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Description of a new species of *Discourella* (Acari: Mesostigmata: Discourellidae) from Yintiaoling Nature Reserve, with a key to Chinese *Discourella* species

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Abstract

Discourella verruca **sp. nov.** (Uropodoidea: Discourellidae) is described and illustrated, based on seven females collected from deciduous leaf samples of Yintiaoling National Nature Reserve, Chongqing, China. Characteristic illustrations, SEM figures of adult mite are provided. The new species is unusual within *Discourella* by some setae on the idiosoma on the verrucose processes. Additionally, a key to the Chinese *Discourella* species is provided.

Key words: Uropodina; Discourellidae; *Discourella*; new species; soil mites

Introduction

The soil mite family Discourellidae Baker & Wharton, 1952 is a relatively small group of the cohort Uropodina (Mesostigmata), including five genera and at least 99 species worldwide (Kontschán 2010; Beaulieu 2011; Kontschán 2015; Kontschán & Friedrich 2020). Members of this family mainly inhabit fallen leaves, weeds, decaying wood residues, and soil.

The type genus, *Discourella* of Discourellidae includes more than 70 species globally and six species from China: *D. baloghi* Hirschmann & Zirngiebl-Nicol, 1969 (from Jilin), *D. dubiosa* (Schweizer, 1961) (from Shandong and Jilin), *D. guizhouensis* Ma, 2015 (from Guizhou), *D. modesta* (Leonardi, 1899) (from Jilin), *D. silvestrisa* Hiramatsu, 1977 (from Guizhou) and *D. stammeri* Hirschmann & Zirngiebl-Nicol, 1969 (from Jilin) (Ma, 2004; Lin *et al.*, 2007; Bei *et al*., 2010a, b; Yin *et al*., 2013; Ma, 2015).

This paper describes a new species of *Discourella* from Yintiaoling Nature Reserve in Chongqing, China. This is the first report on *Discourella* and Discourellidae from Chongqing. Additionally, we provide a key to all Chinese *Discourella* species.

Materials and methods

Mites were extracted using modified Berlese funnels from 12 to 24 hours, preserved in 75% alcohol, and the specimens were carried to the laboratory and the mites were removed under a stereo microscope (Leica DM 3000 and Nikon SMZ 25), preserved in Oudemans's fluid, cleared with Nesbitt's fluid then later soaked in Lundblad's fluid until the internal muscles of the body were completely corroded and became permeable, then dissected in clear water and slide-mounted in Hoyer's solution (Walter & Krantz 2009).

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The dorsal ventral surface and its features were photographed by scanning electron microscopy JCM 6000. Specimens were observed and illustrated under a Nikon DS-Ri2 microscope, and figures were edited with Nikon NIS-Elements AR 4.50 and Adobe Photoshop CC2019.

All measurements are given in micrometers (μm). The morphological terminology generally follows Evans & Till (1979) and Lindquist *et al*. (2009). Nomenclature for the idiosoma was labelled according to the system of Lindquist & Evans (1965) and Lindquist (1994). The type materials are deposited in the Institute of Entomology, Guizhou University, Guiyang, P.R. China (GUGC).

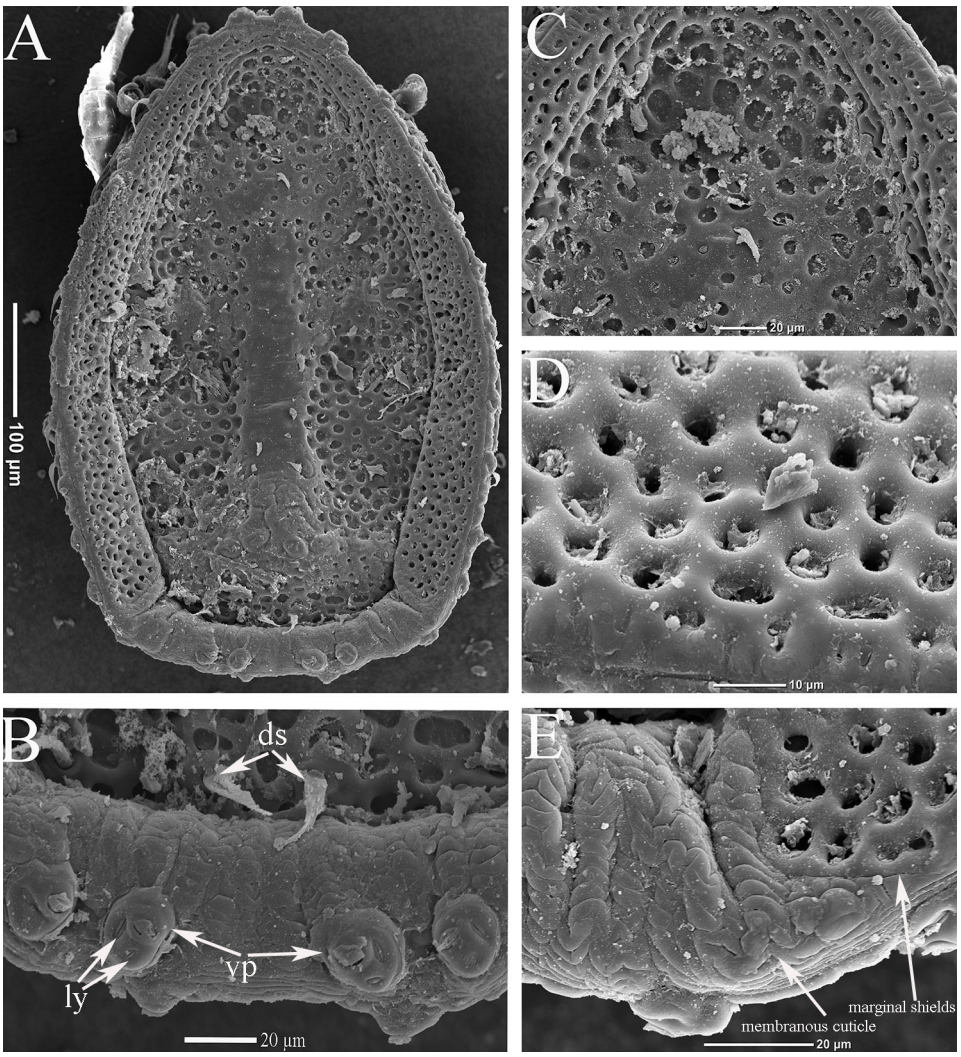

FIGURE 1. *Discourella verrucur* **sp. nov.** Female, dorsal side: A. General view; B. Membranous cuticle; C–D. Ornamentation on dorsal and marginal shields; E. Membranous cuticle and marginal shield on lateral part; vp—Verrucous process, ly—Lyrifissure, ds—Dorsal setae.

