

Lepidocunaxoides bisetosus, a new species of Cunaxidae (Acariformes: Prostigmata) from China

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Original research

ABSTRACT

A new species of genus *Lepidocunaxoides*, namely, *L. bisetosus* Chen & Jin **sp. nov.** is described and illustrated based on female and male from China. Additionally, an identification key to known species of *Lepidocunaxoides* is updated.

Keywords mites; Cunaxoidinae; taxonomy; key

Zoobank <http://zoobank.org/A75B2B8F-338C-4993-A9F1-F4C3E5A5B2C7>

Introduction

Kalúz & Ermilov (2019) erected the genus *Lepidocunaxoides* with the type species *Lepidocunaxoides robustus* Kalúz & Ermilov, 2019 based on females. Chen *et al.* (2020) described *L. bomiensis* based on both sexes from Tibet, China and revised the diagnosis of the genus with the male characteristics, and transferred *Cunaxoides neopectinatus* Shiba, 1978 to *Lepidocunaxoides*.

Until recently, the genus *Lepidocunaxoides* included three known species in the world (Kalúz & Ermilov 2019, Chen *et al.* 2020). In this work, we describe one species new to science of this genus, based on both sexes from China. In addition, a key to adult females of *Lepidocunaxoides* species of the world is presented.

Material and methods

Samples of moss on stone were collected on April 2019 from Yunkaishan National Nature Reserve, Xinyi City, Guangdong Province, China. Mites were isolated from the samples by using Berlese-Tullgren funnels for eight to twelve hours, preserved in 75% alcohol and then mounted in Hoyer's medium on slides (Walter & Krantz 2009). Line drawings were prepared with the aid of a drawing tube attached to a microscope Nikon Ni E and photographs were taken using a camera (Nikon DS-Ri 2) attached to the microscopy. All figures were edited with Adobe Photoshop CC 2019. Measurements given in micrometers (μm) were taken using the software Nikon NIS Elements AR 4.50 and provided for the holotype with the paratypes in parentheses. The dorsal and ventral setal notations follow Skvarla *et al.* (2014), and that of legs follows Den Heyer (1981).

Abbreviations: *ag*—aggenital seta, *at*—anterior trichobothria, *asl*—attenuate solenidion, *bsl*—blunt rod-like solenidion, *dtsl*—dorsoterminal solenidion, *fam*—famulus (=peg organ),

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hg—hypognathal seta, *hgs*—hystergastral seta, *lps*—lateral proterosomal seta, *mps*—median proterosomal seta, *mst*—microseta, *ps*—pseudanal seta, *pt*—posterior trichobothria, *sts*—simple tactile seta, *T*—trichobothrium, *tsl*—terminal solenidion.

Results

Family Cunaxidae Thor, 1902

Subfamily Cunaxoidinae Den Heyer, 1978

Lepidocunaxoides Kalúz & Ermilov, 2019

Generic diagnosis: see Kalúz & Ermilov (2019) and Chen *et al.* (2020).

Type species: *Lepidocunaxoides robustus* Kalúz & Ermilov, 2019.

Lepidocunaxoides bisetosus Chen & Jin sp. nov.

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(Figs 1–8)

Diagnosis

Palp tibiotarsus with two bifurcate setae near the base; ventral area between coxae I with reticulate pattern; anterior end of genital shields with a small rounded median platelet and bearing one seta or null in female but absent in male; genital shields with three paired platelets around in female but only one pair of platelets in male; male genu I–IV, tibia I and tarsi I–II each with one long *bsl*.

Description

Female

(n=9; Figs 1–4)

Idiosoma 381 (348–422) long, 288 (282–340) wide (Figs 1A–B, 2B, 2D).

Dorsum (Fig. 1A) — Propodosomal shield concave anteromedially, and *at* off the shield though very close to the edge of the concaves. Proterosomal and hysterosomal shields fused, forming a large dorsocentral shield, 327 (300–328) long, 270 (245–270) wide, covered by random punctation, bearing one pair of trichobothria (*pt*), two pairs of tactile setae (*lps* and *mps*), four pairs of simple setae (*c1*, *c2*, *d1*, *e1*); *fl* situated on small platelets 12 (7–11) long, 8 (5–8) wide; area anterior to *at* with some papillae; lateral area outside dorsocentral shield with lengthwise striae. The *lps* longer than *mps*, *c1*, *c2*, *d1*, *e1* and *fl*; *pt* subequal to *at*, and *lps* much closer to *at* than to *pt*. One pair of lyrifissures (*im*) situated on lateral soft integument anterior to *fl*. Setal lengths and distances: *at* 150 (147–156), *pt* 155 (146–158), *lps* 69 (67–71), *mps* 50 (44–51), *c1* ~ 28 (26–28), *c2* 24 (24–24), *d1* 28 (24–28), *e1* 42 (40–43), *fl* 35 (31–35); *at*–*at* 37 (35–37), *pt*–*pt* 155 (140–155), *lps*–*lps* 65 (54–65), *mps*–*mps* 120 (108–121), *lps*–*mps* 66 (66–70), *at*–*lps* 30 (26–31), *pt*–*mps* 18 (14–18), *pt*–*lps* 74 (74–78), *at*–*mps* 98 (98–100), *at*–*pt* 106 (105–106), *c1*–*c1* 66 (60–71), *c2*–*c2* 213 (198–214), *d1*–*d1* 82 (72–83), *e1*–*e1* 65 (59–63), *fl*–*fl* 65 (60–65), *c1*–*c2* 76 (72–77), *c1*–*d1* 69 (58–69), *c2*–*d1* 82 (73–85), *d1*–*e1* 82 (74–86), *e1*–*fl* 50 (48–66).

