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Research article

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First record of the genus *Parandes* Muir, 1925 from China with descriptions of two new species (Hemiptera, Fulgoromorpha, Cixiidae)

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Abstract. The genus *Parandes* Muir, 1925 (Cixiinae, Andini) is recorded from China for the first time with two new species, *Parandes circinatus* Wang & Chen sp. nov. and *Parandes fuscus* Wang & Chen sp. nov. Color images for the adults of the two new species and line drawings for the genitalia are provided. A key is presented to separate all species within the genus.

Keywords. Fulgoroidea, morphology, planthopper, Oriental region, taxonomy.

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Introduction

The planthopper genus *Parandes* was established by Muir (1925) in the tribe Andini Emeljanov, 2002 (Hemiptera, Cixiidae, Cixiinae), with *Parandes simplus* Muir, 1925 as the type species. Hitherto *Parandes* has been monotypic, described from a single female specimen from West Borneo (Löcker

et al. 2007). No scholars have conducted morphological or taxonomic studies on this genus since its establishment (Bourgoin 2022).

We record the genus *Parandes* in China for the first time and describe two new species, *P. circinatus* Wang & Chen sp. nov. and *Parandes fuscus* Wang & Chen sp. nov. from Yunnan. So far, including the two new species, the genus currently comprises three valid species, all distributed in the Oriental region. A key to known species of *Parandes* is provided.

Material and methods

The morphological terminology and measurements follow Bourgoin (1987) and Bourgoin *et al.* (2015). The morphological terminology of female genitalia follows Bourgoin (1993). Dry specimens were used for the descriptions and illustrations. Body length was measured from the apex of the vertex to the tip of the forewing; vertex length (median length of vertex) was measured from the apical transverse carina to the tip of the basal emargination. External morphology and drawings were done with the aid of a Leica MZ 12.5 stereo microscope. Photographs of the types were taken with the Keyence VHX-1000 system. Illustrations were scanned with a CanoScan LiDE 200 and imported into Adobe Photoshop CS7 for labelling and plate composition. The dissected male genitalia are preserved in glycerine in small plastic tubes (genitalia vials) pinned together with the specimens.

The type specimens examined are deposited in the Institute of Entomology, Guizhou University, Guiyang, Guizhou Province, China (GUGC). The type specimen of *Parandes simplus* Muir, 1925 is deposited in the Bernice Pauahi Bishop Museum, Honolulu, Hawaii (BMHH).

Results

Class Insecta Linnaeus, 1758
Order Hemiptera Linnaeus, 1758
Infraorder Fulgoromorpha Evans, 1946
Family Cixiidae Spinola, 1839
Subfamily Cixiinae Spinola, 1839
Tribe Andini Emeljanov, 2002

Genus *Parandes* Muir, 1925

Parandes Muir, 1925: 511.

Type species

Parandes simplus Muir, 1925, by original designation.

Diagnosis

Head in profile with the junction of vertex and frons slightly angular and slightly produced. Frons narrow and long. ScP + RA, RP and MP arising separately from a common point on basal cell or forming a minute common stem. Fore coxa produced and rounded on the outer edge of the apical half (Fig. 1A). Hind tibiae without or with several very small lateral spines.

Distribution

China, Indonesia.

Checklist and distribution of species of *Parandes* Muir, 1925

P. circinatus Wang & Chen sp. nov.; China (Yunnan).

P. fuscus Wang & Chen sp. nov.; China (Yunnan).

P. simplus Muir, 1925; Indonesia (West Borneo).

Key to species of *Parandes* Muir, 1925

1. Forewing almost without markings (Fig. 5A–C); hind tibiae without lateral spines (Fig. 5G)
..... *P. simplus* Muir, 1925
- Forewing with markings; hind tibiae with several very small lateral spines 2
2. Apex of forewing dark brown across its entire width apart from a few pale spots (Fig. 3B, E); middle part of inner margin of gonostyli with emarginations ventrally (Fig. 3J–M)
..... *P. fuscus* Wang & Chen sp. nov.
- Apex of forewing light brown apart from a few pale spots and small dark brown stripes and markings (Fig. 2B, E); middle part of inner margin of gonostyli arcuate ventrally (Fig. 2J–M)
..... *P. circinatus* Wang & Chen sp. nov.