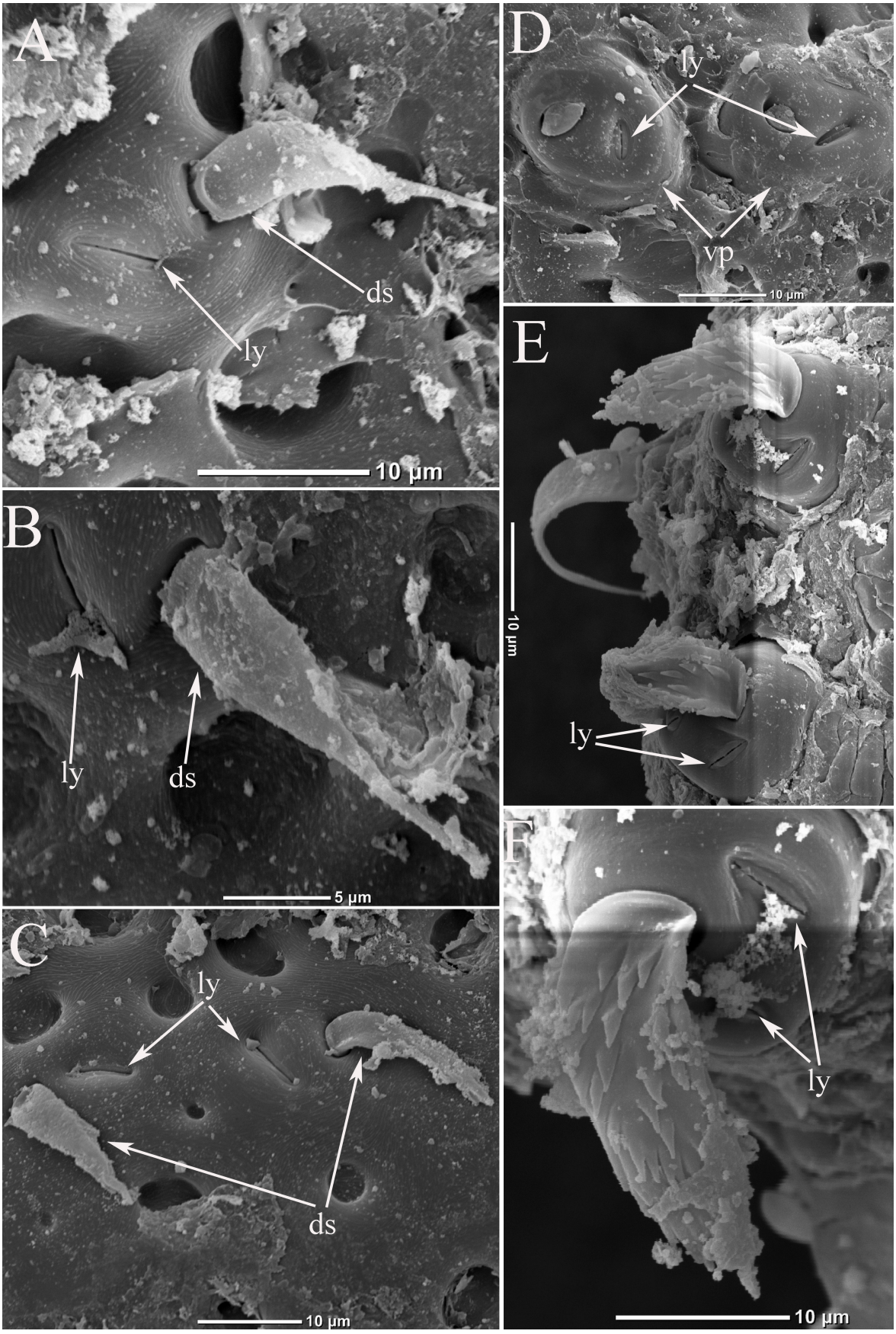

FIGURE 2. *Discourella verrucur* **sp. nov.** Female, dorsal side setae: A–C. Dorsal setae; D. Verrucous processes on the dorsal shield; E—F. Setae situated on the membranous cuticle; vp—Verrucous process, ly—Lyrifissure, ds—Dorsal setae.

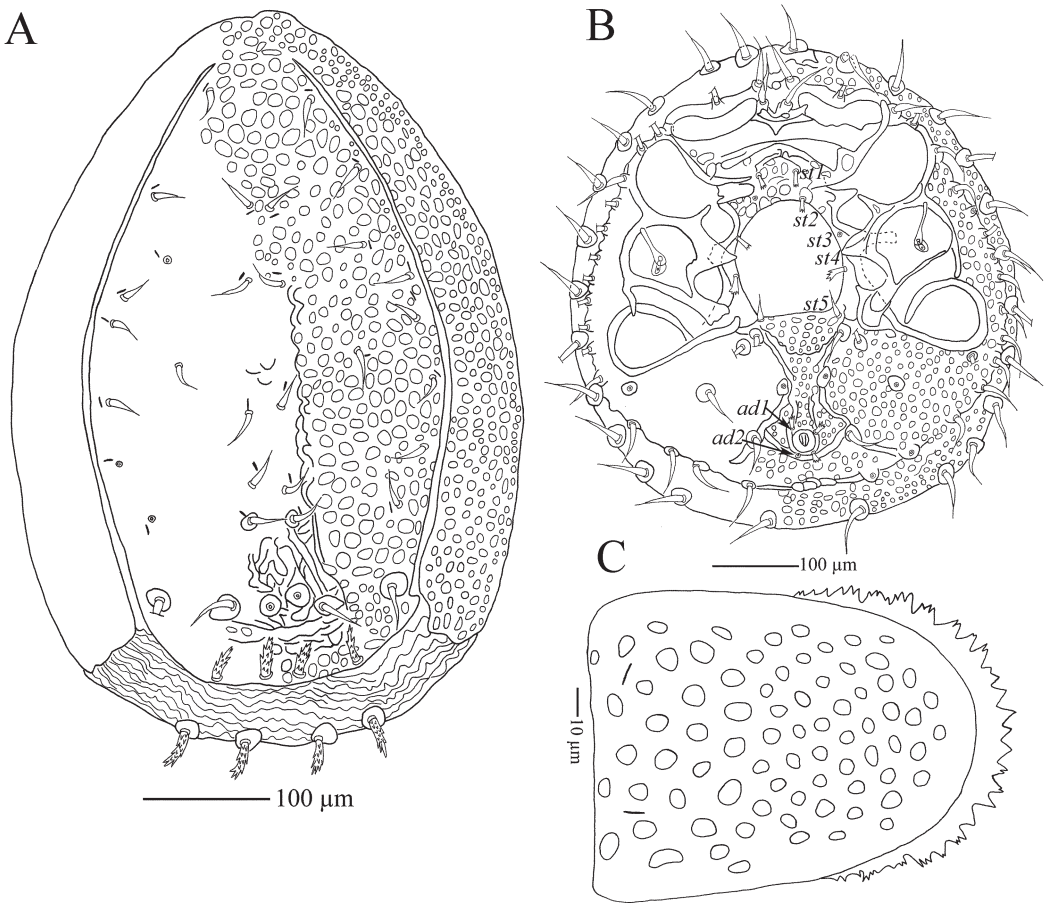

FIGURE 3. *Discourella verrucur* **sp. nov.** Female: A. Dorsal idiosoma; B. Ventral idiosoma; C. Genital shield.

