
Profemora	63.0	60.0-61.0	52.0-67.0
Mesofemora	48.0	47.0-48.0	40.0-52.0
Metafemora	58.0	54.0-55.0	48.0-63.0
Protibiae	85.0	82.0-83.0	72.0-91.0
Mesotibiae	53.0	51.0-53.0	44.0-53.0
Metatibiae	68.0	64.0-68.0	58.0-72.0

Table 3. Measurements of *Neophryganistria jinpingensis* gen. nov. & sp. nov.

line indistinct. Metanotum slender, its lengths about four times length of median segment.

Abdomen: Cylindrical. Median longitudinal line indistinct. Median segment trapezoidal, gently expanded posteriorly, shorter than head. Third segment gently constricted posteriorly. Seventh sternum with a distinct preopercular organ on posteromedian area, distinctly bifurcated, each arm elongated posteriorly, apices pointed and reaching anterior area of operculum. Eighth tergum as long as combined length of ninth tergum and anal segment. Anal segment almost as long as ninth tergum, posterior margin broadly emarginated, middle area with a small and shallow notch, posterolateral angles rounded. Supra-anal plate distinct, tapering posteriorly, posterior margin pointed and distinctly surpassing posterolateral angles. Operculum boat-shaped, tapering posteriorly, posterior margin rounded and reaching posterior margin of supra-anal plate, median longitudinal carina distinct. Cerci short and small, tapering posteriorly, apices blunt and not projecting over posterior margin of supra-anal segment.

Legs: Very slender and long, armed with distinct small serrations. Femora thicker than corresponding tibiae. Profemora distinctly curved basally, anterodorsal and posteroventral carinae sparsely serrated, posterodorsal carina with a very few small serrations, anteroventral carina unarmed. Anterodorsal, posterodorsal, anteroventral and posteroventral carinae of mesofemora and metafemora sparsely serrated, some serrations enlarged. Tibiae longer than corresponding femora. Posterodorsal and posteroventral carinae of protibiae sparsely serrated. Anterodorsal, posterodorsal, anteroventral, posteroventral and medioventral carinae of mesotibiae and metatibiae sparsely serrated. Posterodorsal carina of mesotibiae and metatibiae also with an enlarged tooth pre-medially, apical area gently raised. Probasitarsi unarmed. All ventral carinae of mesobasitarsi and metabasitarsi with a few small serrations, dorsal carina raised with one to two small serrations.

Description of male (Figs. 19-20, 51, 53): Body slender and long, distinctly smaller than female, lacking granulation and unarmed. General colouration of body and legs brown.

Head: Oval, as long as pronotum, gently tapering posteriorly behind compound eyes. Vertex and occiput weakly convex, with distinct median and lateral longitudinal furrows, posterior margin with indistinct swellings. Compound eyes small and rounded, its length about two times of genae. Antennae filiform, apices surpassing apices of profemora; scapus flattened, almost as long as combined length of pedicellus and third segment; pedicellus shorter than third segment.

Thorax: Pronotum rectangular, longer than wide, anterior margin distinctly incurved, posterior margin rounded, transverse and longitudinal sulci crossing at middle point. Mesonotum elongate, longer than combined length of metanotum and median segment, broadly emarginated medially. Metanotum longer than median segment.

Abdomen: Slender and cylindrical. Median segment trapezoidal and gently expanded posteriorly. Eighth tergum gently expanded posteriorly, as long as ninth tergum. Anal segment longer than eighth tergum, dilated into two elongate semi-tergites, tapering posteriorly, apices obtuse and with minute dentations. Inner margin of semi-tergites weakly curved in dorsal view, upper margin moderately curved downwards after middle area in lateral view, lower margin weakly curved upwards after middle area in lateral view. Poculum small, cup-shaped, distinctly elevated medially, posterior margin pointed and reaching posterior area of ninth tergum. Cerci long, weakly incurved, apices obtuse and not exceeding posterior margin of anal segment.

