

ORIGINAL ARTICLE

# First record of *Cubachipteria* (Acari: Oribatida: Achipteriidae) in China, with descriptions of two new species

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**Abstract** The genus *Cubachipteria* of Achipteriidae is firstly reported from China. Two new species of *C. pianmaensis* **sp. nov.** and *C. gaoligongensis* **sp. nov.**, are described here, which are collected on moss and leaf litter from Yunnan Province, China. These two species can be distinguished from all known species of *Cubachipteria* by the absence of interlamellar setae. A key to the known species of *Cubachipteria* is given. All type materials are deposited in Guizhou University, Guiyang City, China (GUGC).

**Key words** Oribatida, Achipteriidae, *Cubachipteria*, new species, China.

## 1 Introduction

*Cubachipteria*, a small oribatid mite genus of the family Achipteriidae, was proposed by Balogh and Mahunka (1979) with *Achipteria* (*Cubachipteria*) *remota* Balogh & Mahunka, 1979 as the type species. Currently, the genus comprises three species which all from Neotropical Region: *C. remota* Balogh & Mahunka, 1979 (Cuba), *C. mayariana* Palacios-Vargas & Socarrás, 2001 (Cuba), *C. bispina* Călugăr, 1990 (Venezuela) (Subías, 2004, online version 2014). The main characters of *Cubachipteria* were summarized by Balogh and Mahunka (1979) and Balogh and Balogh (1992) and can be defined by (including our additional opinions): lamellae large, fused partly; interlamellar setae absent or originating considerably anterior to dorsosejugal suture, on inner sides of cuspides and near each other; notogaster with long, pointed humeral processes; octotaxic system of notogaster with sacculi; ten pairs of notogastral setae present; six pairs of genital, one pair of aggenital, three pairs of adanal and two pairs of anal setae present; legs monodactyle.

In this paper, the genus *Cubachipteria* is firstly reported from China, and two new species are described and illustrated, collected from Yunnan Province, China, under the name *C. pianmaensis* **sp. nov.** and *C. gaoligongensis* **sp. nov.** A key to all known species of *Cubachipteria* is given.

## 2 Materials and methods

Specimens were mounted in lactic acid on temporary cavity slides for measurement and illustration. All body measurements are presented in micrometers (mm). The body length was measured in lateral view, from the tip of the rostrum to the posterior edge of the ventral plate. Notogastral width refers to the maximum width in dorsal aspect. Lengths

of body setae were measured in lateral aspect. Formulae for leg setation are given in parentheses according to the sequence trochanter–femur–genu–tibia–tarsus (famulus included). Formulae for leg solenidia are given in square brackets according to the sequence genu–tibia–tarsus. General terminology used in this paper follows that summarized by Norton and Behan-Pelletier (2009).

### 3 Taxonomy

Achipteriidae Thor, 1929

*Cubachipteria* Balogh & Mahunka, 1979

#### *Cubachipteria pianmaensis* sp. nov. (Figs 1–23)

**Diagnosis.** Body size 435–480 × 325–355; surface of lamellae foveolae, podotectum I and pteromorph with thin striae, notogaster with irregular circular structure; lamellae with 3–4 pointed teeth; interlamellar setae absent; sensilli clavate, with long stalk and oblong, barbed head; notogastral setae long; all legs monoda ctylous.

**Measurements.** Body length 480 (holotype), 435–480 (two paratypes); body width 355 (holotype), 325–355 (two paratypes).

**Integument.** Body color yellow–brownish to brown. Surface of lamellae with very small foveolae densely. Podotectum I with thin striae parallel to anterior margin. Pteromorph with weakly developed striae parallel to lateral–anterior margin, radial striae medially. Medial–posterior border of notogaster with irregular circular structure.

**Prodorsum** (Figs 1–8, 11). Rostrum rounded. Lamellae broad, fused basally. Lamellae cusp with 3–4 pointed teeth in antero–dorsal view. Lamellar setae (32) setiform, short and thick. Rostral setae (83) with unilateral barbs densely. Interlamellar setae absent. Sensilli (135) clavate, with long stalk and well developed barbed, oblong distally head, directed to the middle of lamellae.