Results

Family Discourellidae Baker & Wharton, 1952
尘盘尾螨科

Genus *Discourella* Berlese, 1910
尘盘尾螨属

Diagnosis. Idiosoma oval or broad oval. Dorsum usually with dorsal and marginal shields, with or without pygidial and peritrematal shields. Female genital shield usually with a straight posterior and rounded anterior margin, some with apical process, protruding pointed or dentate. Hypostomal setae *h1* usually longer than *h2–h4*. Corniculi horn-like, smooth. Internal malae usually marginally pilose. Epistome one or two sharp-ended, occasionally branched, its base smooth or denticled, apically dispersed or forked in moderate deep. The base of tritosternum rectangular to wide strip, lacinae with 2–6 branches. Internal sclerotized cheliceral node absent (Bal & Özkan 2003; Mašán 2001).

Discourella verruca sp. nov.
疣尘盘尾螨
(Figures 1–7)

Type materials. Holotype female (slide No. ChQ20220812M010101), collected on deciduous leaf from Linkouzi, Yintiaoling National Nature Reserve, Chongqing City, China, 109°52′39.0144″E, 31°28′28.2288″N, altitude 1289

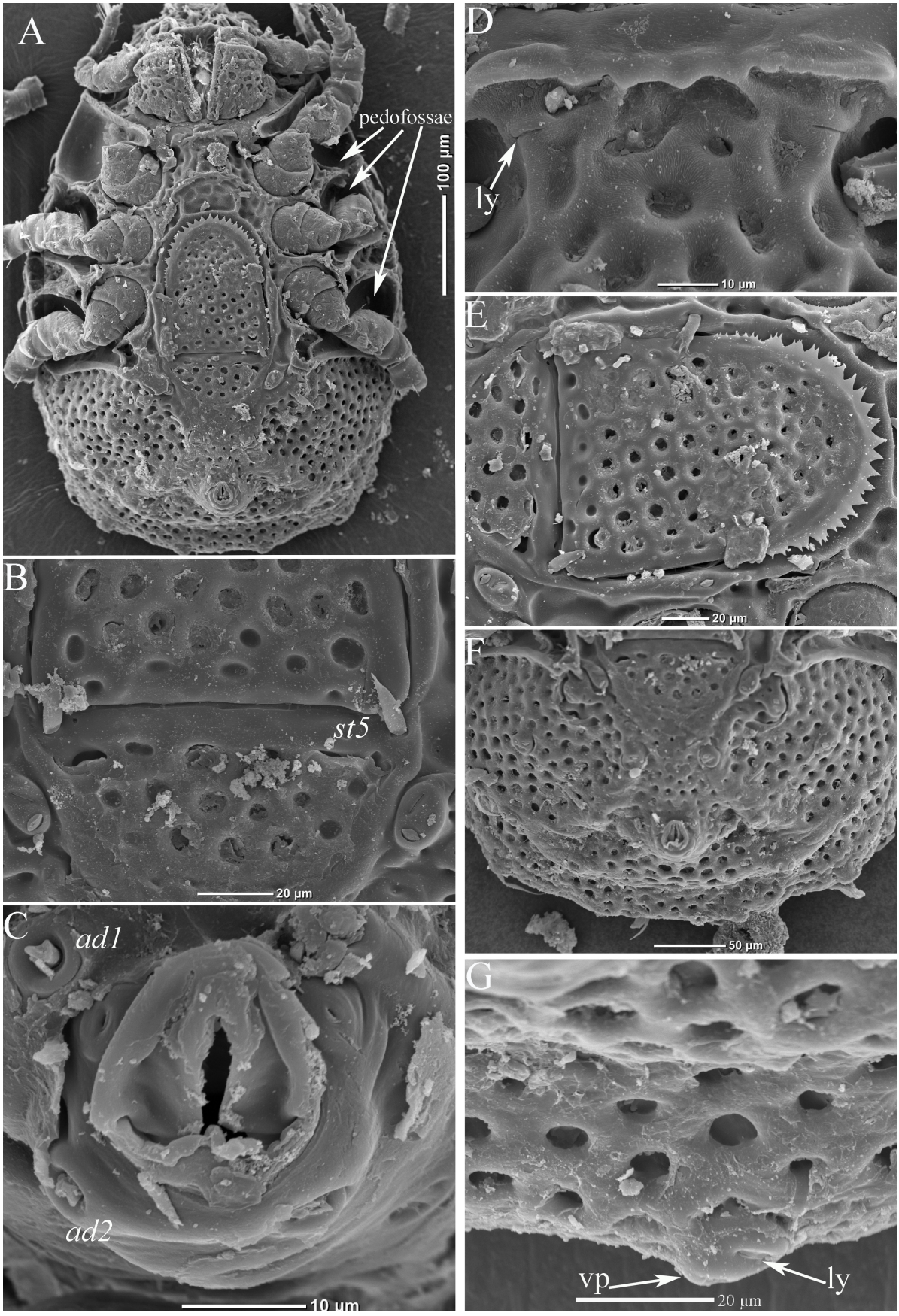

FIGURE 4. *Discourella verrucur* **sp. nov.** Female, ventral side: A. General view; B. Posterior margin of genital shield; C. Anal opening; D. Anterior margin sternal shield; E. Genital shield; F. Opisthosoma; G. Ornamentation on the posterior part of venter; vp—Verrucous process, ly—Lyrifissures.