Venter (Figs 1B, 2B, 2D) — Area between coxae I with reticulate pattern (Figs 2, 3B), coxae I–II fused completely as a V-shaped single sternal plate carved with lines and random punctation; coxae III–IV fused and forming paired lateral ventral plates arranged. Areas anterior to coxae I, between coxae I and coxae II, between coxae III and coxae IV, and posterior to coxae IV with strong punctations; coxal plates III–IV with random punctation and a few of reticulate pattern. Posterior end of coxal plate IV extending and almost reached to *g4* level. Setal formula of coxal plates I–IV: 3(*la*–*c*)-3(*2a*–*c*)-3(*3a*–*c*)-2(*4a*–*b*) *sts*, length of setae: *la*

27 (23–27), 1b 27 (25–27), 1c 26 (23–27), 2a 27 (24–27), 2b 22 (22–26), 2c 26 (24–29), 3a 20 (20–24), 3b 24 (24–34), 3c 30 (30–37), 4a 14 (14–18), 4b 13 (13–19). Three pairs of hystergastral setae (*hgs1*–*hgs3*) on coxal plates III–IV, lengths of *hgs1*–*hgs3*: 18 (18–22), 24 (20–24) and 18 (17–21), respectively. Ventral soft area with striation. Anterior end of genital shields with a small rounded median platelet, 20 (17–20) long, 17 (14–18) wide, bearing one seta 22 (19–21) in length (Fig. 1B) or absent (Fig. 2D). Genital shields large, 107 (102–107) long, 34 (33–35) wide, with reticulate pattern, longitudinal striation and random punctation, two pairs of visible genital papillae and four pairs of genital setae (*g1*–*g4*) in almost straight longitudinal row that 21 (20–25), 20 (20–21), 21 (18–21) and 16 (16–21) in length, respectively; one pair of aggenital setae (*ag*), 21 (18–23) long, almost at *g2* level, and three pairs of small platelets (anterolateral, mediolateral and posterolateral) situated in soft area around genital shields. Anal region with one pair of lyrifissures (*ih*) and one pair of pseudanal setae (*ps1*) 16 (16–20) in length, and two pairs of platelets setae bearing *h1* 25 (21–25) and *h2* 23 (22–24), respectively.

Gnathosoma (Figs 2A, 2C, 3A–C) — Palp (Figs 2A, 2C, 3A). Three-segmented, 80 (74–92) long, all segments with sparse punctation. Palp chaetotaxy: trochanter none; femurogenu six simple setae, of which four dorsal, one ventral and one lateral; tibiotarsus with one spur-like ventral apophysis, two ventral proximal bifurcate setae (Figs 2A, 2C, 3A), one ventral and two dorsal simple setae; claw well-developed and simple. Chelicera (Fig. 3B). 121 (107–115) long, the first segment and second segment laterally with strong punctation; without cheliceral seta; chela developed. Subcapitulum (Fig. 3C). 124 (115–124) long, 100 (95–107) wide; the area between *hg2* and *hg3* with sparse punctation, and the base area with both sparse punctation and polygonal pattern. Adoral setae absent; four pairs of hypognathal setae (*hg1*–*hg4*), lengths of *hg1*–*hg4*: 25 (21–26), 34 (33–36), 32 (25–32) and 42 (39–45). Distances of *hg* setae: *hg1*–*hg1*