**Notogaster** (Figs 1, 11–12). Dorsosejugal suture convex medially. Process of pteromorphs narrowed apically. Lateral corner of pteromorphs with slightly pointed process. Ten pairs of notogastral setae short, setiform and smooth. Setae *c* and *la* (35–38) longest; *h*<sub>2</sub>, *p*<sub>1</sub> and *p*<sub>3</sub> shortest (19–25); others of medium size (27–33). Sacculi *Sa* oval, indistinct; *S*<sub>1</sub> oblonged, well developed; *S*<sub>2</sub> and *S*<sub>3</sub> hardly visible. Lyrifissure *im* S-shaped. Opisthosomal gland openings located lateral–posteriorly to *h*<sub>3</sub>.

**Gnathosoma** (Figs 2, 11). Subcapitulum: 54 × 96. Setae *h* (13), *m* (40) and *a* (11) setiform, smooth.

**Epimeral region** (Figs 2, 11). Epimeral setal formula 3–1–3–3, setiform, smooth. Setae *1a* and *2a* only alveoli present; *3b* (4) shortest; *1c*, *3a*, *3c* and *4c* (19–33) middle; *1b*, *4a*, and *4b* (38–46) longest. Setae *3c* and *4c* inserted laterally. Pedotecta II convex. Discidia triangular, pointed-ended.

**Anogenital** (Figs 9–10). Six pairs of genital setae (*g*<sub>1</sub>–*g*<sub>2</sub> 33–38, *g*<sub>3</sub>–*g*<sub>6</sub> 24–27), one pair of aggenital (35). Two pairs of anal (15–17) and three pairs of adanal (15–25) setae setiform, smooth. Lyrifissures *iad* located in paranal position, near to anal plates, anterior to *ad*<sub>3</sub>.

**Legs** (Figs 13–23). Monoda ctylous. Generally similar to other species of Achipteriidae. Formulae of leg setation and solenidia: I (1–5–3–4–20)[1–2–2], II (1–5–3–4–14)[1–2–2], III (1–2–1–3–12)[1–1–0], IV (1–2–2–3–11)[1–1–0]. Seta *s* of tarsi II and I thick, with strong spines unilaterally. Famulus short, blunt-ended.

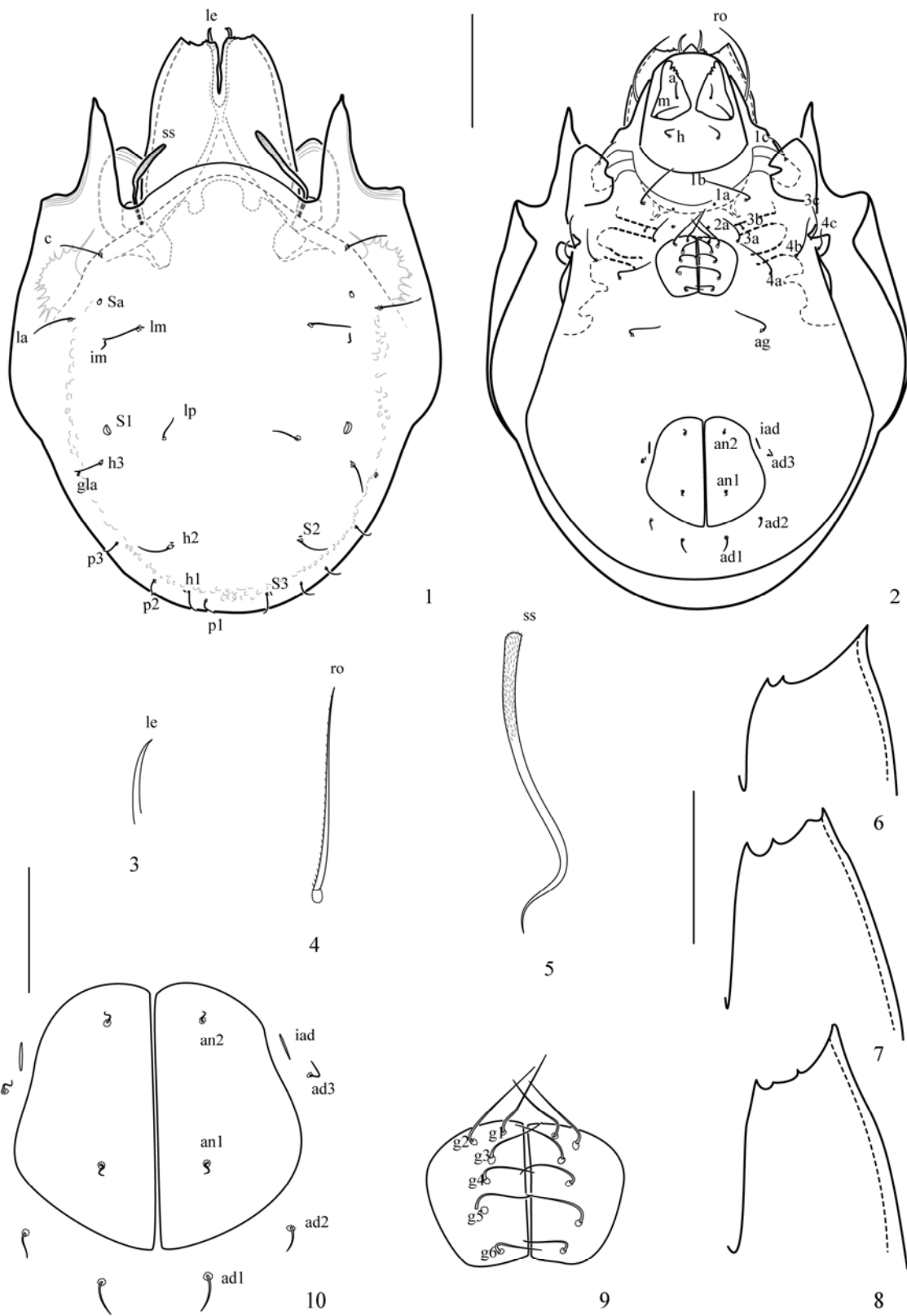
**Material examined.** Holotype male, China, Yunnan, Nujiang Prefecture, Lushui County, Pianma Town (26°0'N, 98°37'E), 12 July 2010, Ping Feng, in moss. Paratypes 2 males, same data as holotype. All deposited in Institute of Entomology, Guizhou University, Guiyang City, China (GUGC).