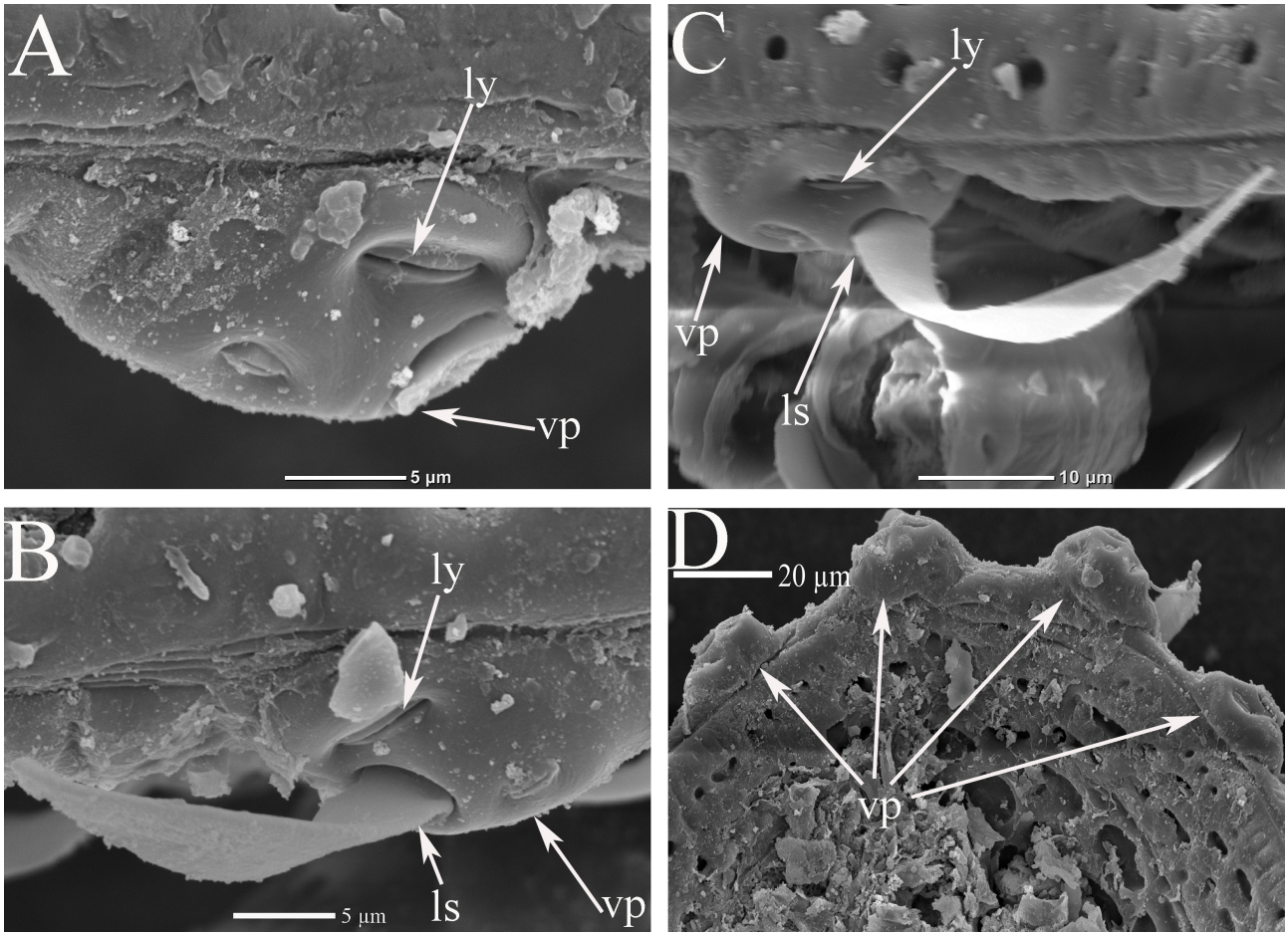

FIGURE 5. *Discourella verrucur* **sp. nov.** Female, ventral side: A–C. Lateral setae; D. Vertex; vp—Verrucous process, ly—Lyrifissures, ls—Lateral setae.

m, on 12 August 2022, coll. Gui-Ming Mu. **Paratypes**, six females (slides No. ChQ20220812M010102~07), the same data as holotype.

Description

Female (n = 7). Idiosoma long oval, 590 (520–590) in length, maximum width 418 (404–497).

Dorsal idiosoma (Figs 1, 3A). Dorsum with dorsal and marginal shields, with oval pits on dorsal (Fig. 1C) and marginal shields (Fig. 1D); marginal shield fused with dorsal shield on anterior part of dorsal side (Fig. 1E). Dorsal shield central bulge, 521 (499–520) in length, maximum width 290 (275–290); Dorsal shield with 17 pairs of smooth, anteriorly thick and apically thin setae (Figs 2A–C) (16–29) (four pairs of setae located on the verrucous processes (Fig. 2D), two pairs of margin and center serrated setae (Fig. 1B) (20–31) and several lyrifissures. Dorsal shield caudally reduced (Fig. 1E), caudal area covered by membranous cuticle (Fig. 1B). Two pairs of margin and center serrated (27–31) setae situated on the verrucous processes (Figs 1B, 2E–F). All verrucous processes with one or two lyrifissures (Figs 1B, 2D–F).

Ventral idiosoma (Figs 3B, 4A). Venter covered by irregular oval pits (Figs 4B, 4D–G). Five pairs of sternal setae (Figs 4B, 7A–D). Setae *st1* and *st2* situated anterior margin of genital shield, *st3* and *st4* on both sides of the genital shield, *st1–st4* (7–13) apically serrate; setae *st5* (12–21) located at the posterior margin of the genital shield. Genital shield (Figs 3C and 4E) of female linguliform, 126 (126–129) in length, maximum width 107 (104–113), placed between coxae III and IV, with a straight posterior (Fig. 4B) and rounded anterior margin, with alveolar ornamentation and with crown-like process (Fig. 7A) on anterior margin. One pair of lyriform fissure on the terminal part of genital shield. Peritreme and stigmata situated in the fovea pedales of leg III. Peritreme short and linear form, 40 (39–46) in length. Six pairs of ventri-anal setae (32–47) (Fig. 6A) similar in shape to dorsal shield setae. venter with a ring of marginal setae (Fig. 6B–C) (32–53) and lateral setae (Figs 5A–D) (41–62) similar in shape to dorsal

shield setae. anterior margin of the venter with a pair of setae (Fig. 6D) 63 (63–67) in length, similar in shape to dorsal shield setae. Two pairs of adanal setae similar in shape and length to *st1–st4.* All setae of venter located on the verrucous processes, excepting for two pairs of adanal setae and five pairs of sternal setae. pedofossae (Fig. 4A) present. All verrucous processes with one or two lyrifissures. All lyrifissures not clearly visible under the light microscope (Nikon Nis Elements AR 4.50).