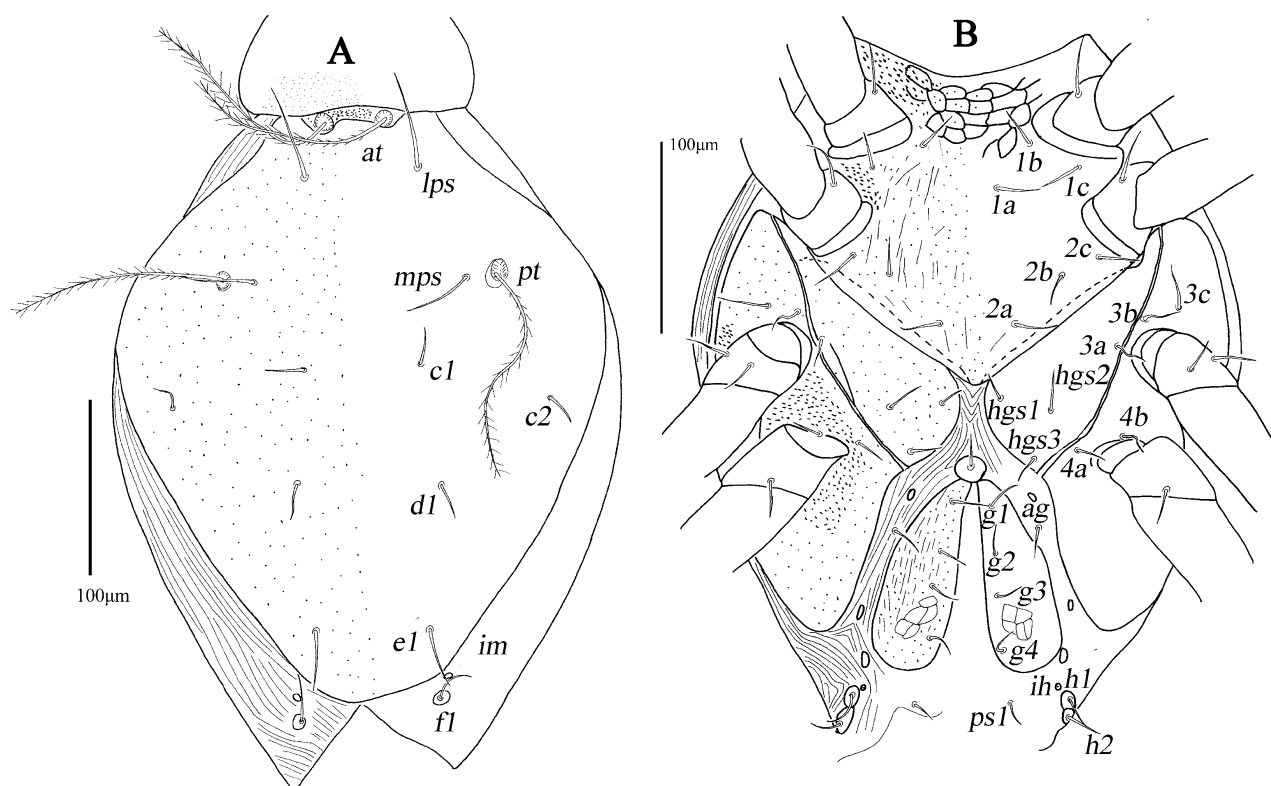


Figure 1 *Lepidocunaxoides bisetosus* Chen & Jin sp. nov. female: A – dorsal idiosoma; B – ventral idiosoma. Scale represents 100 µm.

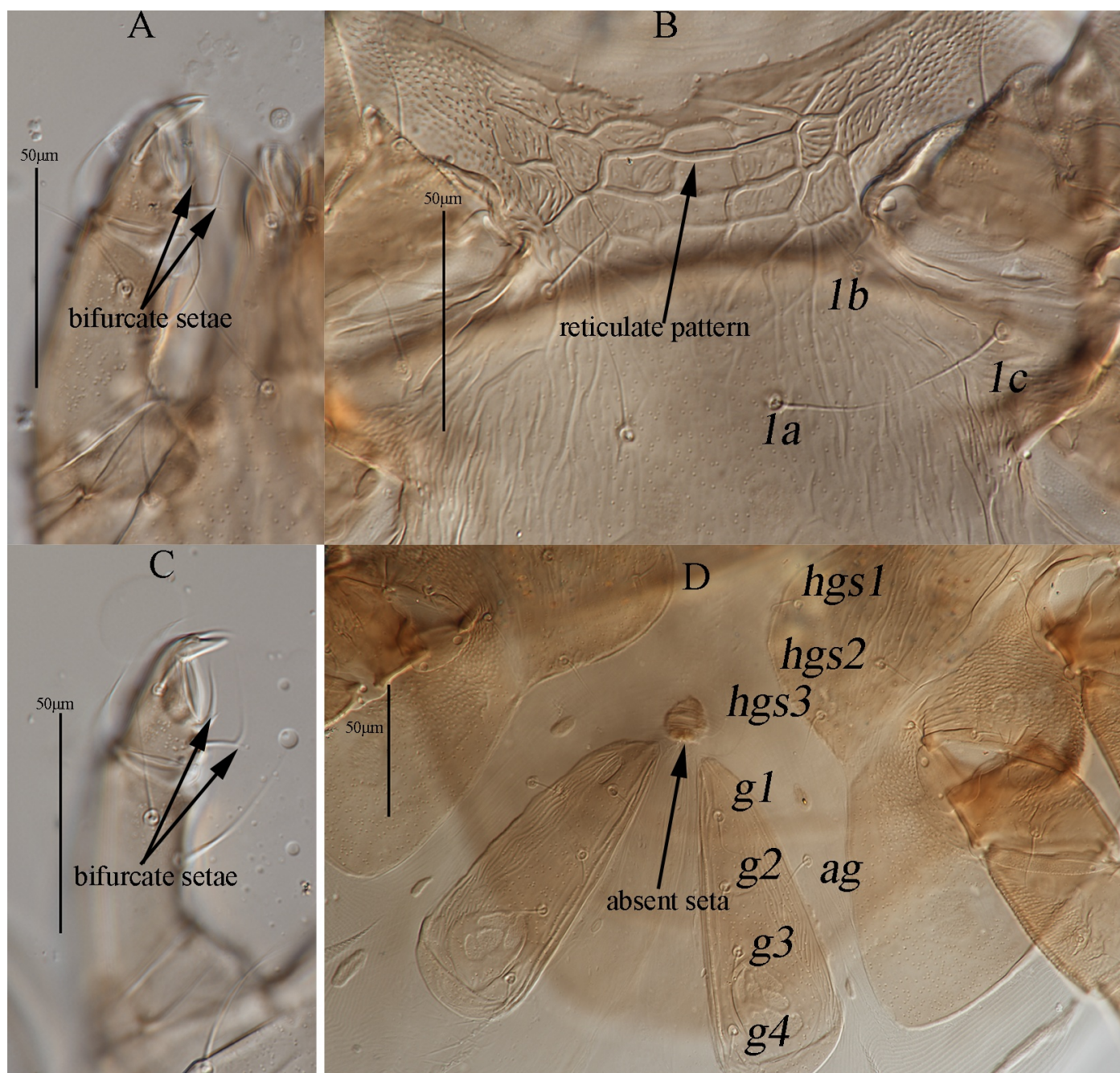


Figure 2 *Lepidocunaxoides bisetosus* Chen & Jin **sp. nov.** female: A, C – palp (photo); B – ventral propodosoma (photo); D – ventral hysterosoma (photo). Scale represents 50 µm.