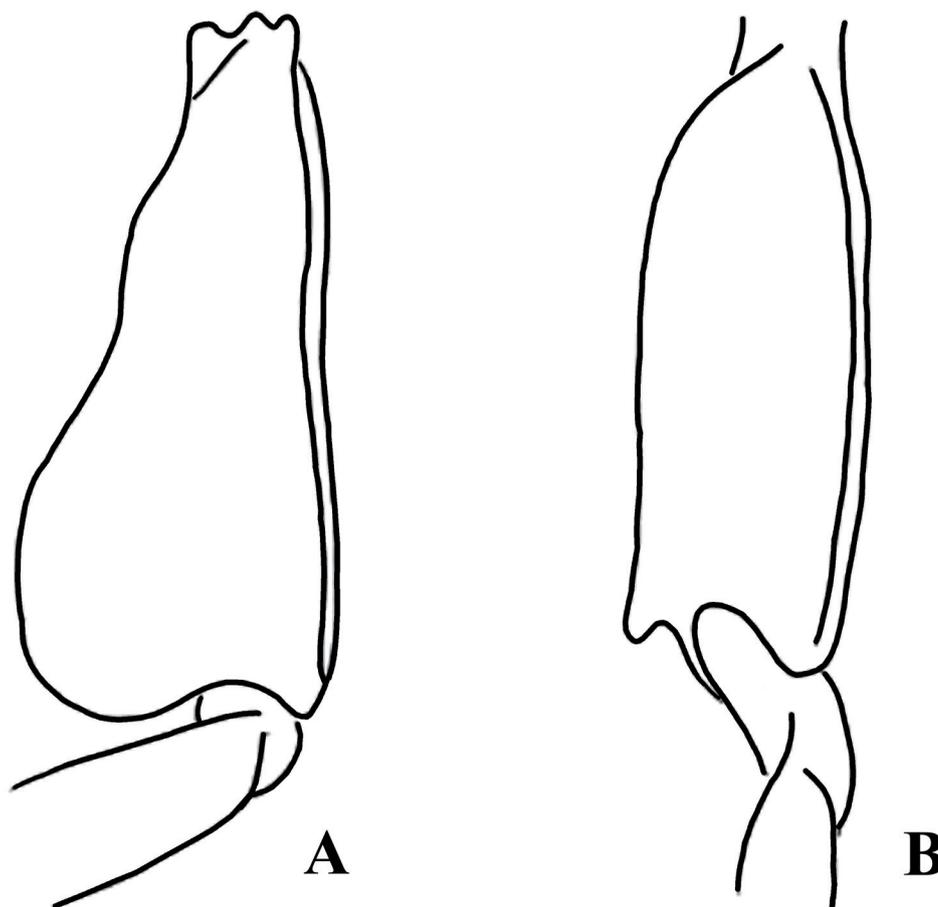


Fig. 1. Fore coxa. **A.** *Parandes* Muir, 1925. **B.** *Andes* Stål, 1866 (modified from Muir 1925).

Parandes circinatus Wang & Chen sp. nov.

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Figs 2, 6A

Diagnosis

The salient features of the new species include the following: dorsal margin of periandrium with a laminal process near base, covering the left half of periandrium (Fig. 2K); apical left side of periandrium with a laminal process, upper part around the periandrium, bottom part bending cephalad (Fig. 2K); basal right side of periandrium with a long circinate spinose process (Fig. 2J–M).

Etymology

The specific name is derived from the Latin adjective ‘*circinatus*’, referring to the one long circinate spinose process arising from the basal right side of periandrium.

Type material

Holotype

CHINA • ♂; Yunnan Province, Mengla County, Menglun Town, Bakaxiaozhai Village; 21.97° N, 101.22° E; 13 Jun. 2019; Feng-E. Li leg.; GUGC.

Paratypes

CHINA • 2 ♂♂; same collection data as for holotype; GUGC.

Description

MEASUREMENTS. Body length: male 5.87–6.12 mm (N = 3).