Gnathosoma (Figs 8–9). Corniculi horn-like, internal malae and labrum pilose and longer than corniculi (Fig. 8A). Hypostomal setae (Figs 8A, 9B) *h1* (42–44) smooth, needle-like, *h2–h4* (10–16), robust and marginally serrate, *h1* about three times longer than *h2–h4*. Deutosternum bearing some denticles (Fig. 8A). Salivary stylet (Fig. 8A) smooth and needle-like,43–47 in length. Trochanter of palp (Fig. 8B) bearing one long, robust and marginally serrate dorsal seta and one short, marginally serrate ventral seta. Palp apotele bifurcate. Epistome (Fig. 8C) marginally and centrally serrate and apically pilose. Base of tritosternum narrow, tritosternal laciniae subdivided into five serrate branches (Figs 8E, 9C). Chelicerae (Figs 8D, 9A) without internal sclerotized node, fixed digit longer than movable digit, with a circular terminal and a finger-like apical sensillum, some small spines inside the fixed digit, movable digit bearing one tooth and one dorsal seta.

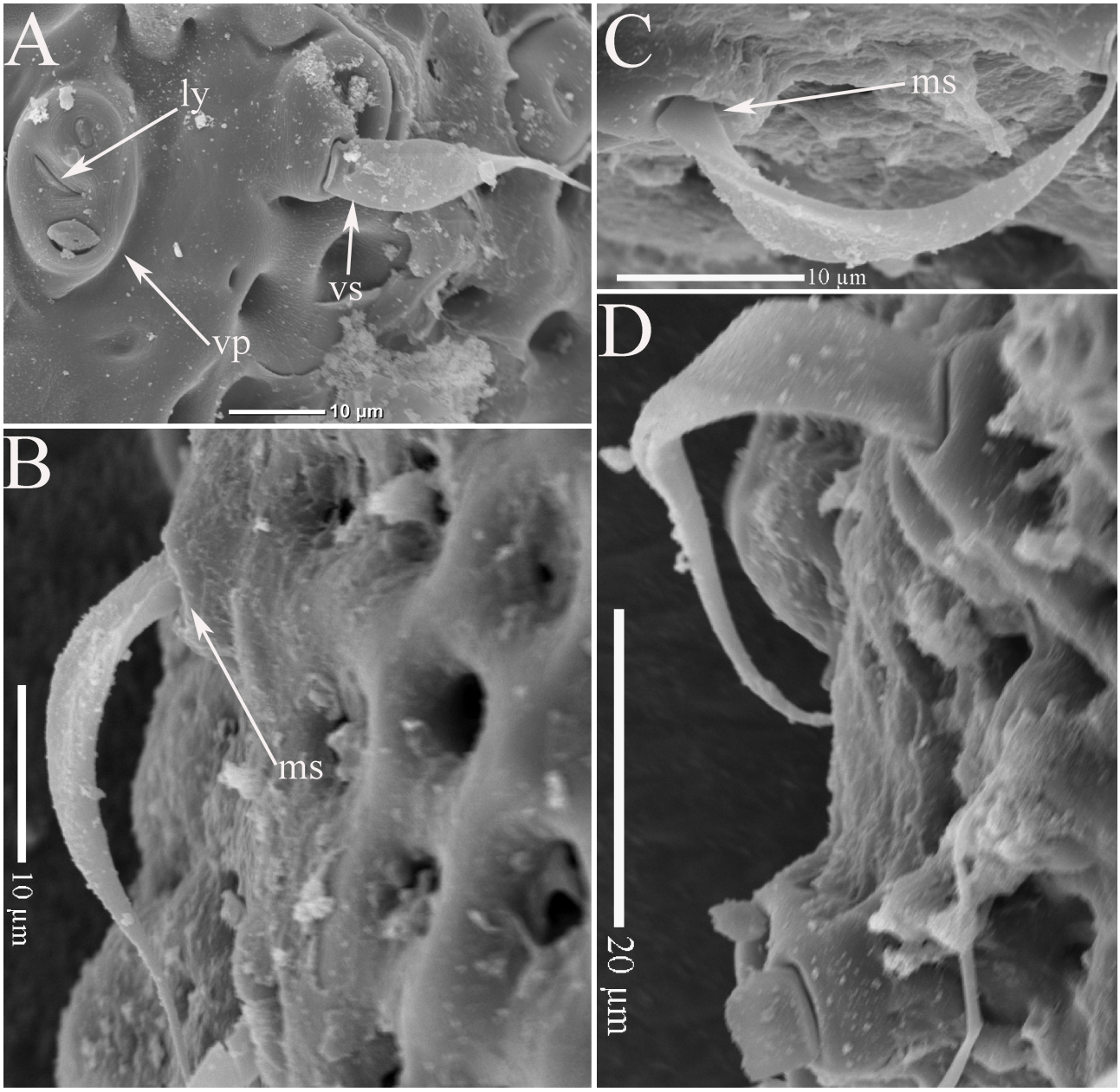

FIGURE 6. *Discourella verrucur* **sp. nov.** Female, ventral side: A. Ventral setae; B–C. Marginal setae; D. The anterior margin of the venter; vp—Verrucous process, ly—Lyrifissures. vs—Ventral setae, ms—Marginal setae.