6 (6–10), *hg2–hg2* 18 (18–23), *hg3–hg3* 34 (34–43), *hg4–hg4* 65 (65–85), *hg1–hg2* 30 (30–36), *hg2–hg3* 45 (45–60), *hg3–hg4* 35 (33–48).

Legs (Figs 4A–D) — Lengths of legs I–IV: 252 (240–252), 235 (212–235), 240 (225–240) and 254 (240–260). Lengths of tarsi I–IV: 98 (86–98), 83 (76–83), 78 (66–78) and 80 (65–80). Seta *T* on tibia IV 112 (105–114) in length. Legs I–IV chaetotaxy: Coxae I–IV 3-3-3-2 *sts*; trochanters I–IV 1-1-2-1 *sts*; basifemora I–IV: 3-5-3-2 *sts*; telofemora I–IV 5-5-4-3 *sts*. Genu I 3 *asl*, {1 *asl*, 1 *mst*}, 4 *sts*; genu II 2 *asl*, 5 *sts*; genu III 1 *asl*, 5 *sts*; genu IV 2 *asl*, 5 *sts*. Tibia I 2 *asl*, 5 *sts*; tibia II 1 *bsl*, 5 *sts*; tibia III 1 *bsl*, 5 *sts*; tibia IV 1 smooth *T*, 4 *sts*. Tarsus I 4 *asl*, 1

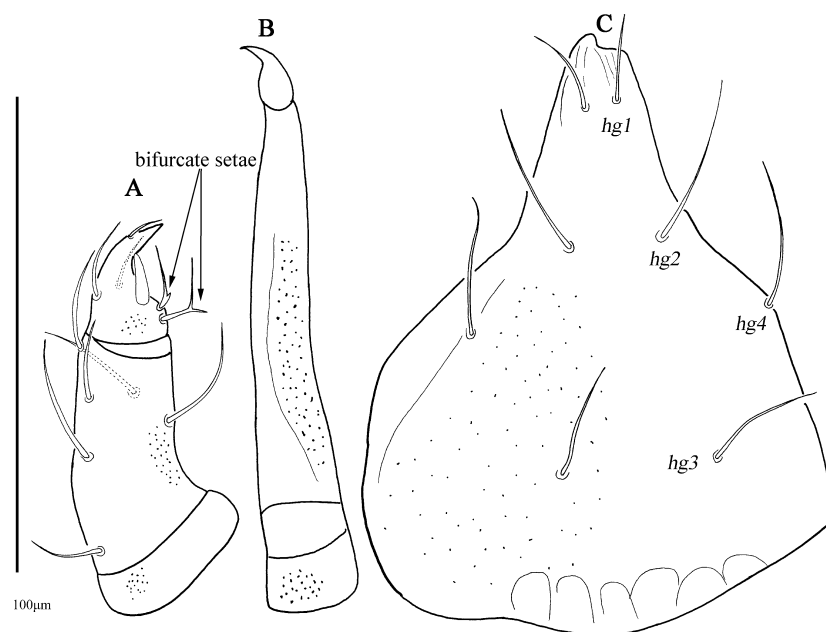


Figure 3 *Lepidocunaxoides bisetosus* Chen & Jin sp. nov. female: A – palp; B – chelicerae; C – subcapitulum. Scale represents 100 µm.

fam, 1 *dtsl*, 2 *tsl*, 20 *sts*; tarsus II 1 *bsl*, 1 *dtsl*, 2 *tsl*, 20 *sts*; tarsus III 1 *dtsl*, 1 *tsl*, 16 *sts*; tarsus IV 1 *dtsl*, 16 *sts*.

Male

(n=1; Figs 5–8)

Idiosoma 1250 long, 189 wide (Figs 5A–B, 6A–B).

Dorsum (Fig. 5A) — Resembling the female, dorsocentral shield 214 long, 173 wide; Setal lengths and distances: *at* 108, *pt* 113, *lps* 36, *mps* 48, *c1*~ 18, *c2* 19, *d1* 16, *e1* 34, *fl* 20; *at-at* 22, *pt-pt* 98, *lps-lps* 40, *mps-mps* 77, *lps-mps* 50, *at-lps* 24, *pt-mps* 11, *pt-lps* 52, *at-mps* 72, *at-pt* 78, *c1-c1* 55, *c2-c2* 138, *d1-d1* 45, *e1-e1* 26, *fl-fl* 22, *c1-c2* 42, *c1-d1* 42, *c2-d1* 52, *d1-e1* 53, *e1-fl* 25.

Venter (Figs 5B, 6A–B) — Resembling the female. Setal formula of coxal plates I–IV: 3(*1a-c*)-3(*2a-c*)-3(*3a-c*)-2(*4a-b*) *sts*, lengths of setae: *1a* 19, *1b* 23, *1c* 15, *2a* 18, *2b* 16, *2c* 22, *3a* 15, *3b* 20, *3c* 25, *4a* 11, *4b* 10. Three pairs of hystergastral setae (*hgs1-hgs3*) 13, 16 and 15 in length, respectively. Genital shields relatively small, 51 long, 14 wide; with four pairs of genital setae in almost straight longitudinal row; lengths of setae *g1-g4*: 11, 11, 9 and 8; aggenital setae (*ag*) 12 in length; anteriorly without small rounded median platelet and laterally only one pair of platelets around; pseudanal setae (*ps1*) 12 in length; *h1* 13 and *h2* 14, respectively.