COLORATION. General color yellowish white (Fig. 2A–B). Eyes black brown, margin light green; ocelli faint red, semi-translucent. Lateral carinae of frons yellowish white; lateral side of head with a triangular yellowish green spot anterior to the eyes. Antenna faint yellow, base light green. Vertex yellowish brown. Face and rostrum generally yellowish brown. Pronotum yellowish green. Mesonotum yellowish brown. Forewing semi-translucent, basal and middle part of wing with yellow stripes, costal vein with a V-shaped spot, apical half of wing with several irregular dark spots. Stigma yellowish green. Veins and tubercles yellowish brown. Hind tibiae light yellow. Abdomen yellowish brown ventrally.

HEAD AND THORAX. Vertex (Fig. 2A, C) 2.8 times as long as wide; anterior margin nearly straightly, posterior margin U-shaped recessed, lateral carina developed, median carina absent. Frons (Fig. 2D) 4.0 times as long as wide, lateral carina developed, base of median carina raised, median carina of postclypeus transparent. Pronotum (Fig. 2A, C) slightly shorter than vertex; posterior margin recessed. Mesonotum as long as pronotum and vertex combined. Forewing (Fig. 2B, E) 2.3 times as long as wide, with twelve apical cells and seven subapical cells; RP 3 branches, MP with 5 terminals: MP₁₁, MP₁₂, MP₂, MP₃, and MP₄, fork MP₁+MP₂ basad of fork MP₃+MP₄. Hind tibia (Fig. 6A) with five lateral spines; chaetotaxy of hind tarsi: 7–9/8, 2nd hind tarsus with 3 platellae.

MALE GENITALIA. Pygofer (Fig. 2F–G) in ventral view symmetrical; in lateral view, lateral lobes arcuate and extended caudally. Medioventral process lanceolar in ventral view. Anal segment (Fig. 2F, H) flat tubular, dorsal margin almost straight, ventral margin curved slightly in lateral view; 1.7 times as long as wide in dorsal view; anal style strap-shaped, not extending beyond anal segment. Gonostyli (Fig. 2G, I) symmetrical ventrally, inner margin slightly protruding near base, apical margin enlarged; in inner lateral view, dorsal margin recessed, right side of apex with a small process. Aedeagus (Fig. 2J–M) with a spinose process. Dorsal margin of periandrium with a laminal process near base, covering the left half of periandrium; apical left side of periandrium with a laminal process, upper part wrapping around the