Legs: Very slender and long, distinctly armed with small serrations. Femora thicker than corresponding tibiae. Profemora curved basally, anterodorsal carina sparsely serrated, other carinae unarmed. Anterodorsal, posterodorsal, anteroventral and posteroventral carinae of mesofemora and metafemora sparsely serrated, anteroventral and posteroventral carinae also with a large spine subapically. Tibiae longer than corresponding femora. Protibiae unarmed. Anterodorsal, posterodorsal, anteroventral, posteroventral and medioventral carinae of mesotibiae and metatibiae sparsely armed with spine-like serrations. Ventral carinae of mesobasitarsi and metabasitarsi with a few small spines.

Measurements: See Table 4.



Figures 50-53. *Neophryganistria yunnanensis* gen. nov. & sp. nov. 50. Female, habitus. 51. Male, habitus. 52. Female, head and thorax, dorsolateral view. 53. Male, head and thorax, dorsolateral view. Scale bars = 10 mm. Photos by author.

Description of egg (Figs. 32-33): Capsule brown, smooth, oval, tapering posteriorly, posterior pole pointed. Micropylar plate oblong and elongate, longer than width of capsule, gently tapering anteriorly, anterior apex rounded. Micropylar cup placed near posterior margin of micropylar plate. Median line short, about one-fifth of micropylar plate. Operculum flat, centrally with disc-like stalked capitulum.

Measurements: Length, 5.5 mm; width, 3.0 mm; height, 3.0 mm.

Distribution: China (Yunnan).

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

Phryganistria Stål, 1875

Phryganistria Stål, 1875: 6, 63; Kirby, 1904: 358; Brunner von Wattenwyl, 1907: 183; Otte and Brock, 2005: 272; Chen and He, 2008: 336; Hennemann and Conle, 2008: 198; Hennemann et al., 2008: 24; Mandal and Yadav, 2010: 32; Bresseel and Constant, 2014: 8; Brock and Büscher, 2022: 555.

Type-species: *Bacteria sarmentosa*, Westwood, 1848: 66, pl. 32: 1-2 (= *Bacteria virgea* Westwood, 1848: 66), by subsequent designation of Kirby, 1904: 358.

Diagnosis: *Phryganistria* Stål, 1875 is closely related to *Neophryganistria* **gen. nov.**, but can be separated by the comparatively short metanotum (about one-half length of the mesonotum), the comparatively long median segment (about one-half length to one-third length of the metanotum), the unarmed medioventral carina of mesofemora and metafemora and the non-thick-built femora (not distinctly thicker than corresponding tibiae) in both sexes, the more convex occiput of head, the presence of rounded lobes on lateral margins of third to sixth abdominal tergites and the lanceolate and long operculum in the female, also the comparatively slender and elongate semi-tergites and the absence of

subapical spine on the anteroventral and posteroventral carinae of mesofemora and metafemora in the male.

Description: Large size. Apterous. Dull colouration. Body slender, long, cylindrical, female more robust and longer than male; smooth and unarmed. Head oval, unarmed. Occiput moderately convex in female, weakly convex in male. Antennae filiform. Thorax smooth and unarmed. Pronotum rectangular, longer than wide. Mesonotum elongate, longer than combined length of metanotum and median segment. Metanotum about one-half length of mesonotum. Abdomen cylindrical, smooth, tapering posteriorly. Median segment elongate, rectangular, longer than wide, about one-half length to one-third length of metanotum. Lateral margins of third to sixth abdominal tergites with rounded lobes. Female anal segment with a distinct emargination on posterior margin. Male anal segment dilated into two elongate semi-tergites, tapering posteriorly. Female seventh sternum with distinct preopercular organ posteromedially, formed by a pair of long and elongate spine-like structures. Female operculum long to very long, lanceolate, tapering posteriorly, apex pointed and distinctly surpassing over anal segment. Male poculum small, cup-shaped, with median hump. Supra-anal plate small and distinct in female, indistinct in male. Cerci short and small in female, male with longer cerci. Legs very long and slender, femora not distinctly thicker than corresponding tibiae (except *Phryganistria bachmaensis*). Anterodorsal and posteroventral carinae of profemora serrated in female, only anterodorsal carina serrated in male. Anterodorsal, posterodorsal, anteroventral and posteroventral carinae of mesofemora and metafemora serrated in both sexes, medioventral carina unarmed (except *P. bachmaensis*), dorsal carinae with fewer and smaller serrations than ventral carinae. Anterodorsal, posterodorsal, anteroventral and posteroventral carinae of mesotibiae and metatibiae serrated in both sexes. Dorsal carina of mesobasitarsi and metabasitarsi raised in female, not raised in male. Egg capsule oval, posterior pole rounded. Micropylar plate oval. Operculum with stalked capitulum.

