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## Monograph

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# A review of the genus *Tyrannochthonius* (Pseudoscorpiones: Chthoniidae) from Guangxi, China, with the description of eleven new species

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**Abstract.** Eleven new species of *Tyrannochthonius* from Guangxi Province in southern China are described, including detailed diagnosis and illustrations: *T. baiseensis* sp. nov. from Dayan Cave (Lingyun County), *T. fenghuangensis* sp. nov. from Unnamed Cave 3 (Bama Yao Autonomous County), *T. laqiuensis* sp. nov. from Laqiu Cave (Donglan County), *T. longulimembrum* sp. nov. from Guangyang Cave (Tiandong County), *T. miridentatus* sp. nov. from Xi'an Cave (Fengshan County), *T. shenlongensis* sp. nov. from Shenlong Cave (Huanjiang Maonan Autonomous County), *T. xianguensis* sp. nov. from Xianggu Cave (Yizhou District), *T. xiannvyanensis* sp. nov. from Xiannvyan Cave (Yizhou District), *T. xiaoi* sp. nov. from Unnamed Cave 1 (Xing'an County), *T. yilingyanensis* sp. nov. from Yilingyan Cave (Wuming District) and *T. yui* sp. nov. from Unnamed Cave 2 (Yufeng District). An identification key to all known species of *Tyrannochthonius* from China is also provided.

**Keywords.** Diversity, karst, morphology, taxonomy.

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## Introduction

The genus *Tyrannochthonius* Chamberlin, 1929, belonging to the tribe Tyrannochthoniini Chamberlin, 1962, subfamily Chthoniinae Daday, 1889, and family Chthoniidae Daday, 1889, is the most species-rich genus within the family Chthoniidae, comprising 180 species (including four subspecies) distributed globally on every continent except Antarctica (Harms *et al.* 2022; World Pseudoscorpiones Catalog 2026). It can be recognized by the following combination of characters: trichobothria *ib* and *isb* situated

close together in a median or sub-basal position on the dorsum of the chelal hand; chelal hand not distally constricted and the movable finger without a complex or strongly sclerotized apodeme at the base; fixed finger usually with one large, medial acuminate spine-like seta at its base, but can be reduced or absent in some cave-dwelling species; coxal spines only present on coxae II (Chamberlin 1962; Muchmore 1984, 1991; Muchmore & Chamberlin 1995; Edward & Harvey 2008).

The genus *Tyrannochthonius* has garnered significant attention from researchers in China in recent years, and primarily distributed in the karst regions of Southwest China (Song 1996; Mahnert 2009; Gao *et al.* 2020; Li 2022; Hou *et al.* 2022a, 2023a, 2023b). However, it is important to note that other karst areas in China, such as Guangxi, also cover extensive territories. According to survey statistics, the area of karst landform in Guangxi is  $9.77 \times 10^4$  km<sup>2</sup>, accounting for approximately 41.0% of the total land area of the region (Yu 2003). Although its karst area is only slightly smaller compared to that of Guizhou ( $10.91 \times 10^4$  km<sup>2</sup>) (Lin 2001), the species diversity of the genus *Tyrannochthonius* in Guangxi is significantly lower than that in Guizhou (4 species vs 27 species) (Gao *et al.* 2018, 2020; Li 2022; Hou *et al.* 2023b; Sun *et al.* 2025). This discrepancy may indicate that the diversity in this area has been severely underestimated.

This study describes eleven new cave-dwelling species of *Tyrannochthonius*, based on specimens collected from caves in Guangxi by our laboratory members in recent seven years. Detailed descriptions, illustrations, a distribution map (Fig. 1) from Guangxi, China and the key to the species of the genus *Tyrannochthonius* from China (subspecies not included) are provided.