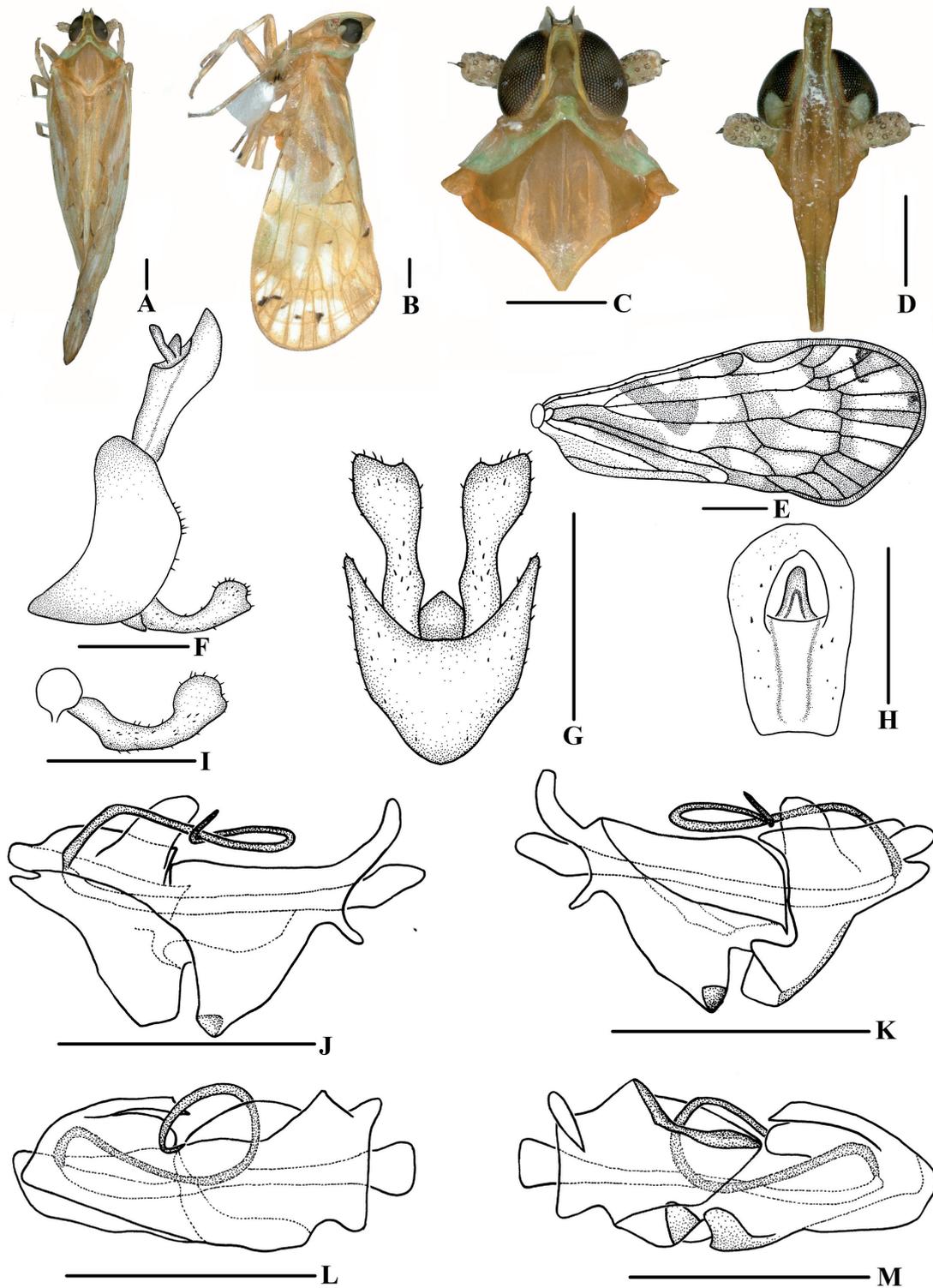


Fig. 2. *Parandes circinatus* Wang & Chen sp. nov., holotype, ♂ (GUGC). **A.** Dorsal view. **B.** Lateral view. **C.** Head and thorax, dorsal view. **D.** Face, ventral view. **E.** Forewing. **F.** Genitalia, lateral view. **G.** Pygofer and gonostyli, ventral view. **H.** Anal segment, dorsal view. **I.** Gonostyli, lateral view. **J.** Aedeagus, right side. **K.** Aedeagus, left side. **L.** Aedeagus, dorsal view. **M.** Aedeagus, ventral view. Scale bars: A–D, F–M = 0.5 mm; E = 1.0 mm.

periandrium, bottom part bending cephalad; basal right side of periandrium with a long circinate spinose process, curved dorso-cephalad then strongly bending, directed caudad, and then bending upwards, directed dorso cephalad; apex of ventral margin of periandrium with a laminal process, basal half of periandrium with a laminal process, apex bending to the left. Endosoma slightly sclerotized, without process.

Distribution

China (Yunnan).

Remarks

This species can be distinguished from the other species of the genus by the body color, forewing markings and male genitalia.

Parandes fuscus Wang & Chen sp. nov.

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Figs 3–4, 6B

Diagnosis