	Holotype Female	Paratype Males
Body	246.0	149.0-152.0
Head	10.0	5.0
Antennae	60.0	65.0-67.0
Pronotum	9.0	5.0
Mesonotum	54.0	34.0-36.0
Metanotum	30.0	22.0-24.0
Median Segment	7.0	4.0-5.0
Profemora	65.0	47.0-50.0
Mesofemora	50.0	37.0
Metafemora	56.0	42.0
Protibiae	90.0	68.0-71.0
Mesotibiae	60.0	42.0-43.0
Metatibiae	71.0	54.0-55.0

Table 4. Measurements of *Neophryganistria yunnanensis* **gen. nov. & sp. nov.**

Distribution: China, India and Vietnam.

Notes: Currently, a total of three species are recognised in *Phryganistria*, including *P. bachmaensis* (Ta & Hoang, 2004) [Vietnam], *P. laikuenae* **sp. nov.** [China], and *P. virgea* (Westwood, 1848) [India]. *P. bachmaensis* is a special species and shows striking features of both the genera *Phryganistria* and *Neophryganistria* **gen. nov.** Although *P. bachmaensis* shows a few generic features of *Neophryganistria* **gen. nov.**, including the thick-built mesofemora and metafemora and the presence of a few minute serrations on the medioventral carina of mesofemora and metafemora in both sexes, it is closer to *Phryganistria* by the comparatively short metanotum and the comparatively long median segment in both sexes, the presence of rounded lobes on lateral margins of third to sixth abdominal tergites and the lanceolate and long operculum in the female and the comparatively slender and elongate anal abdominal segment and the absence of subapical spine on the anteroventral and posteroventral carinae of mesofemora and metafemora in the male. Hence, *P. bachmaensis* has been retained in *Phryganistria*.

Species included in China:

1. *Phryganistria laikuenae* **sp. nov.** 麗娟佛螳 [China (Yunnan)]

Phryganistria laikuenae **sp. nov.** (Figs. 21-25, 34-35, 54-57)

Types: Holotype, ♀, 2000m, Baoshan, Yunnan, China, 30 June 2019, George Ho Wai-Chun (HKES); Paratypes, 2♂, 64 eggs (32 eggs laid by holotype & 32 eggs extracted from the abdomen of holotype), same data as holotype (HKES).

Diagnosis: *Phryganistria laikuenae* **sp. nov.** is similar to *P. virgea* (Westwood, 1848), but can be separated by the smaller and robust body, the broad U-shaped emargination on the posterior margin of anal segment and the presence of a few small serrations on the posterodorsal carina of protibiae in the female, also the longer median segment, the elongate anal segment and the unarmed ventral carinae of profemora in the male.

Description of female (Figs. 21-23, 54, 56): Large size. General colouration of body and legs green. Body

elongate and very slender, surface glossy, lacking granulation and unarmed.