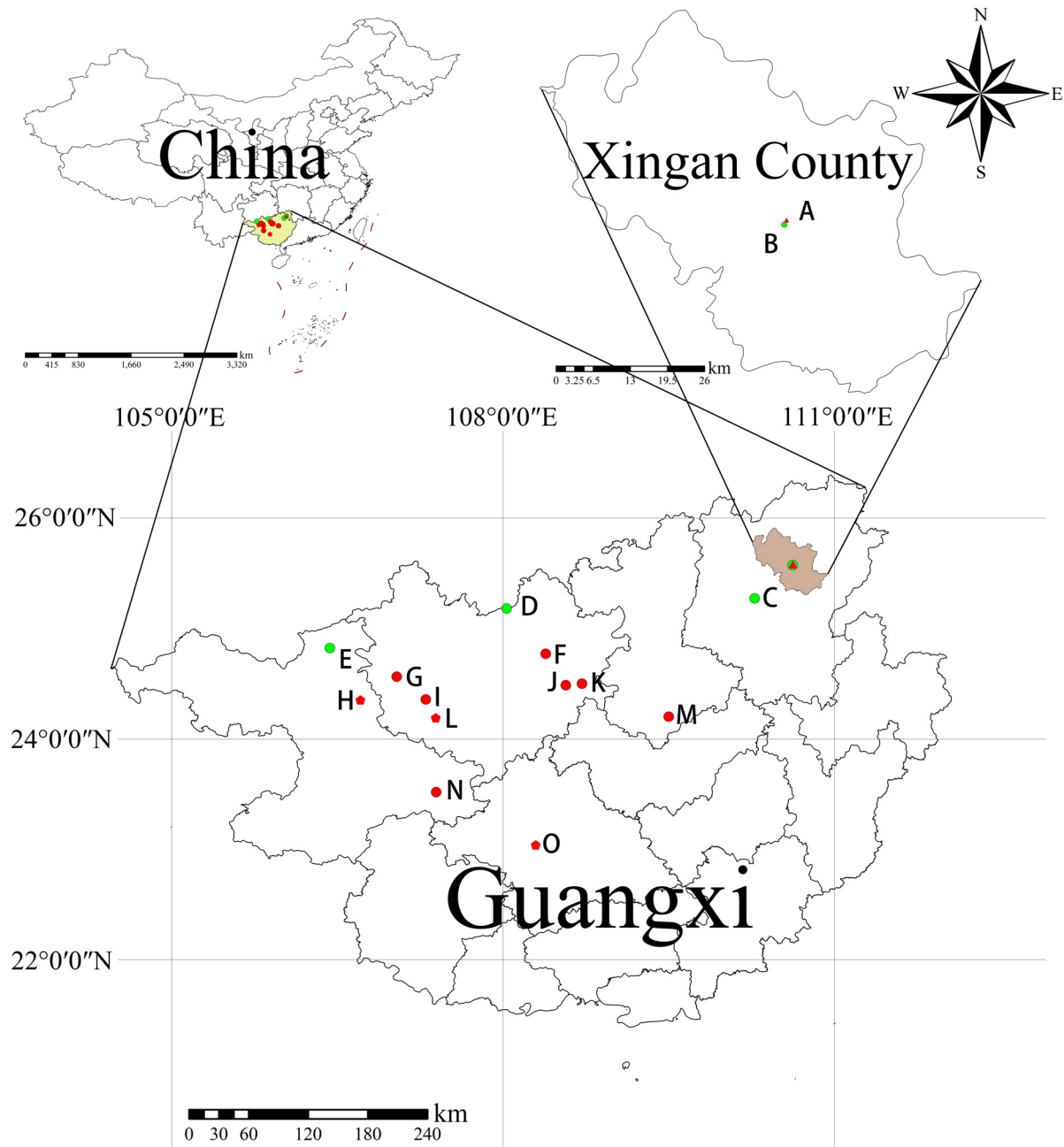
## Material and methods

The specimens examined for this study are preserved in 75% ethyl alcohol in a refrigerator at -20°C and deposited in the Museum of Hebei University (MHBHU) (Baoding, China). Photographs and measurements were taken using a Leica M205A stereo microscope equipped with a Leica DFC550 camera. Drawings were made using the Inkscape software ver. 1.0.2.0. Detailed examination was carried out with an Olympus BX53 general optical microscope. All images were edited and formatted using Adobe Photoshop 2017.

Terminology and measurements follow Chamberlin (1931) with some small modifications to the terminology of trichobothria (Harvey 1992; Judson 2007) and chelicera (Judson 2007). The chela and legs are measured in lateral view and others are taken in dorsal view. The measurements of the specimens are predominantly provided in millimeters (mm) unless specified otherwise, whereas the measurements on the map are presented in kilometers (km). Proportions and measurements of chelicerae, carapace and pedipalps correspond to length/breadth, and those of legs to length/depth.