**Distribution.** China (Yunnan).

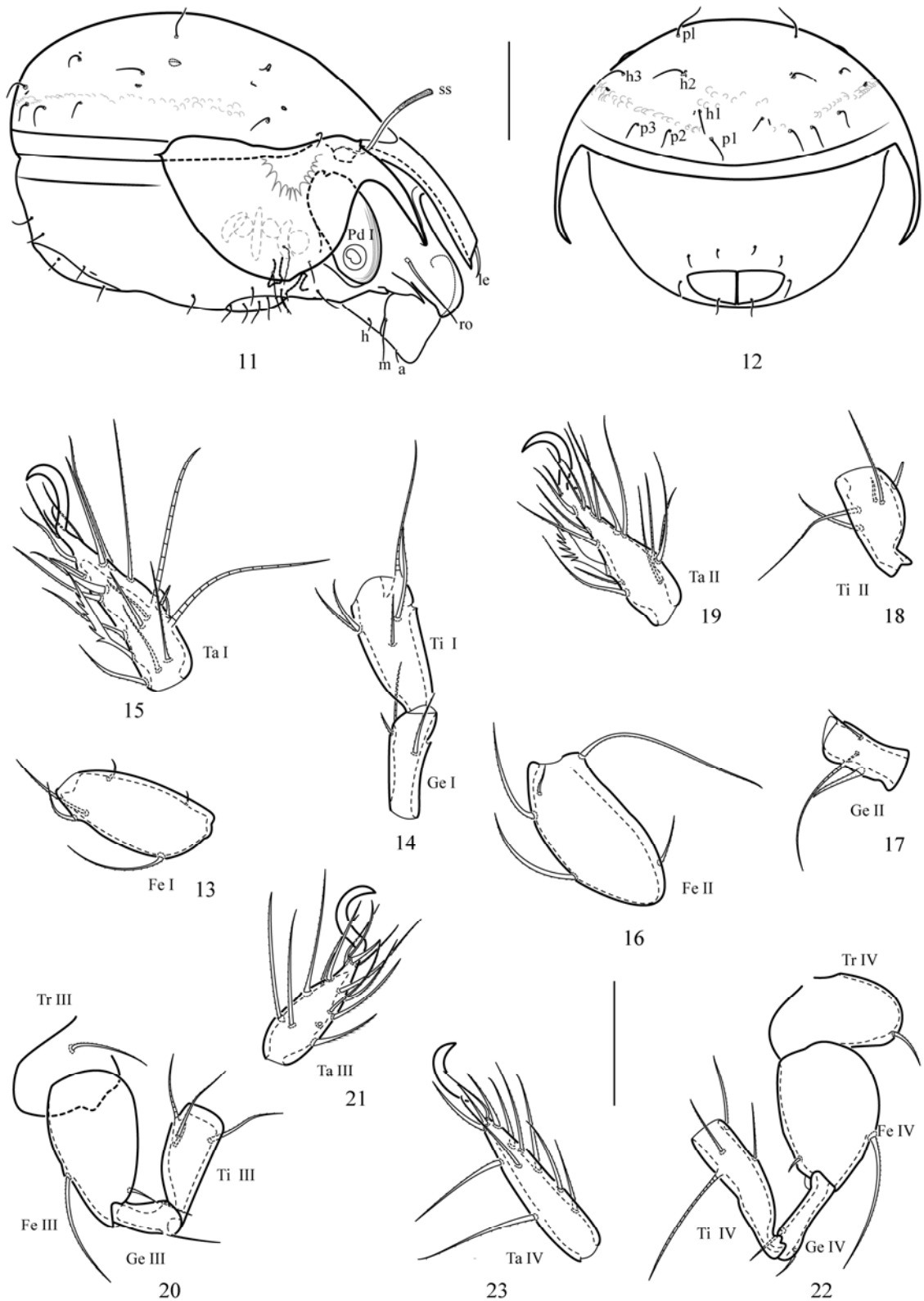
**Etymology.** The specific name “*pianmaensis*” refers to the type locality, Pianma Town.