Gnathosoma (Figs 7A–C) — Resembling the female. Palp (Fig. 7A) 48 long. Chelicera (Fig. 7B) 73 long. Subcapitulum (Fig. 7C) 81 long, 77 wide; the base area without polygonal pattern; lengths of *hg1-hg4*: 20, 28, 18 and 31. Distances of *hg* setae: *hg1-hg1* 6, *hg2-hg2* 13, *hg3-hg3* 28, *hg4-hg4* 55, *hg1-hg2* 23, *hg2-hg3* 43, *hg3-hg4* 31.

Legs (Figs 8A–D) — Resembling the female, lengths of leg I–IV: 188, 178, 181 and 198. Lengths of tarsi I–IV: 71, 63, 60 and 53. Seta *T* on tibia IV 82 in length. Legs I–IV chaetotaxy: Coxae I–IV 3-3-3-2 *sts*; trochanters I–IV 1-1-2-1 *sts*; basifemora I–IV: 3-5-3-2 *sts*; telofemora I–IV 5-5-4-3 *sts*. Genu I 2 *asl*, 1 long *bsl*, {1 *asl*, 1 *mst*}, 4 *sts*; genu II 1 *asl*, 1 long *bsl*, 5 *sts*; genu III 1 *asl*, 1 long *bsl*, 5 *sts*; genu IV 1 *asl*, 1 long *bsl*, 5 *sts*. Tibia I 1 *asl*, 1 long *bsl*, 5 *sts*;

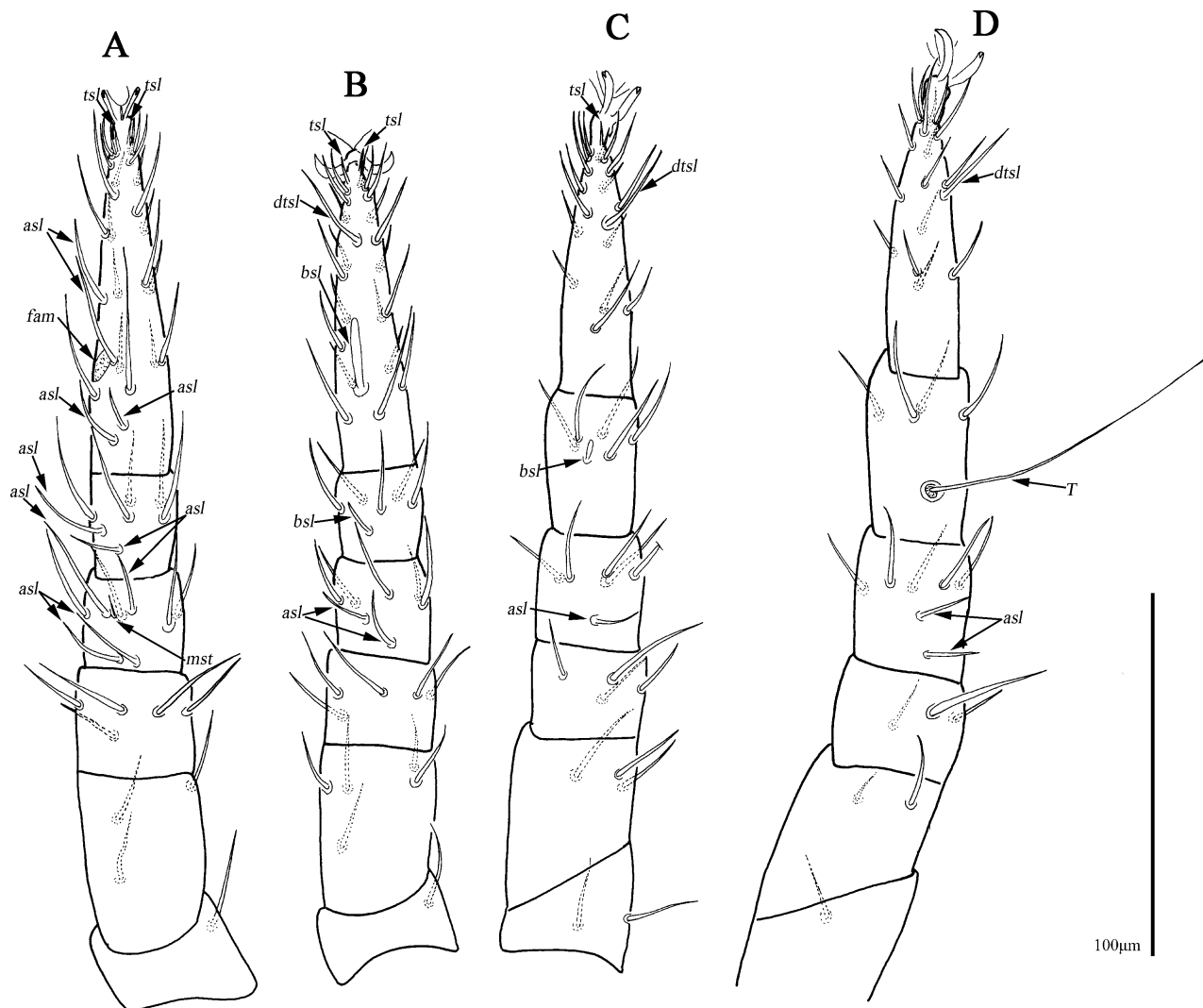


Figure 4 *Lepidocunaxoides bisetosus* Chen & Jin **sp. nov.** female: A–D – leg I–IV respectively. Scale represents 100 μm .