Head: Oval, moderately constricted posteriorly, longer than wide, longer than pronotum. Occiput moderately convex, with distinct median and lateral longitudinal furrows, posterior margin with indistinct small swellings. Compound eyes rounded and small, its lengths about four times length of genae. Antennae filiform, longer than mesonotum, apices just surpassing apices of profemora; scapus dorsoventrally flattened, slightly constricted basally, longer than wide, longer than pedicellus, roughly as long as third segment.

Thorax: Pronotum rectangular, longer than wide, narrower than head, weakly emarginated pre-medially, anterior margin thickened and distinctly curved inwards, posterior margin rounded, transverse sulcus short and both ends not reaching lateral margins, transverse and longitudinal sulci crossing at middle area. Mesonotum slender and elongate, longer than combined length of metanotum and median segment, moderately expanded posteriorly, median longitudinal line indistinct, with minute and indistinct pits along lateral margins. Metanotum parallel-sided, its lengths about two times length of median segment.

Abdomen: Cylindrical, tapering posteriorly. Lateral margins of third to sixth tergites swollen. Median longitudinal line indistinct. Median segment rectangular, longer than wide. Second tergum gently constricted posteriorly. Seventh sternum with a pair of small and flattened horn-like preopercular organ on posteromedian area, each arm strongly elongated posteriorly. Eighth tergum as long as combined length of ninth tergum and anal segment. Anal segment as long as ninth tergum, with a small and broad shallow U-shaped emargination on posterior margin, posterolateral angles rounded. Supra-anal plate distinct, small, posterior margin rounded, median longitudinal carina distinct. Operculum very long, longer than combined length of three terminal tergites, lanceolate, tapering posteriorly, apex pointed and surpassing apices of metatarsi, median longitudinal carina distinct after pre-median area. Cerci short and small, tapering posteriorly, apices pointed and projecting over posterior margin of supra-anal segment.

Legs: Very slender and long, distinctly armed with small serrations. Femora not thicker than corresponding tibiae.



Figures 54-57. *Phryganistria laikuenae* **sp. nov.** 54. Female, habitus. 55. Male, habitus. 56. Female, head and thorax, dorsolateral view. 57. Male, head and thorax, dorsolateral view. Scale bars = 10 mm. Photos by author.

Profemora distinctly curved basally, anterodorsal and posteroventral carinae densely serrated, posterodorsal carina with a very few small serration, other carinae unarmed. Anterodorsal, posterodorsal, anteroventral and posteroventral carinae of mesofemora and metafemora densely serrated, medioventral carina unarmed. Tibiae longer than corresponding femora. Posterodorsal carina of protibiae with a very few minute serrations, posteroventral carina densely serrated. Anterodorsal, posterodorsal, anteroventral and posteroventral carinae of mesotibiae and metatibiae densely serrated, medioventral carina sparsely serrated. Probasitarsi unarmed. All carinae of mesobasitarsi and metabasitarsi with small serrations.

Description of male (Figs. 24-25, 55, 57): Body slender and long, distinctly smaller than female, surface glossy, lacking granulation and unarmed. General colouration of body brown and legs brown with small blackish markings.

Head: Oval, longer than pronotum, gently tapering posteriorly behind compound eyes. Vertex and occiput weakly convex, with distinct median and lateral longitudinal furrows, posterior margin with six small swellings. Compound eyes small and rounded, its length about two times of genae. Antennae filiform, apices surpassing apices of profemora; scapus flattened, as long as combined length of pedicellus and third segment; third segment as long as pedicellus.

Thorax: Pronotum rectangular, longer than wide, anterior margin distinctly incurved, posterior margin rounded, transverse and longitudinal sulci crossing at middle point. Mesonotum elongate, its lengths about two times length of metanotum, longer than combined length of metanotum and median segment, broadly emarginated medially. Metanotum longer than median segment, its lengths about two times length of median segment.