#### *Cubachipteria gaoligongensis* sp. nov. (Figs 24–36)

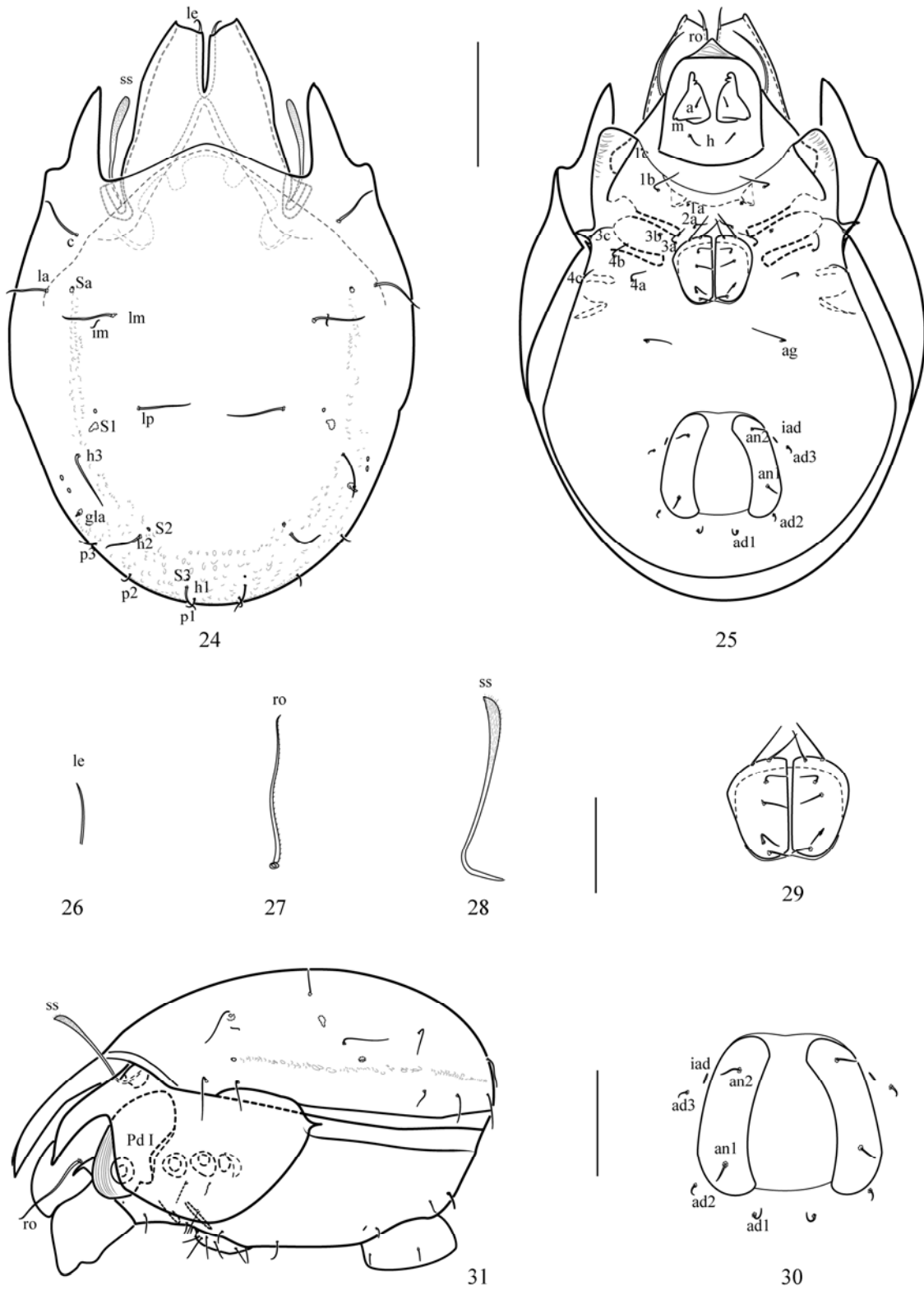
**Diagnosis.** Body size 385–445 × 285–310; surface of lamellae and process of pteromorphs with granules, notogaster with foveolae and irregular circular sculpture, lamellae with point lateral tooth; interlamellar setae absent; sensilli clavate, with long stalk and oblong, barbed head; notogastral setae thick; all legs monoda ctylous.