tibia II 1 *bsl*, 5 *sts*; tibia III 1 *bsl*, 5 *sts*; tibia IV 1 smooth *T*, 4 *sts*. Tarsus I 3 *asl*, 1 long *bsl*, 1 *fam*, 1 *dtsl*, 2 *tsl*, 20 *sts*; tarsus II 1 *asl*, 1 long *bsl*, 1 *dtsl*, 2 *tsl*, 20 *sts*; tarsus III 1 *dtsl*, 1 *tsl*, 16 *sts*; tarsus IV 1 *dtsl*, 15 *sts*.

Other developmental stages

Unknown.

Etymology

The new species name refers to palp tibiotarsus with two bifurcate setae near the base (*bisetosus*).

Remarks

The new species resembles *L. bomiensis*, but it differs from the latter by the following features: (1) palp tibiotarsus with two bifurcate setae near the base (vs. one in *L. bomiensis*); (2) venter area between coxae I with reticulate pattern (vs. no reticulation in *L. bomiensis*).

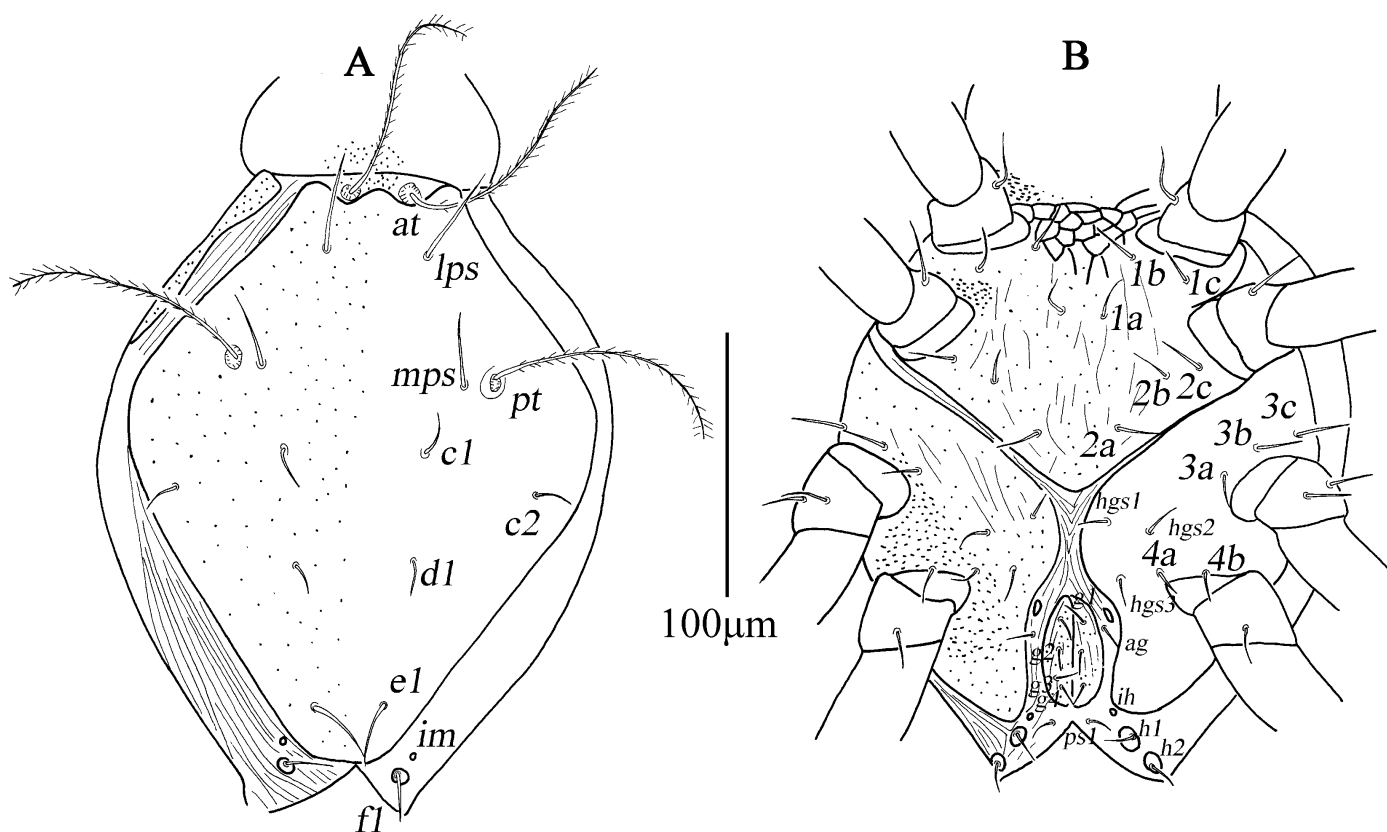


Figure 5 *Lepidocunaxoides bisetosus* Chen & Jin sp. nov. male: A – dorsal idiosoma; B – ventral idiosoma. Scale represents 100 µm.