The salient features of the new species include the following: apex of forewing dark brown across its entire width apart from a few pale spots (Fig. 3A, C); ventral margin of periandrium with a laminal process near base, bending up to the left (Fig. 3M); basal $\frac{1}{3}$ of periandrium with an expanded semi-enclosed structure around the left and right side and ventral margin of periandrium (Fig. 3J–K, M); apex of periandrium with a long spinose process, curved dorsally to the base, then strong bending (Fig. 3J–M).

Etymology

The specific name is derived from the Latin adjective '*fuscus*', referring to an arcuate dark brown stripe from the apical margin of forewing.

Type material

Holotype

CHINA • ♂; Yunnan Province, Mengla County, Menglun Town; 21.94° N, 101.26° E; 18 Aug. 2014; Ying-Jian Wang leg.; GUGC.

Paratypes

CHINA • 1 ♂; same collection data as for holotype; GUGC • 1 ♂; Yunnan Province, Mengla County, Menglun Town, Bakaxiaozhai Village; 21.97° N, 101.22° E; 27 Aug. 2014; Mei-Na Guo leg.; GUGC • 1 ♀; same collection data as for preceding but 26 Sep. 2015; Qiang Luo leg.; GUGC • 1 ♀; same collection data as for preceding but 1 Sep. 2017; Yan Zhi leg.; GUGC • 3 ♂♂, 2 ♀♀; same collection data as for preceding but 13 Jun. 2019; Feng-E Li leg.; GUGC.