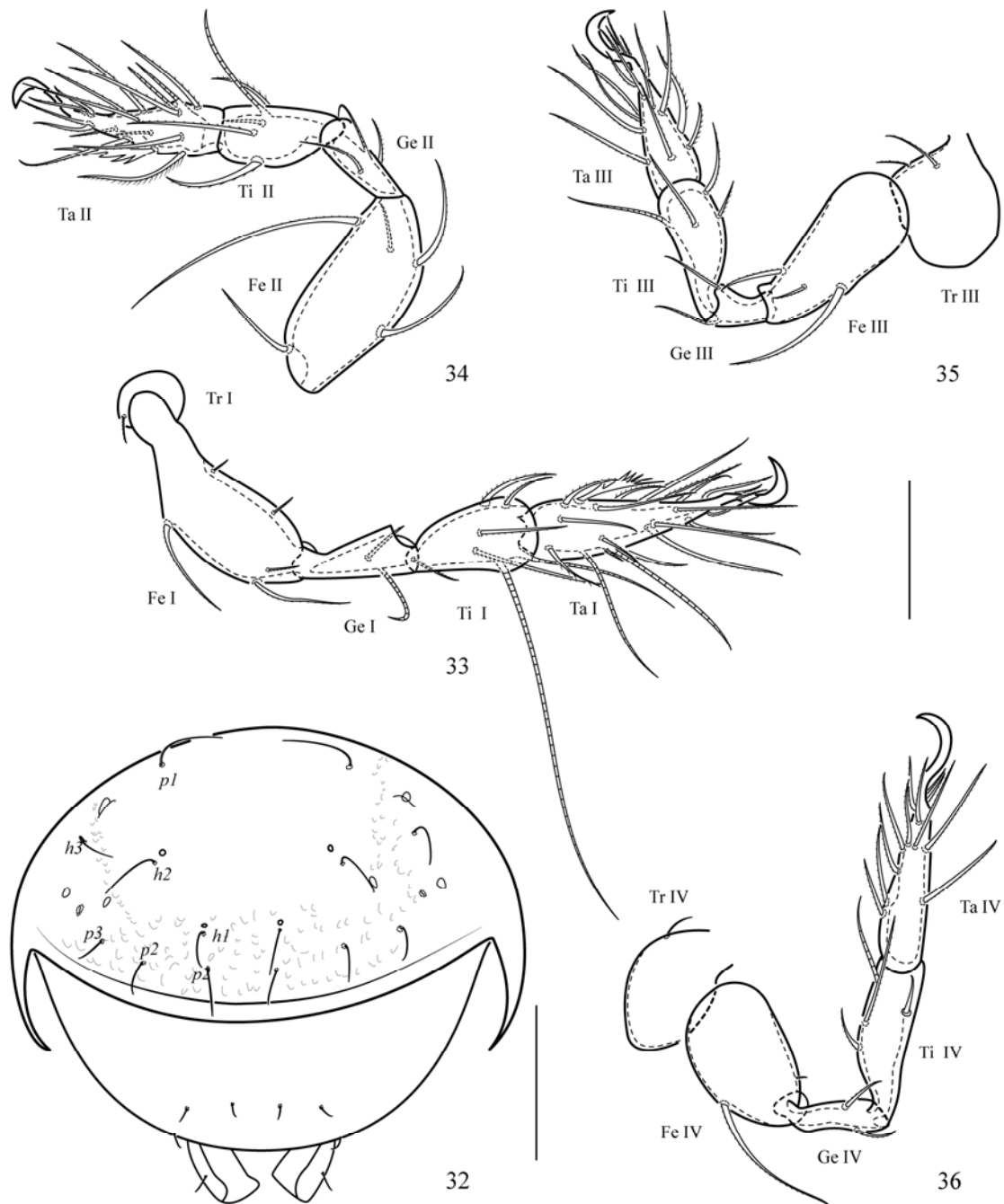
Figs 1–10. *Cubachipteria pianmaensis* sp. nov. 1. Dorsal view. 2. Ventral view. 3. Lamellar sata. 4. Rostral sata. 5. Sensillus. 6–8. Right lamellar cusps. 9. Genital plate. 10. Anal plate. Scale bars: 1–2=100 μm, 3–5, 6–8=50 μm, 9–10=50 μm.