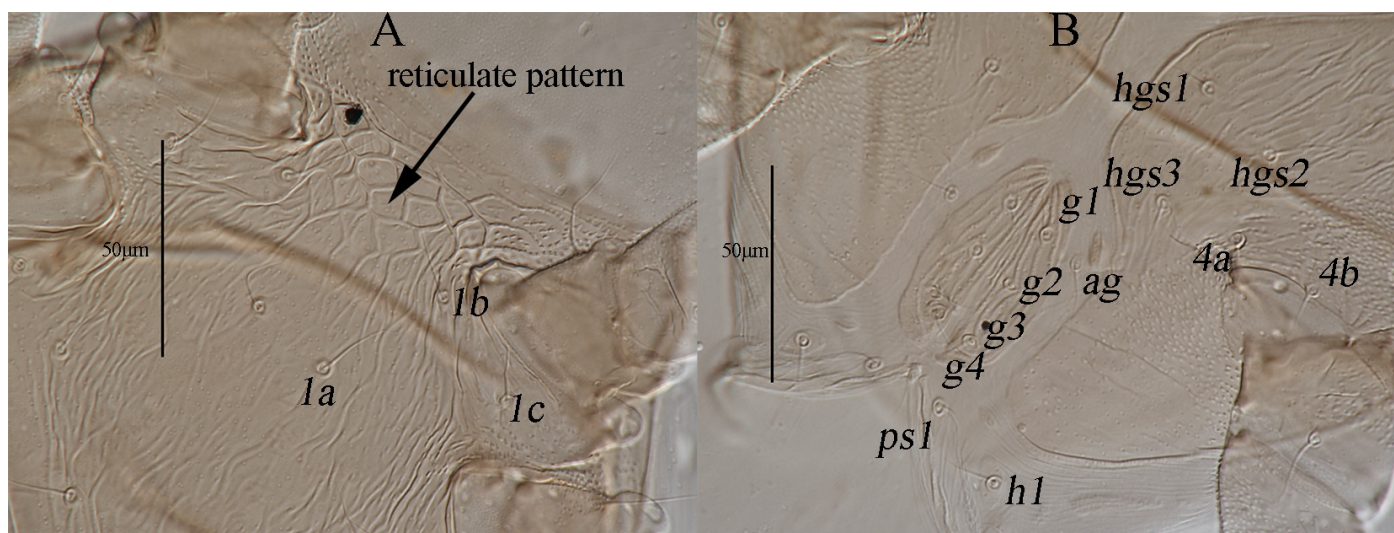


Figure 6 *Lepidocunaxoides bisetosus* Chen & Jin sp. nov. male: A – ventral propodosoma (photo); B – ventral hysterosoma (photo). Scale represents 50 µm.

The new species is also close to *L. robustus*, however, it can be separated from the latter by the following features: (1) propodosomal shield concave anteromedially and *at* off the shield

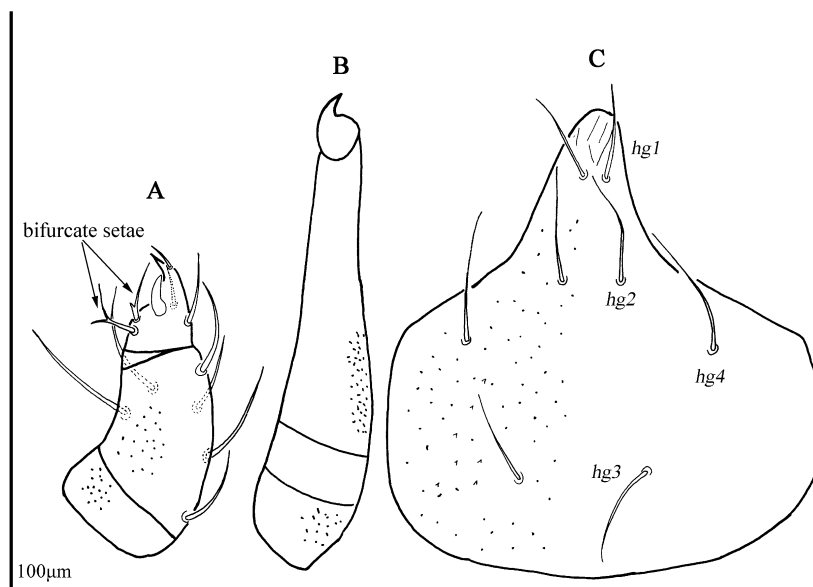


Figure 7 *Lepidocunaxoides bisetosus* Chen & Jin sp. nov. male: A – palp; B – chelicerae; C – subcapitulum. Scale represents 100 µm.

(vs. not concave and *at* on the shield in *L. robustus*); (2) palp claw unbranched and tibiotarsus with two bifurcate setae (vs. tricuspid and not bifurcate in *L. robustus*); (3) cheliceral seta and adoral setae absent (vs. present in *L. robustus*).

The new species is also similar to *L. neopectinatus*, however it can be distinguished from the latter by the following features: (1) telofemora I–IV 5-5-4-3 *sts* (vs. 4-4-4-4 *sts* in *L. neopectinatus*); (2) genu I 3 *asl*, {1 *asl*, 1 *mst*}, 4 *sts*; genu II 2 *asl*, 5 *sts*; genu IV 2 *asl*, 5 *sts* (vs. genu I 1 *asl*, 5 *sts*; genu II 1 *asl*, 5 *sts*; genu IV 1 *asl*, 5 *sts* in *L. neopectinatus*); (3) tarsus I 4 *asl* (vs. 3 *asl* in *L. neopectinatus*); (4) cheliceral seta absent (vs. present in *L. neopectinatus*).