Abdomen: Slender and cylindrical. Median segment rectangular, longer than wide, longer than head. Eighth

tergum weakly expanded posteriorly, longer than ninth tergum. Anal segment longer than eighth tergum, dilated into two elongate semi-tergites, tapering posteriorly, apices swollen and obtuse; inner margin weakly curved in dorsal view, with minute dentations, upper margin gently curved downwards in lateral view, lower margin weakly curved upwards in lateral view. Poculum small, cup-shaped, distinctly elevated medially, posterior margin pointed and reaching posterior area of ninth tergum. Cerci short, apices obtuse and not exceeding posterior margin of anal segment.

Legs: Very slender and long, distinctly armed with small serrations. Femora not thicker than corresponding tibiae. Profemora curved basally, anterodorsal carina densely serrated, other carinae unarmed. Anterodorsal and posterodorsal carinae of mesofemora and metafemora sparsely serrated, anteroventral and posteroventral carinae sparsely serrated, medioventral carina unarmed. Protibiae unarmed. Anterodorsal, posterodorsal, anteroventral, posteroventral and medioventral carinae of mesotibiae and metatibiae sparsely armed with small spines. All carinae of mesobasitarsi and metabasitarsi with small spines.

Measurements: See Table 5.

Description of egg (Figs. 34-35): Capsule brown, oval, posterior pole rounded, surface reticulate-foveate. Micropylar plate oval, gently tapering anteriorly. Micropylar cup placed at posterior margin of micropylar plate. Median line long, placed behind micropylar cup, almost as long as length of micropylar plate. Operculum flattened, centrally with a disc-like stalked capitulum.

Measurements: Length, 4.6 mm; width, 2.5-3.0 mm; height, 3.5 mm.

Distribution: China (Yunnan).

Etymology: This new species is named and dedicated to the memory of the author's mother, Mrs. Leung Lai-Kuen.

	Holotype Female	Paratype Males
Body	220.0	134.0-138.0
Head	8.0	5.0
Antennae	50.0	63.0-67.0
Pronotum	7.0	4.5
Mesonotum	41.0	29.0-30.0
Metanotum	20.0	14.0-15.5
Median Segment	10.0	7.0
Profemora	53.0	43.0-45.0
Mesofemora	41.0	34.0-35.0
Metafemora	47.0	40.0-41.0
Protibiae	72.0	60.0
Mesotibiae	52.0	38.0-39.0
Metatibiae	58.0	50.0-52.0

Table 5. Measurements of *Phryganistria laikuenae* sp. nov.

CONCLUSION

In this paper, *Phryganistria* Stål, 1875 is redescribed, and currently, three species are known. *Phryganistria* exhibits discontinuous distributions between northeastern Indian subcontinent, western Yunnan in China, and central Vietnam. This distribution suggests the potential presence of the genus in Myanmar, Laos, Thailand, southern Yunnan in China, and northern Vietnam. In contrast, *Neophryganistria* **gen. nov.** has a broader distribution compared to *Phryganistria*, with nine species and three subspecies currently known. *Neophryganistria* **gen. nov.** is primarily found in southern to southwestern parts of China, such as Guangdong, Guangxi, and Yunnan. Its distribution might also extend to neighbouring provinces like Fujian, Guizhou, Hunan, and Jiangxi in southern to eastern China. Further collection efforts in certain primitive forests could potentially reveal more localities and even new taxa of *Neophryganistria* **gen. nov.** in these provinces in China.

To better understand the phylogenetic relationships within Pharnaciini, molecular research should be conducted. Specifically, *Phryganistria bachmaensis* (Ta & Hoang, 2004) shows characteristics of both *Phryganistria* and *Neophryganistria* **gen. nov.**, but it is closer to *Phryganistria*. Molecular analysis can provide insights into the classification of this species.

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Figure 58. *Neophryganistria guangdongensis* gen. nov. & sp. nov., adult female, Heishiding, Fengkai, Guangdong, China, 27 July 2011. Photo by author.