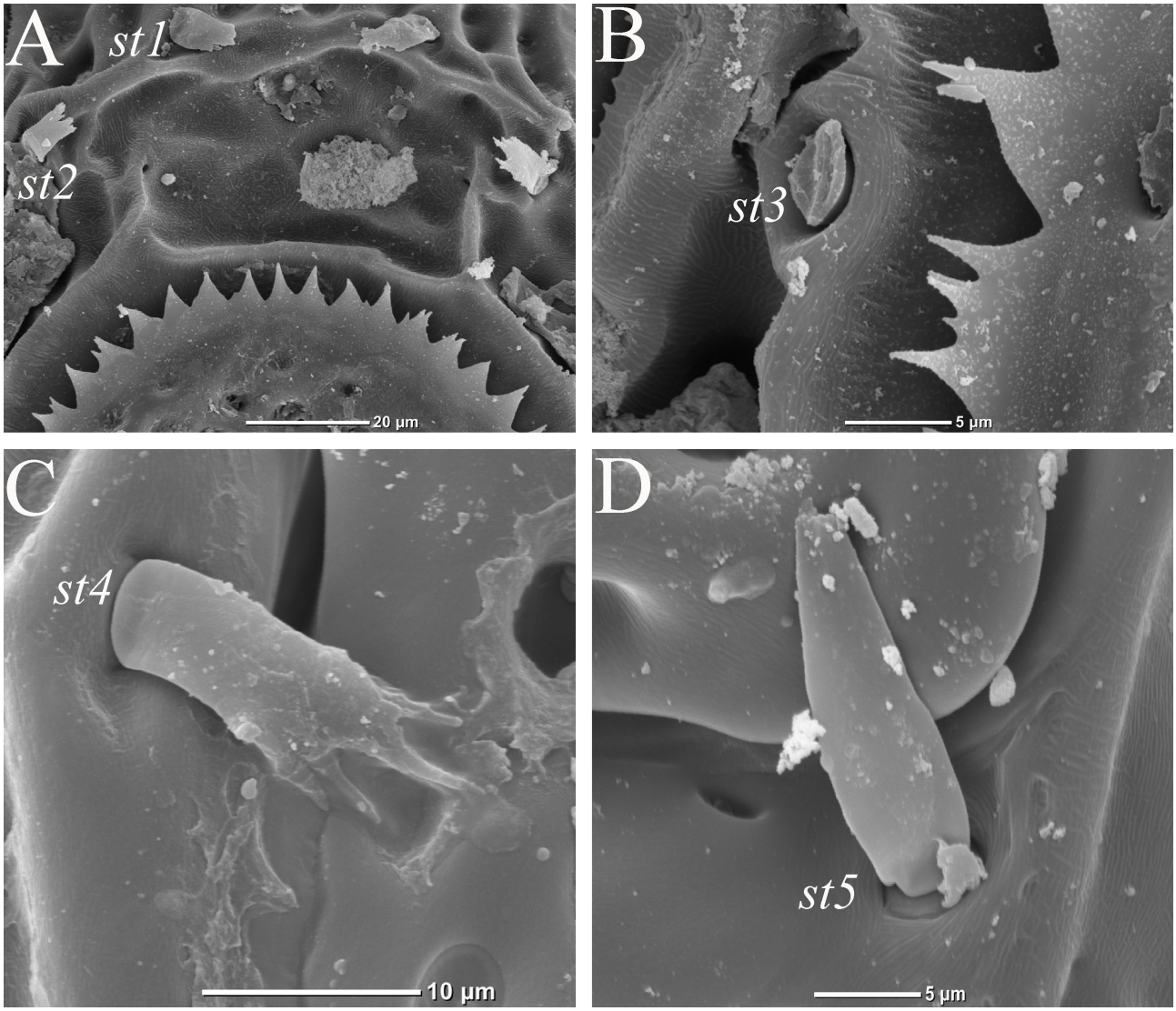

FIGURE 7. *Discourella verrucur* **sp. nov.** Female, ventral side: A–D. Sternal setae.

Legs (Figs 10–11). Leg I without ambulacral claw, with an extremely long seta on tarsi. Coxae I broad, hiding tritosternum. Setae on all legs needle-like, marginally serrate setae or phylliform setae. A few of setae on the legs I–IV located on the verrucous processes.

Male unknown.

Etymology. The new species is named after the verrucous processes of idiosomal setae.

Remarks. Hirschmann (1972a, b) divided the genus *Discourella* into 11 species groups and compiled a key to species groups and species. However, these species recorded by Hirschmann are almost all European and South American species. The key and classification would probably fail when species from other parts of the world are included. It is difficult to place *Discourella verruca* **sp. nov.** in Hirschmann's classification. The new species was compared with all the species that occur in the Oriental Region of Asia.

Up to now, a total of 19 *Discourella* species have been described in the Oriental Region of Asia. Among them, 11 species were described from Japan only: *D. ishikawai* Hiramatsu, 1979, *D. miyakawai* Hiramatsu, 1979, *D. domotoi* Hiramatsu, 1979, *D. komoroensis* Hiramatsu, 1979, *D. morikawai* Hiramatsu, 1979, *D. aokii* Hiramatsu, 1979, *D. artificiosa* Hiramatsu, 1979, *D. omogoensis* Hiramatsu, 1979, *D. onishii* Hiramatsu, 1979, *D. fumiakii* Hiramatsu, 1980 and *D. radnaensis* (Willmann, 1941); Four species from China only: *D. modesta, D. dubiosa*, *D. baloghi* and *D. guizhouensis*; One species from Korea only: *D. koreae* Hirschmann, 1981; and one from Mongolia only: *D. kaszabi* Hirschmann, 1972. The rest two species, *D. silvestrisa* Hiramatsu, 1977 recorded from Japan and China, *D. modesta* (Leonardi, 1899) from Korea and China.