Type series

Holotype, female, collected from Yunkaishan National Nature Reserve (22°16'5.42"N, 111°12'52.26"E, elevation 1350 m), Xinyi City, Guangdong Province, China, on 25 April, 2019, by Jian-Xin Chen, slide No., GD-CU-201804250101. Paratypes, eight females and one male the same data as the holotype, slide No.: GD-CU-201804250102–GD-CU-201804250110. All types are deposited in the Institute of Entomology, Guizhou University, Guiyang, P. R. China (GUGC).

Key to the adults of genus *Lepidocunaxoides* of the world

Updated from Chen *et al.* (2020).

1. Palp tibiotarsal claw apically unbranched 2
— Palp tibiotarsal claw tricuspid *L. robustus* Kalúz & Ermilov, 2019
2. Genu I, II and IV with 4 *asl*, 2 *asl* and 2 *asl*, respectively; tarsus I with 4 *asl*; cheliceral seta absent 3
— Genu I, II and IV with 1 *asl*, 1 *asl* and 1 *asl*, respectively; tarsus I with 3 *asl*; cheliceral seta present *L. neopectinatus* (Shiba, 1978)

3. palp tibiotarsus with one bifurcate seta, venter area between coxae I without reticulate pattern *L. bomiensis* Chen & Jin, 2020
 — palp tibiotarsus with two bifurcate setae, venter area between coxae I with reticulate pattern *L. bisetosus* Chen & Jin **sp. nov.**

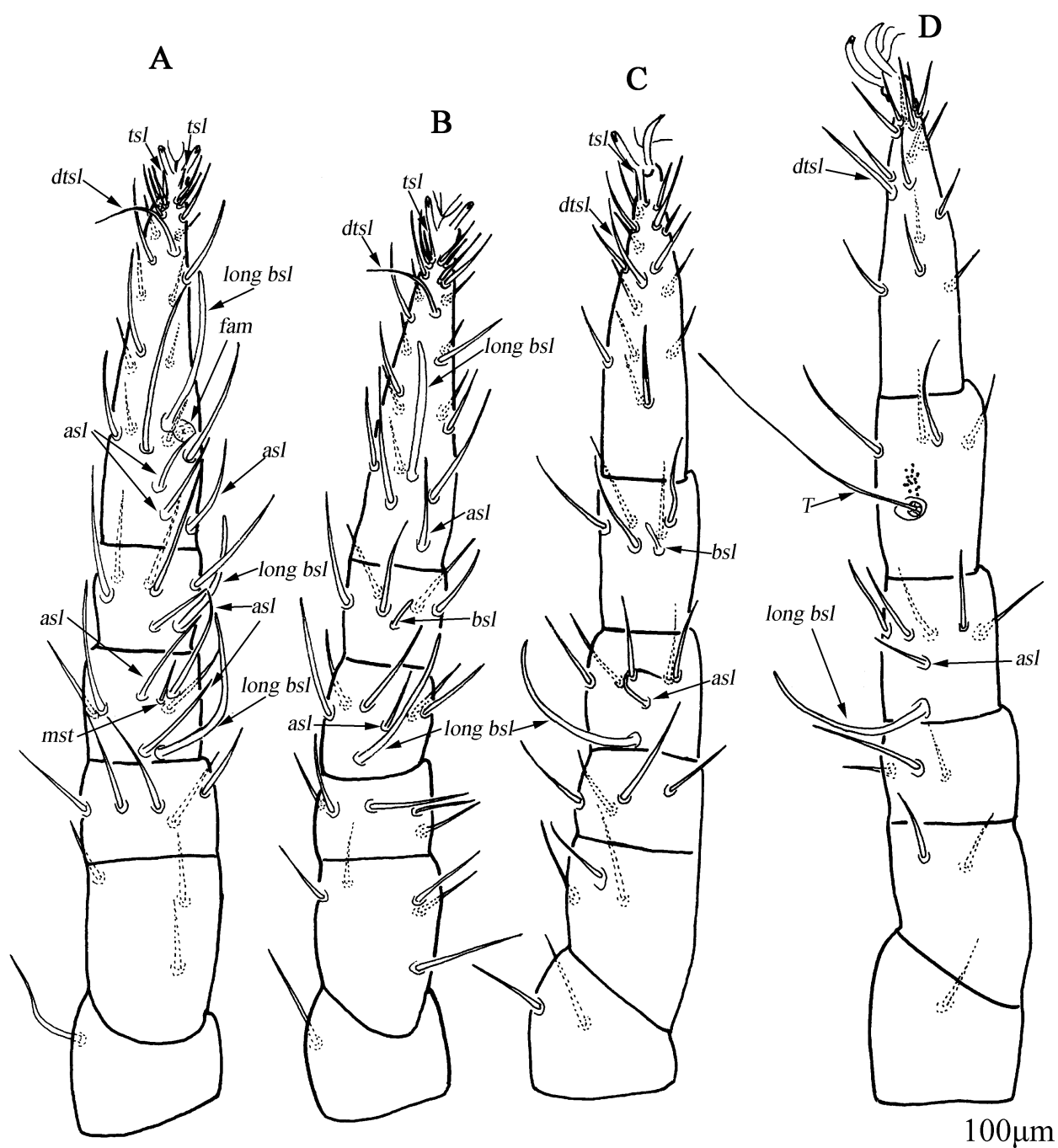


Figure 8 *Lepidocunaxoides bisetosus* Chen & Jin **sp. nov.** male: A–D – leg I–IV respectively. Scale represents 100 μm.

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