## Abbreviations for morphological terms

- b = basal
- dx = duplex trichobothria
- eb = exterior basal
- esb = exterior sub-basal
- est = exterior sub-terminal
- et = exterior terminal
- ib = interior basal
- isb = interior sub-basal
- ist = interior sub-terminal
- it = interior terminal
- sb = sub-basal
- st = subterminal



**Fig. 1.** Study area and species composition of the genus *Tyrannochthonius* Chamberlin, 1929 in karst caves of Guangxi Zhuang Autonomous Region. Green represents known species, red represents new species. A. Unnamed Cave 1 (*T. xiaoi* sp. nov.). B. Rudongyan Cave (*T. rudongyanensis* Sun, Guo & Zhang, 2025). C. Maomaotou Cave (*T. chixingi* Gao, Wynne & Zhang, 2018). D. Ganxiao Cave (*T. tiani* Sun, Guo & Zhang, 2025). E. Yanwu Cave (*T. yanwuensis* Sun, Guo & Zhang, 2025). F. Shenlong Cave (*T. shenlongensis* sp. nov.). G. Xian Cave (*T. miridentatus* sp. nov.). H. Dayan Cave (*T. baiseensis* sp. nov.). I. Laqiu Cave (*T. laqiuensis* sp. nov.). J. Xiannvyan Cave (*T. xiannvyanensis* sp. nov.). K. Xianggu Cave (*T. xiangguensis* sp. nov.). L. Unnamed Cave 3 (*T. fenghuangensis* sp. nov.). M. Unnamed Cave 2 (*T. yui* sp. nov.). N. Guangyang Cave (*T. longulimembrum* sp. nov.). O. Yilingyan Cave (*T. yilingyanensis* sp. nov.).

t = terminal

## Results

### Taxonomy

Class Arachnida Cuvier, 1812  
Order Pseudoscorpiones de Geer, 1778  
Family Chthoniidae Daday, 1889  
Subfamily Chthoniinae Daday, 1889  
Tribe Tyrannochthoniini Chamberlin, 1962

Genus *Tyrannochthonius* Chamberlin, 1929

### Type species

*Chthonius terribilis* With, 1906, by original designation.

### *Tyrannochthonius baiseensis* sp. nov.

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Figs 1H, 2–6

### Diagnosis

(♂♀) Moderately sized troglomorphic species with elongated appendages; four eyes, anterior pair of eyes well-developed, posterior pair with flat lenses; anterior margin of carapace thin, finely denticulated, epistome small, rounded and obtuse; posterior margin of carapace with 2 setae; tergites I–II each with four setae. Pedipalps slender, femur 5.31 (♂), 5.14 (♀) × as long as broad, length 0.69 (♂), 0.72 (♀); chela 5.94 (♂), 5.21 (♀) × as long as broad, length 0.95 (♂), 0.99 (♀); both chelal fingers with intercalary teeth; sb closer to st than b.

### Etymology

Named after the closest city to the type locality, Baise City.

### Vernacular name

百色暴伪蝎.

### Type material

#### Holotype

CHINA • ♂; Guangxi, Baise City, Lingyun County, Xiaoluo Town, Dayan Cave; 24.35539° N, 106.708811° E; 735 m a.s.l.; 26 Jul. 2021; Zegang Feng, Hongru Xu, Liu Fu and Nana Zhan leg.; MHBUSPs.-MHBUSGX2021072601.

#### Paratypes

CHINA • ♀; same data as for holotype; MHBUSPs.-MHBUSGX2021072602.