Description

MEASUREMENTS. Body length: male 6.38–6.82 mm (N = 6), female 6.80–7.15 mm (N = 4).

COLORATION. General color yellowish brown (Fig. 3A–B). Eyes black brown, margin yellowish brown; ocelli faint red, semi-translucent. Lateral carinae of frons yellowish white; lateral side of head with a long brown spot anterior to the eyes. Antenna yellowish brown. Vertex dark brown. Face and rostrum generally dark brown. Pronotum yellowish brown. Mesonotum with area between lateral carinae darker brown, lateral areas yellowish brown. Forewing semi-translucent, slightly anterior and posterior to fork CuA with a narrow and small irregular puce stripe respectively, posterior to clavus with an elliptical

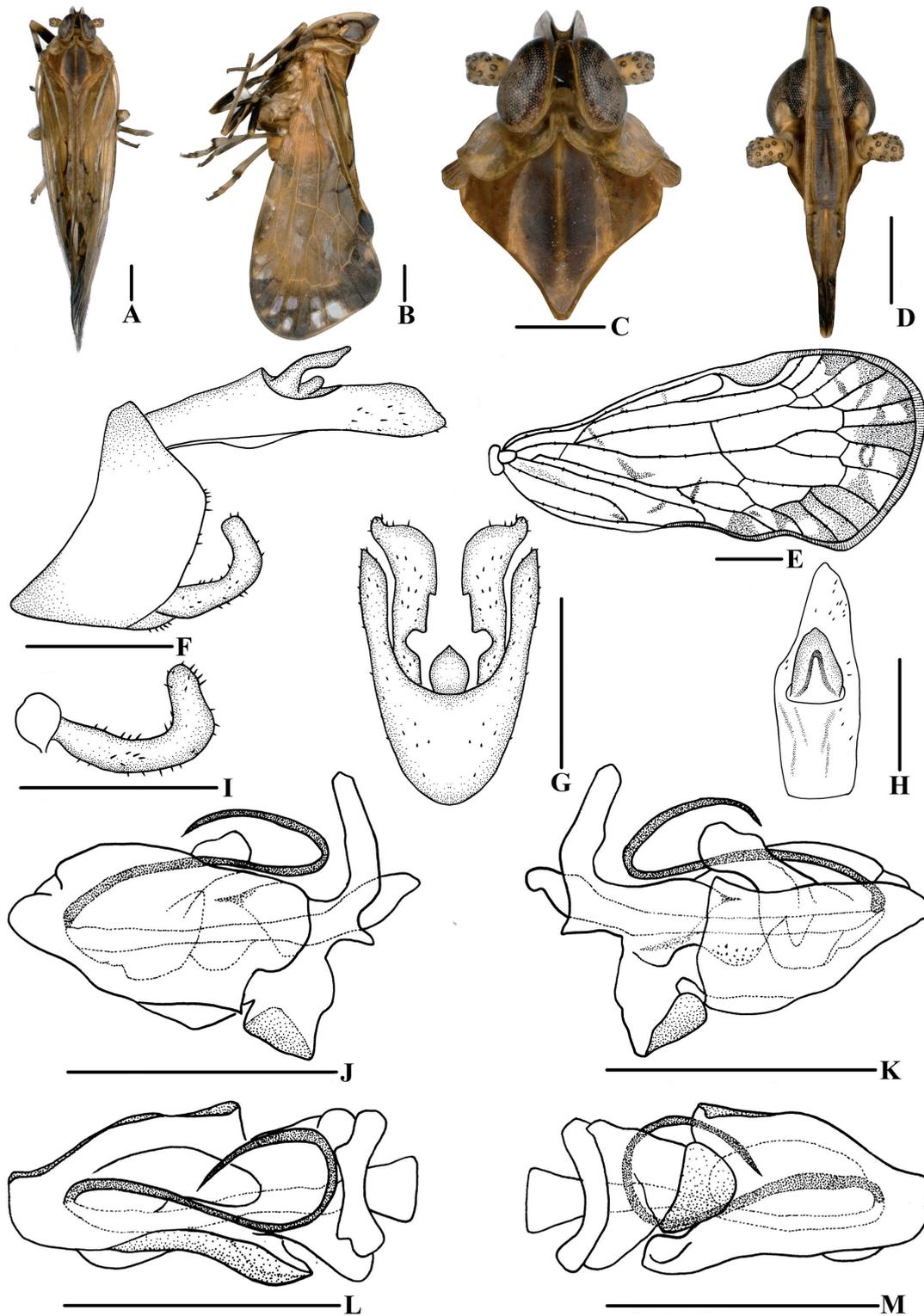


Fig. 3. *Parandes fuscus* Wang & Chen sp. nov., holotype, ♂ (GUGC). **A.** Dorsal view. **B.** Lateral view. **C.** Head and thorax, dorsal view. **D.** Face, ventral view. **E.** Forewing. **F.** Genitalia, lateral view. **G.** Pygofer and gonostyli, ventral view. **H.** Anal segment, dorsal view. **I.** Gonostyli, lateral view. **J.** Aedeagus, right side. **K.** Aedeagus, left side. **L.** Aedeagus, dorsal view. **M.** Aedeagus, ventral view. Scale bars: A–D, F–M = 0.5 mm; E = 1.0 mm.

black brown spot, apex of forewing dark brown across its entire width apart from a few pale spots. Stigma black brown. Veins and tubercles concolorous with wing. Hind tibiae yellowish brown. Abdomen yellowish brown ventrally.

HEAD AND THORAX. Vertex (Fig. 3A, C) 2.1 times as long as wide; anterior margin nearly straightly, posterior margin U-shaped recessed, lateral carina developed, median carina absent. Frons (Fig. 3D) 4.7 times as long as wide, lateral carina developed, base of median carina raised, median carina of postclypeus transparent. Pronotum (Fig. 3A, C) slightly shorter than vertex; posterior margin recessed. Mesonotum 1.1 times as long as pronotum and vertex combined. Forewing (Fig. 3B, E) 2.12 times as long as wide, with twelve apical cells and seven subapical cells; RP 3 branches, MP with 5 terminals:

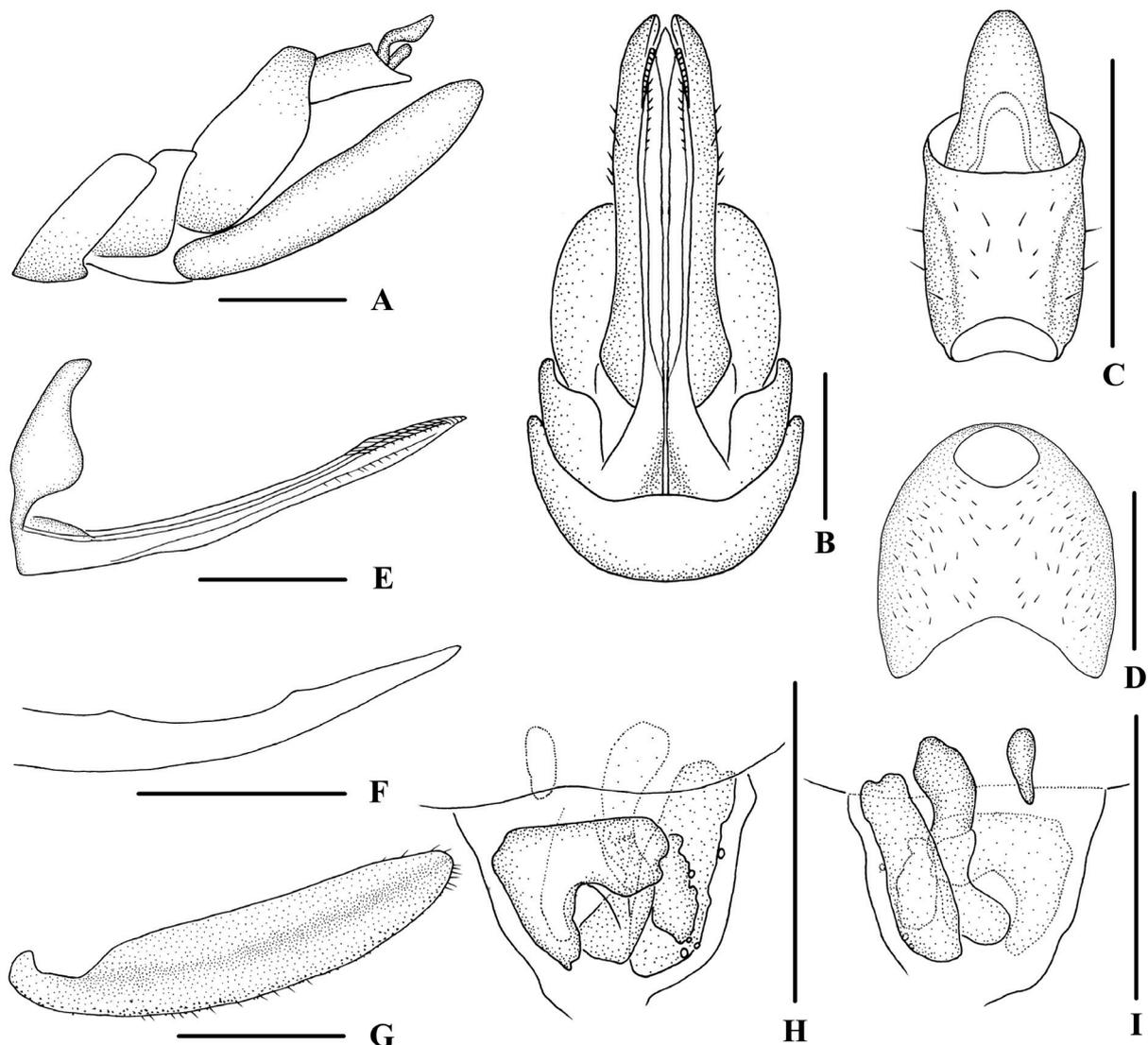


Fig. 4. *Parandes fuscus* Wang & Chen sp. nov., paratype, ♀ (GUGC). **A.** Genitalia, lateral view. **B.** Genitalia, ventral view. **C.** Anal segment, dorsal view. **D.** Tergite IX, caudal view. **E.** Gonapophysis VIII and gonocoxa VIII, dorsal view. **F.** Gonapophysis IX, lateral view. **G.** Gonoplac, inner lateral view. **H.** Posterior vagina, ventral view. **I.** Posterior vagina, dorsal view. Scale bars = 0.5 mm.

MP₁₁, MP₁₂, MP₂₂, MP₃₃, and MP₄₄, fork MP₁+MP₂ basad of fork MP₃+MP₄. Hind tibia (Fig. 6B) with five lateral spines; chaetotaxy of hind tarsi: 7/7–8, 2nd hind tarsus with 2–3 platellae.

MALE GENITALIA. Pygofer (Fig. 3F–G) in ventral view symmetrical; in lateral view, lateral lobes arcuate and extended caudally. Medioventral process linguiform in ventral view, apex pointed. Anal segment (Fig. 3F, H) flat tubular, dorsal margin almost straight, ventral margin curved slightly in lateral view; 2.8 times as long as wide in dorsal view; anal style strap-shaped, not extending beyond anal segment. Gonostyli (Fig. 3G, I) symmetrical ventrally, middle part of inner margin with emarginations; gonostyli in inner lateral view L-shaped. Aedeagus (Fig. 3J–M) with a spinose process. Ventral margin of periandrium with a laminal process near base, bending up to the left; basal 1/3 of periandrium with an expanded semi-enclosed structure around the left and right side and ventral margin of periandrium; apex of periandrium with a long spinose process, curved dorsally to the base, then strong bending, directed dorsocaudad. Endosoma slightly sclerotized, without process.

FEMALE GENITALIA. Tergite IX (Fig. 4A–B, D) moderately sclerotized, without wax plate. Anal segment (Fig. 4C) rectangular, 2.2 times as long as wide in dorsal view, anal style linguiform. Gonapophysis VIII (Fig. 4E) elongate, and slightly curved upwards. Gonapophysis IX (Fig. 4F) with two middle teeth, denticulation unsharp. Gonoplac (Fig. 4G) rod-like, 4.4 times as long as wide in lateral view. Posterior vagina pattern as shown in Figure 4H–I.