Figs 11–23. *Cubachipteria pianmaensis* sp. nov. 11. Lateral view. 12. Caudal view. 13. Femur of leg I, right. 14–15. Genu, tibia and tarsus of leg I, left. 16. Femur of leg II, right. 17. Genu of leg II, left. 18. Tibia of leg II, right. 19. Tarsus of leg II, left. 20. Trochanter, femur, genu and tibia of leg III, right. 21. Tarsus of leg III, right. 22–23. Leg IV, left. Scale bars: 11–12=100µm, 13–23=50µm.



Figs 24–31. *Cubachipteria gaoligongensis* sp. nov. 24. Dorsal view. 25. Ventral view. 26. Lamellar sata. 27. Rostral sata. 28. Sensillus. 29. Genital plate. 30. Anal plate. 31. Lateral view. Scale bars: 24–25, 26–30 = 50  $\mu$ m, 31 = 100  $\mu$ m.



Figs 32–36. *Cubachipteria gaoligongensis* sp. nov. 32. Caudal view. 33. Leg I, left. 34. Leg II, left. 35. Leg III, left. 36. Leg IV, right. Scale bars: 32 = 100  $\mu$ m, 33–36 = 50  $\mu$ m.

Measurements. Body length 445 (holotype), 385–425 (three paratypes); body width 310 (holotype), 285–290 (three paratypes).

Integument. Body color yellow-brownish to brown. Surface of lamellae with rugged granules densely. Podotectum I with thin striae parallel to anterior margin. Process of pteromorphs with irregular granules. Notogaster with foveolae densely, medial-posterior border with irregular circular sculpture.

Prodorsum (Figs 24–28, 31). Rostrum rounded. Longitudinal ridge present near rostrum. Lamellae broad, fused basally. Lamellae cusp with pointed lateral tooth. Lamellar setae (35) setiform, short and thick. Rostral setae (79) with

unilateral ciliate densely. Interlamellar setae absent. Sensilli (135) clavate, with long stalk and well developed barbed, oblong distally head, parallel to the lateral margin of lamellae.

Notogaster (Figs 24, 31–32). Dorsosejugal suture angular weakly medially. Process of pteromorphs pointed apically. Lateral corner of pteromorphs with well pointed process. Ten pairs of notogastral setae thick, setiform and smooth. Setae *c*, *la*, *lm*, *lp* and *h*<sub>3</sub> (38–50) longest; *p*<sub>3</sub> shortest (17); others of medium size (27–33). Sacculi *S*<sub>a</sub> oval, indistinct; *S*<sub>l</sub> oblonged, well developed; *S*<sub>2</sub> rounded, very small; *S*<sub>3</sub> hardly visible. Lyrifissure *im* S-shaped. Opisthosomal gland openings located lateral-posteriorly to *h*<sub>3</sub>.