### Description

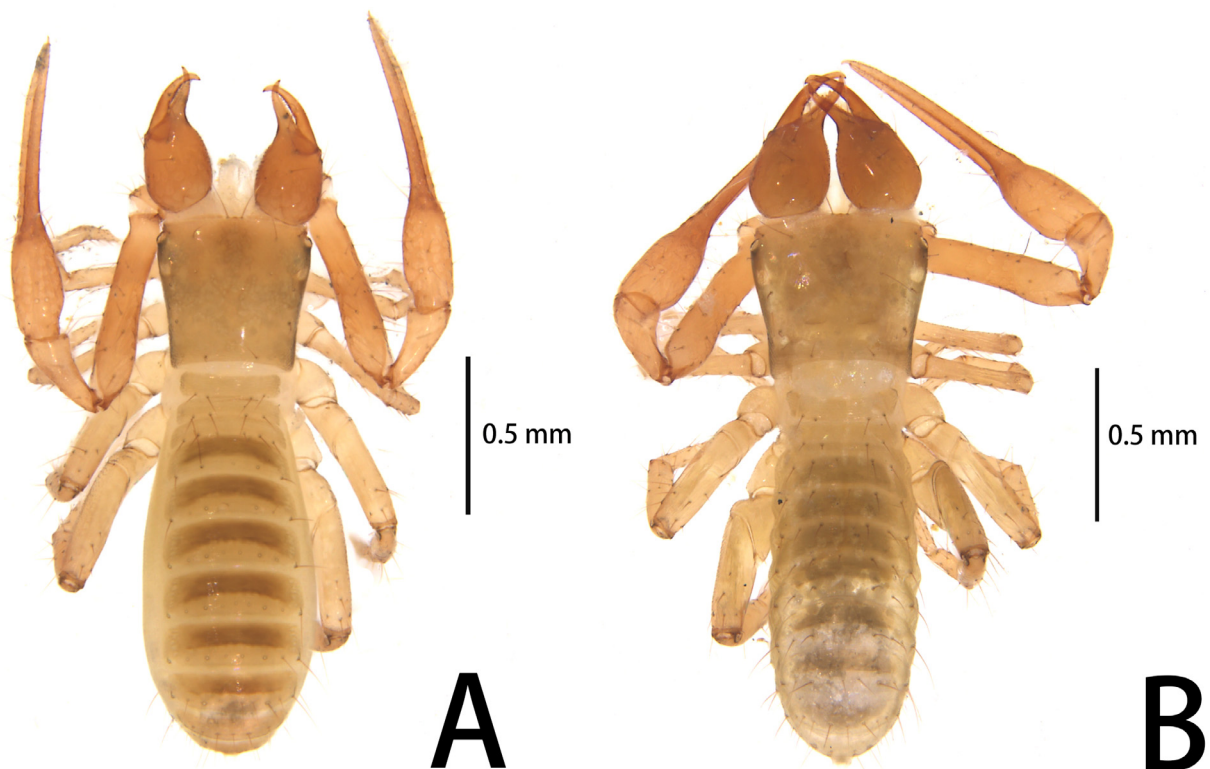
**Adult male** (holotype and male paratypes; Figs 2–6)