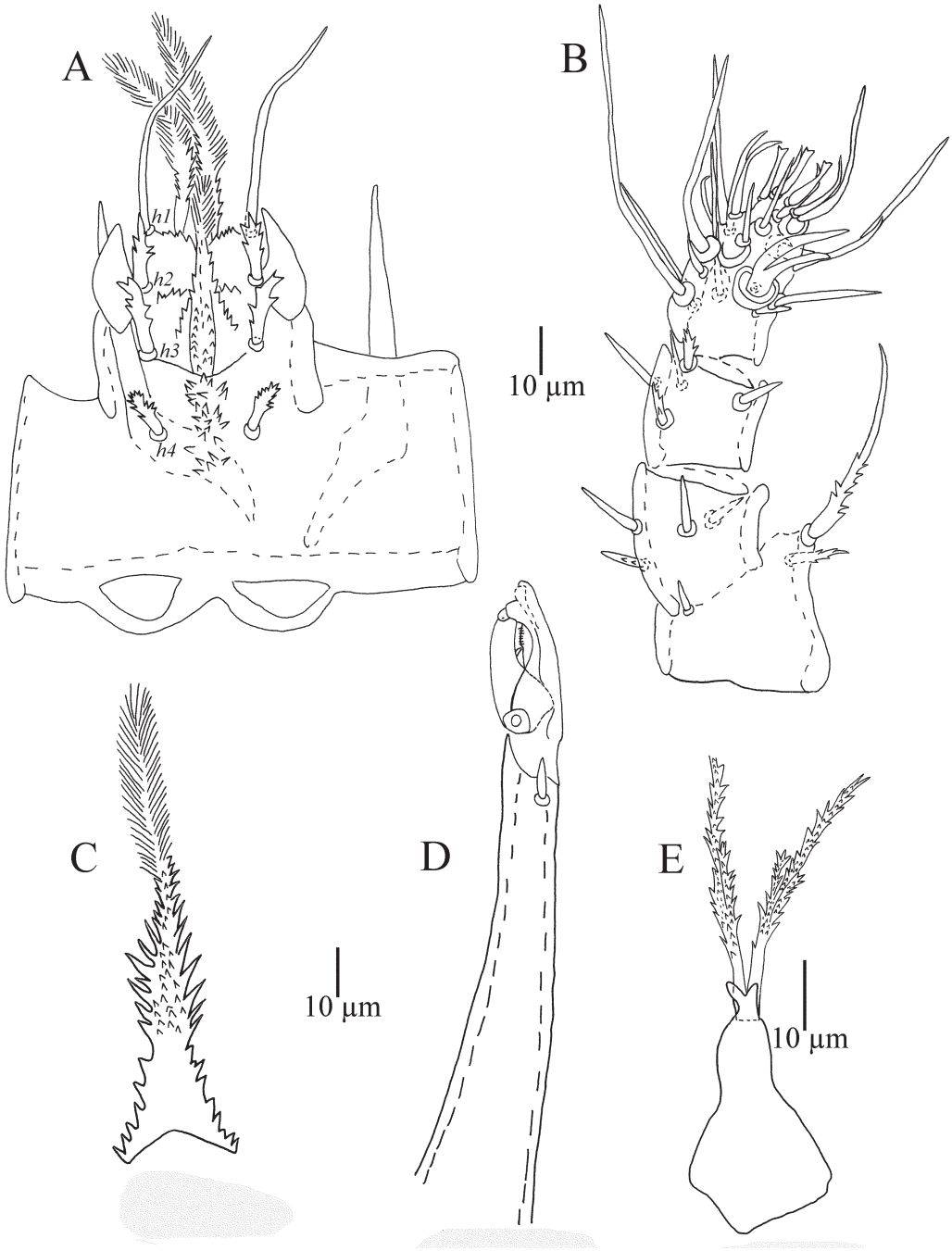

FIGURE 8. *Discourella verrucur* **sp. nov.** Female: A. Gnathosoma; B. Palp; C. Epistome; D. Chelicera; E. Tritosternum.

Among these species, two of them (*D. modesta, D. dubiosa*) have pygidial shield, three of them (*D. radnaensis, D. baloghi, D. guizhouensis*) lack the crown-like apical process on the female genital shield, two of them (*D. koreae, D. ishikawai*) have completely separated dorsal and marginal shields, ten of them (*D. kaszabi, D. silvestrisa, D. miyakawai, D. komoroensis, D. aokii, D. artificiosa, D. omogoensis, D. onishii, D. fumiakii, D. stammeri*) have smooth sternal setae and genital shield placed between coxae II and IV. The rest two species were described on the basis of males (*D. domotoi, D. morikawai*) and cannot to be compared.

The following characteristics distinguish new species from these known species from the Oriental Region of Asia by: pygidial shield absent, genital shield with a crown-like apical process and placed between coxae III and IV, marginal shield fused with dorsal shield on anterior part of dorsal side, and *st1–st4* apically serrate.

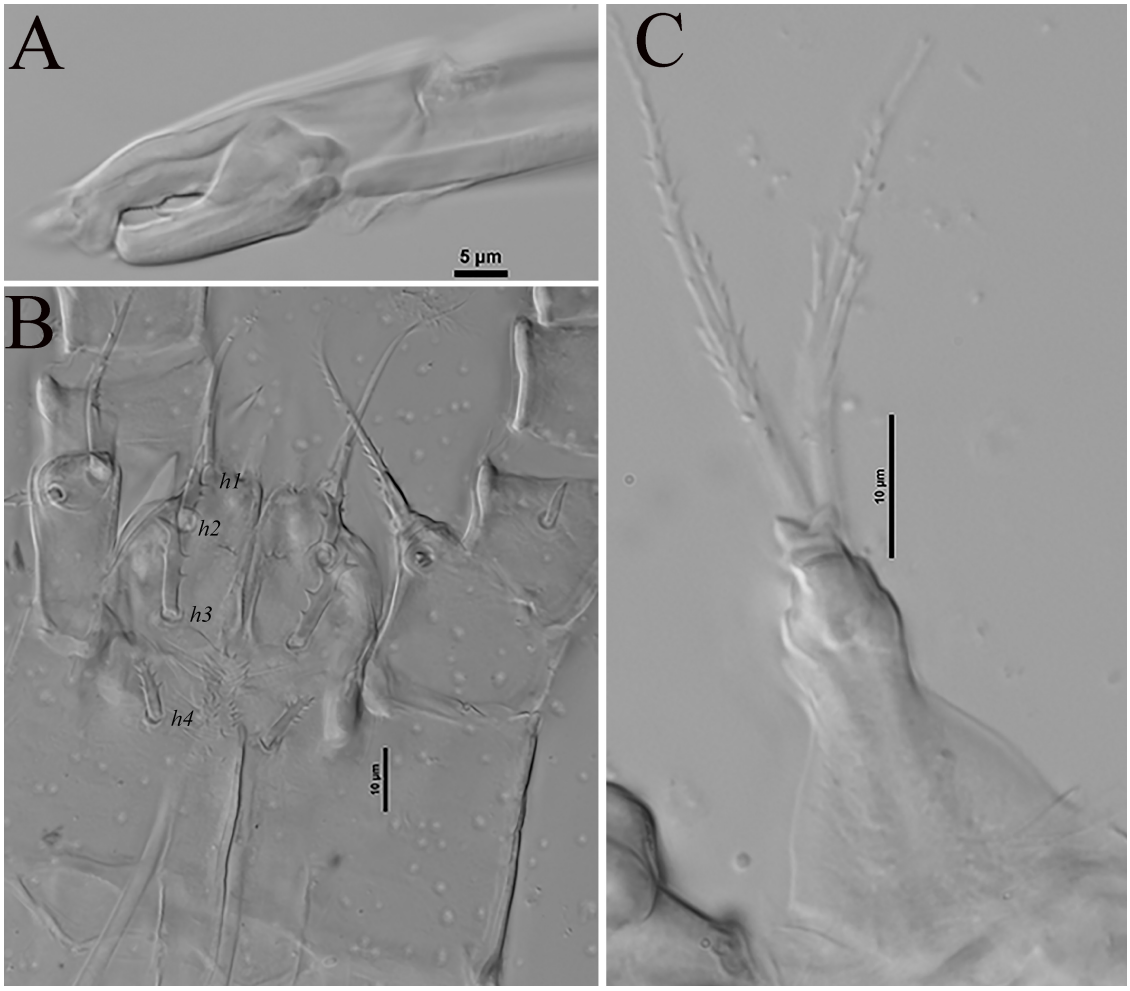

FIGURE 9. *Discourella verrucur* **sp. nov.** Female: A. Chelicera; B. Hypostomal setae; C. Tritosternum.