Gnathosoma (Figs 25, 31). Subcapitulum: 54 × 96. Setae *h* (15), *m* (25) and *a* (10) setiform, smooth.

Epimeral region (Figs 25, 31). Epimeral setal formula 3–1–3–3, setiform, smooth. Setae *1a*, *1c* and *3b* only alveoli present; *2a* (13) shortest; *1b*, *3a* and *3c* (21–29) longest; *4a*, *4b* and *4c* (15–17) middle. Setae *3c* and *4c* inserted laterally. Pedotecta II triangular. Discidia thorn-like.

Anogenital (Figs 29–30). Six pairs of genital setae (*g*<sub>1</sub>–*g*<sub>2</sub> 19–23, *g*<sub>3</sub>–*g*<sub>6</sub> 10–16), one pair of aggenital (29). Two pairs of anal (8–10) and three pairs of adanal (10–22) setiform, smooth. Lyrifissures *iad* located in paranal position, near to anal plates, anterior to *ad*<sub>3</sub>.

Legs (Figs 33–36). Monoda ctylous. Generally similar to other species of Achipteriidae. Formulae of leg setation and solenidia: I (1–5–2–4–20) [1–2–2], II (1–5–2–3–15) [1–2–2], III (2–3–1–3–15) [1–1–0], IV (1–2–2–3–12) [0–1–0]. Seta *s* of tarsi II and I thick, with strong spines unilaterally. Famulus short, blunt-ended.

Material examined. Holotype male, China, Yunnan, Baoshan, Longyang District, Mt. Gaoligong (25°17'N, 98°48'E), 7 May 2011, Li-Xia Xie, in leaf litter. Paratypes 3 males, same data as holotype. All deposited in Institute of Entomology, Guizhou University, Guiyang City, China (GUGC).

Distribution. China (Yunnan).

Etymology. The specific name “*gaoligongensis*” refers to the type locality, Mt. Gaoligong.

## 4 Remarks

*Cubachipteria pianmaensis* **sp. nov.** and *C. gaoligongensis* **sp. nov.** are included in the *Cubachipteria* because of the presence of long, pointed humeral processes and sacculi, monoda ctylous legs. *C. pianmaensis* **sp. nov.** can be distinguished from *C. gaoligongensis* **sp. nov.** by: 1) lamellae cusp with 3–4 pointed teeth (versus one pointed lateral tooth in *C. gaoligongensis*); 2) pteromorph with weakly developed striae parallel to lateral-anterior margin, radial striae medially (versus irregular granules in *C. gaoligongensis*); 3) lateral corner of pteromorphs with slightly pointed process (versus well pointed process in *C. gaoligongensis*); 4) pedotecta II convex, discidia triangular, pointed-ended (versus triangular, discidia thorn-like in *C. gaoligongensis*).

The new species can be distinguished from all known species of *Cubachipteria* by the key presented below. The known species are *C. remota* Balogh & Mahunka, 1979 and *C. mayariana* Palacios-Vargas & Socarrás, 2001 from Cuba, *C. bispina* Călugăr, 1990 from Venezuela. The latitude of the new species occur is almost same with those of the known species.

### Key to species of the genus *Cubachipteria*.

1. Interlamellar setae present.....2  
Interlamellar setae absent.....4
2. Interlamellar setae inserted under middle of lamellae, near their inner sides and near each other .....  
.....*C. remota* Balogh & Mahunka, 1979  
Interlamellar setae inserted under anterior margin of dorsosejugal suture, not near each other .....3
3. Notogastral setae *h*<sub>1</sub> exactly like a heavy spine, ciliate ..... *C. bispina* Călugăr, 1990  
Notogastral setae *h*<sub>1</sub> setiform..... *C. mayariana* Palacios-Vargas & Socarrás, 2001
4. Lamellae cusp with pointed lateral tooth..... *C. gaoligongensis* **sp. nov.**  
Lamellae cusp with 3–4 pointed teeth ..... *C. pianmaensis* **sp. nov.**

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