**COLOR.** Generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.

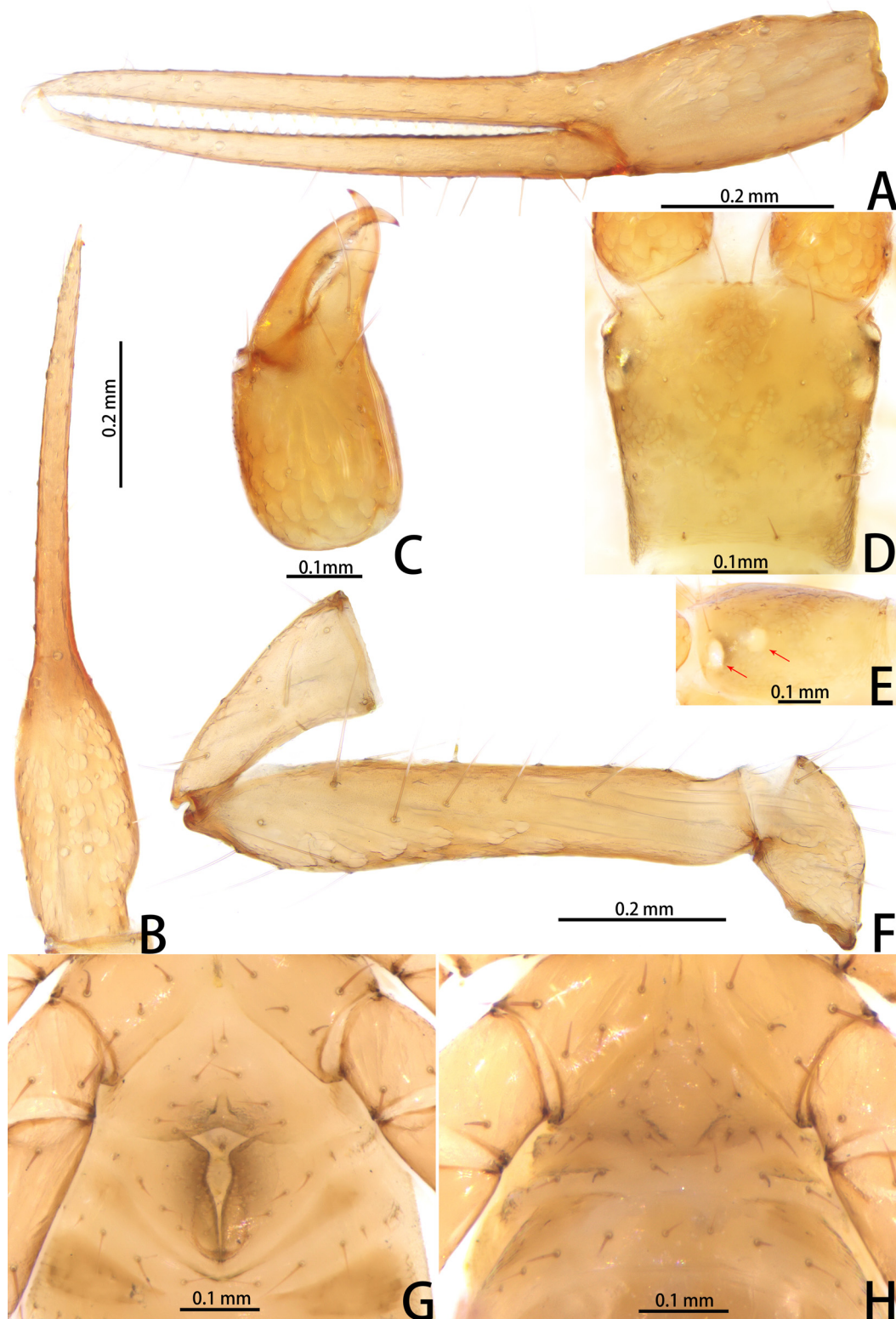
**CEPHALOTHORAX** (Figs 3D–E, 4A). Carapace nearly subquadrate,  $1.09 \times$  as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin slightly serrate; epistome small, rounded and obtuse; four eyes, anterior pair of eyes well-developed, posterior pair with flat lenses; with 18 setae arranged s4s: 4:4:2:2, most setae acuminate, sturdy, long and gently curved, anterolateral setae much shorter than others; with three pairs of lyrifissures, first and second pair situated middle and flank to the setae of ocular row, third pair situated lateral to sole pair of setae of posterior row. Manducatory process with two acuminate distal setae, anterior seta more than  $\frac{1}{2}$  as long as medial seta; apex of coxa I with rounded anteromedial process; coxae II with 8–11 terminally indented coxal spines on each side, set as oblique and arched row, central spines slightly longer than others (Fig. 4D); intercoxal tubercle absent; chaetotaxy of coxae: P 3, I 3, II 4, III 5, IV 5.

**CHELICERA** (Figs 3C, 4B). Almost as long as carapace,  $2.19 \times$  as long as broad; five setae and two lyrifissures (exterior condylar lyrifissure and exterior lyrifissure) present on hand, all setae acuminate, ventrobasal setae shorter than others; movable finger with one medial seta. Cheliceral hand with moderate wrinkle on both ventral and dorsal sides. Both fingers well provided with teeth, fixed finger with 13 teeth, distal one largest; movable finger with 13 contiguous small teeth; galea completely vestigial (Fig. 4B). Serrula exterior with 20 and serrula interior with 13 blades. Rallum with eight blades, distal one longest, with fine barbules and slightly set apart from other blades, latter tightly grouped and with long pinnae, some of which subdivided (Fig. 4C).