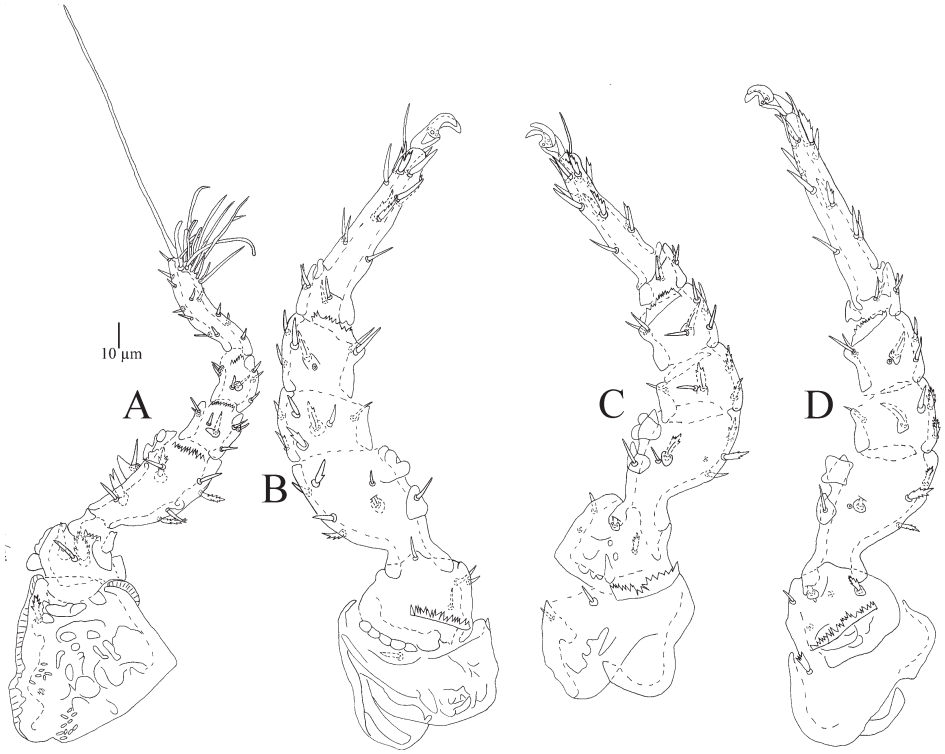

FIGURE 10. *Discourella verrucur* **sp. nov.** Female, legs: A. I; B. II; C. III; D. IV.

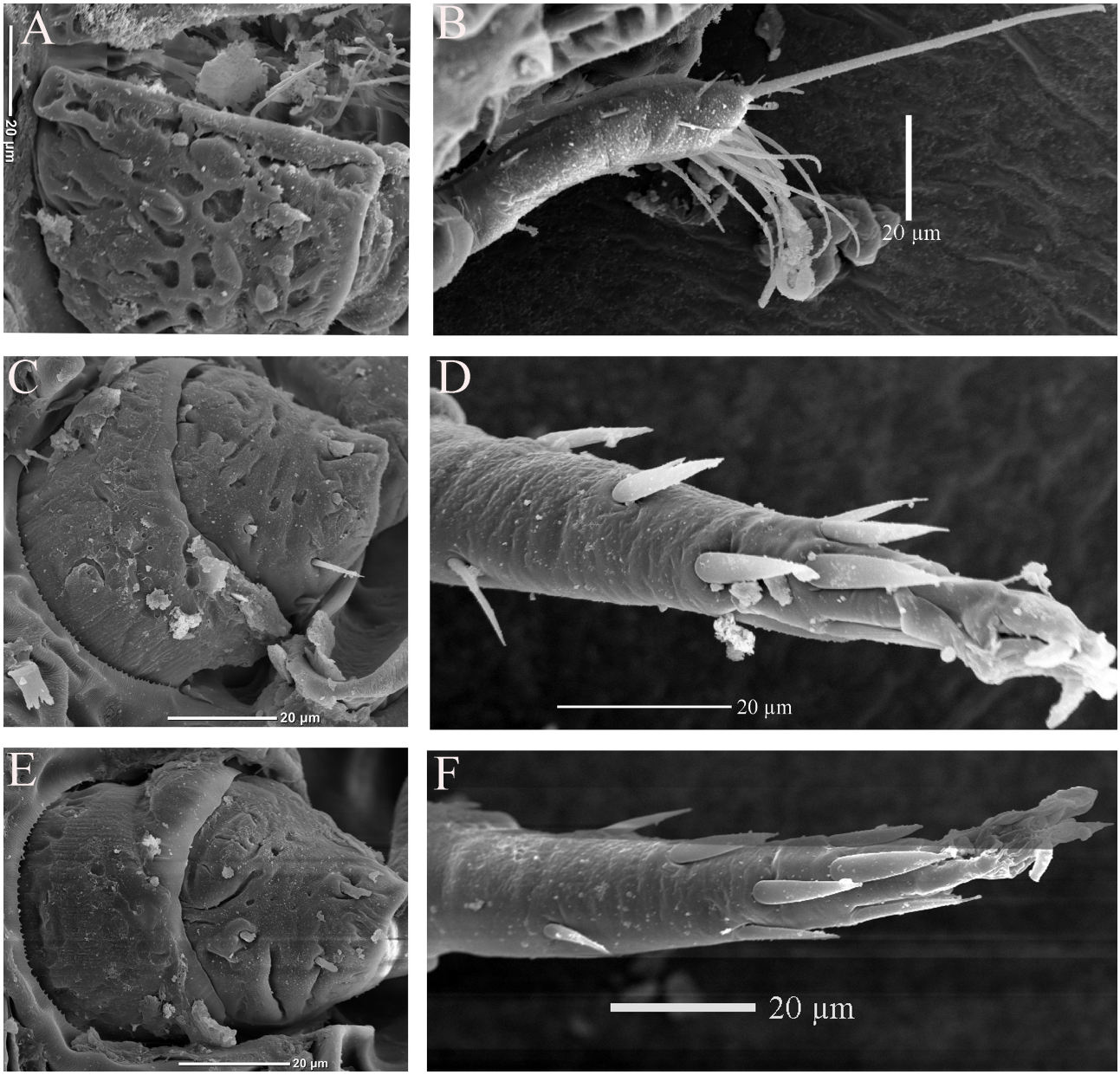

FIGURE 11. *Discourella verrucur* **sp. nov.** Female, legs: A. Coxa I; B. Tarsus I; C. Coxa and trochanter II; D. Tarsus II; E. Coxa and trochanter III; F. Tarsus III.

Key to the females of *Discourella* species of China

1. Dorsum with independent pygidial shield 2
- Dorsum without independent pygidial shield. 3
2. Marginal shield divided into four pairs of platelets . . . . . *D. modesta*
- Marginal shield divided into three pairs of platelets . . . . . *D. dubiosa*
3. Genital shield with a crown-like anterior process 4
- Genital shield without a crown-like anterior process. 6
4. Genital shield with a straight posterior margin 5
- Genital shield with a rounded posterior margin . . . . . *D. stammeri*
5. Ventri-anal shield is complete . . . . . .*D. verruca* **sp. nov.**
- Ventri-anal shield is divided into two pairs . . . . . .*D. silvestrisa*
6. Marginal shield free posteriorly . . . . . *D. guizhouensis*
- Marginal shield not free posteriorly . . . . . .*D. baloghi*

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