Distribution

China (Yunnan).

Remarks

This species can be distinguished from the other species of the genus by the body color, forewing markings and male genitalia.

Parandes simplus Muir, 1925

Fig. 5

Parandes simplus Muir, 1925: 511.

Diagnosis

The salient features of the new species include the following: forewing hyaline, slightly tinged with brown, almost without markings (Fig. 5A–B); hind tibia without lateral spines (Fig. 5G).

Material examined

Holotype

INDONESIA • ♀; West Borneo, Mowong; F. Muir leg.; BMHH type No. 1134 (Fig. 5F).

Redescription

MEASUREMENTS. Body length: female 4.30 mm; length of tegmen: 6.50 mm (N = 1).

COLORATION. General color brown (Fig. 5A–B). Eyes yellowish brown, margin pale; ocelli faint red, semi-translucent. Lateral carinae of frons lighter; lateral side of head with a long brown spot anterior to the eyes. Antenna yellowish brown. Vertex, face and rostrum generally brown. Pronotum light brown. Mesonotum darker than pronotum, shiny. Forewing hyaline, slightly tinged with brown, more distinctly over clavus and Cu, almost without markings; stigma brown; veins light brown, costa darker brown; tubercles sparse, minute, same color as veins. Front coxa dark brown, the apical half shiny black; front and middle legs with a longitudinal dark mark. Abdomen light yellowish brown ventrally.



Fig. 5. *Parandes simplex* Muir, 1925, holotype, ♀ (BMHH type No. 1134). **A.** Dorsal view. **B.** Lateral view. **C.** Left ventral view. **D.** Genitalia, ventral view. **E.** Face. **F.** Label information of specimen. **G.** Hind leg, lateral view. Scale bars = 0.5 mm. (Provided by the BMHH.)

HEAD AND THORAX. Vertex (Fig. 5A) longer than wide; anterior margin nearly straightly, posterior margin U-shaped recessed, lateral carina developed. Frons (Fig. 5C, E) longer than wide, lateral carina developed. Pronotum (Fig. 5A) slightly shorter than vertex; posterior margin recessed. Mesonotum longer than pronotum and vertex combined. Forewing (Fig. 5A–B) longer than wide; RP 3 branches, MP with 5 terminals. Hind tibia (Fig. 5G) without lateral spines; chaetotaxy of hind tarsi: 6/7.

FEMALE GENITALIA. Ovipositor (Fig. 5D) twice as long as pygofer; pygofer a little longer than wide; anal segment not as long as pygofer, a little longer than wide. Apex rounded.

Distribution

Indonesia (West Borneo).

Remarks

This species can be distinguished from the other species of the genus by the body color, forewing markings and hind tibia.

Discussion

Parandes Muir, 1925 is the smallest genus in the tribe Andini Emeljanov, 2002. A comparison of *Andes* Stål, 1866, *Andixius* Emeljanov & Hayashi, 2007 and *Parandes*, shows that species in these genera look rather similar because the forewings are strongly folded at rest (Wang *et al.* 2022). But this genus can be easily distinguished from other genera of Andini by the following characters: fore coxa produced and rounded on the outer edge of the apical half.



Fig. 6. Hind tibiae. **A.** *Parandes circinatus* Wang & Chen sp. nov. **B.** *Parandes fuscus* Wang & Chen sp. nov. Arrows indicate lateral spines. Scale bars = 0.5 mm.

In fact, *Parandes* is more similar to *Andes*. Because their forewing veins have a common feature, which are the ScP + RA, RP and MP arising separately from a common point on basal cell or forming a minute common stem, but differs in the shape and size of the front coxae, which are straight in *Andes* (Fig. 1B) and produced and rounded on the outer edge of the apical half in *Parandes* (Fig. 1A).

Long-term field investigations have found that the number of species in the genus *Parandes* is relatively small, and it was only collected in Yunnan Province in China. The Chinese species *P. fuscus* sp. nov. and *P. circinatus* sp. nov. share a similar aedeagus, and a similar long spinose process on the perianthrium. We therefore believe that these species may be closely related. But they are easily distinguished based on the shape of the aedeagus, the genital styles and anal segment. Based on the complex and variable geomorphological environment and rich biological resources in China, we expect that further new collections will increase the number of new records or species.

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