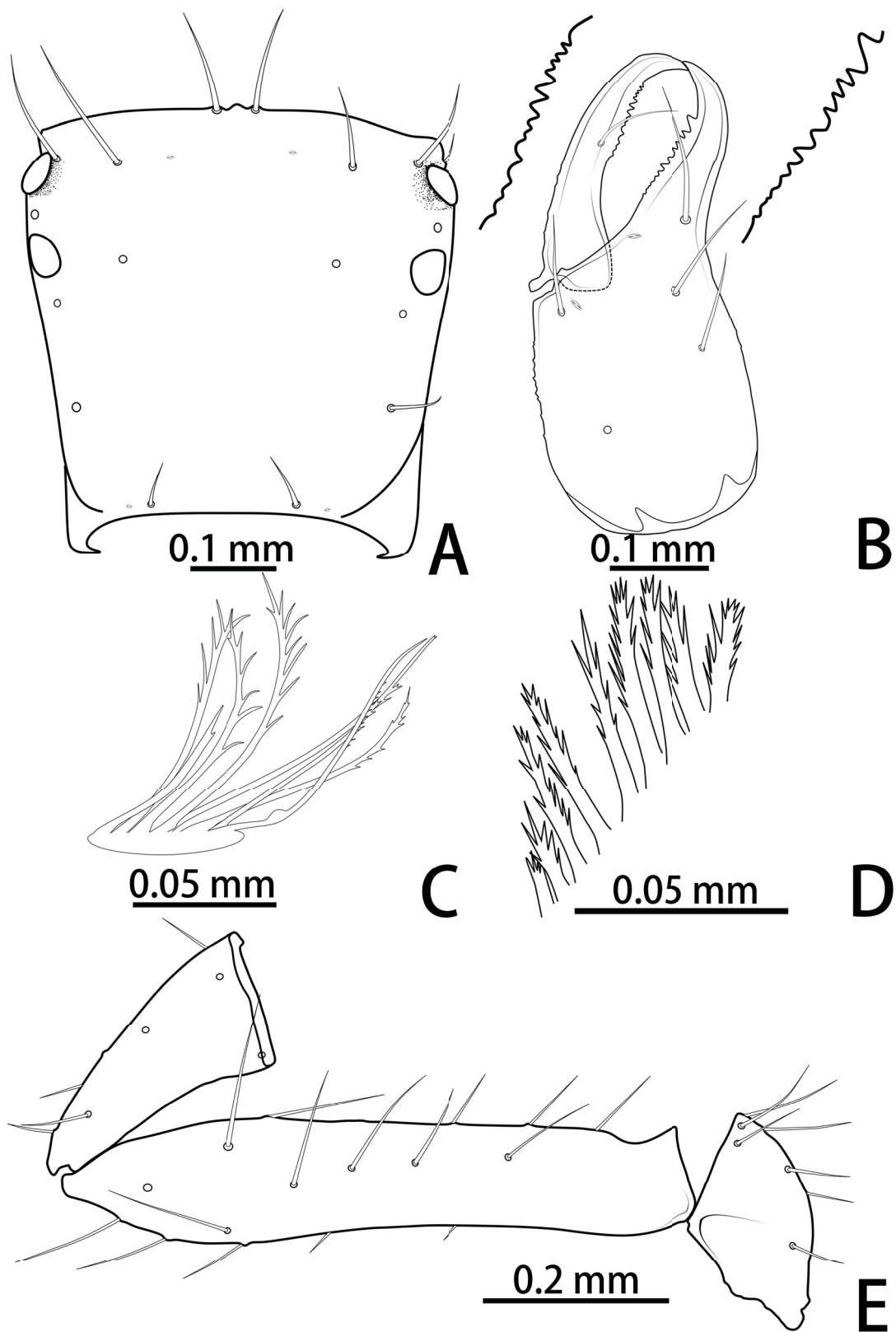
**PEDIPALP** (Figs 3A–B, F, 5A–B). Trochanter 1.69, femur 5.31, patella 2.29, chela 5.94, hand  $1.94 \times$  as long as broad; femur  $2.16 \times$  as long as patella; movable chelal finger  $2.13 \times$  as long as hand and  $0.69 \times$  as long as chela. Setae generally long and acuminate. Chelal hand not constricted towards



**Fig. 2.** *Tyrannochthonius baiseensis* sp. nov. **A.** Holotype, ♂ (Ps.-MHBG-GX2021072601), dorsal view. **B.** Paratype, ♀ (Ps.-MHBG-GX2021072602), dorsal view.

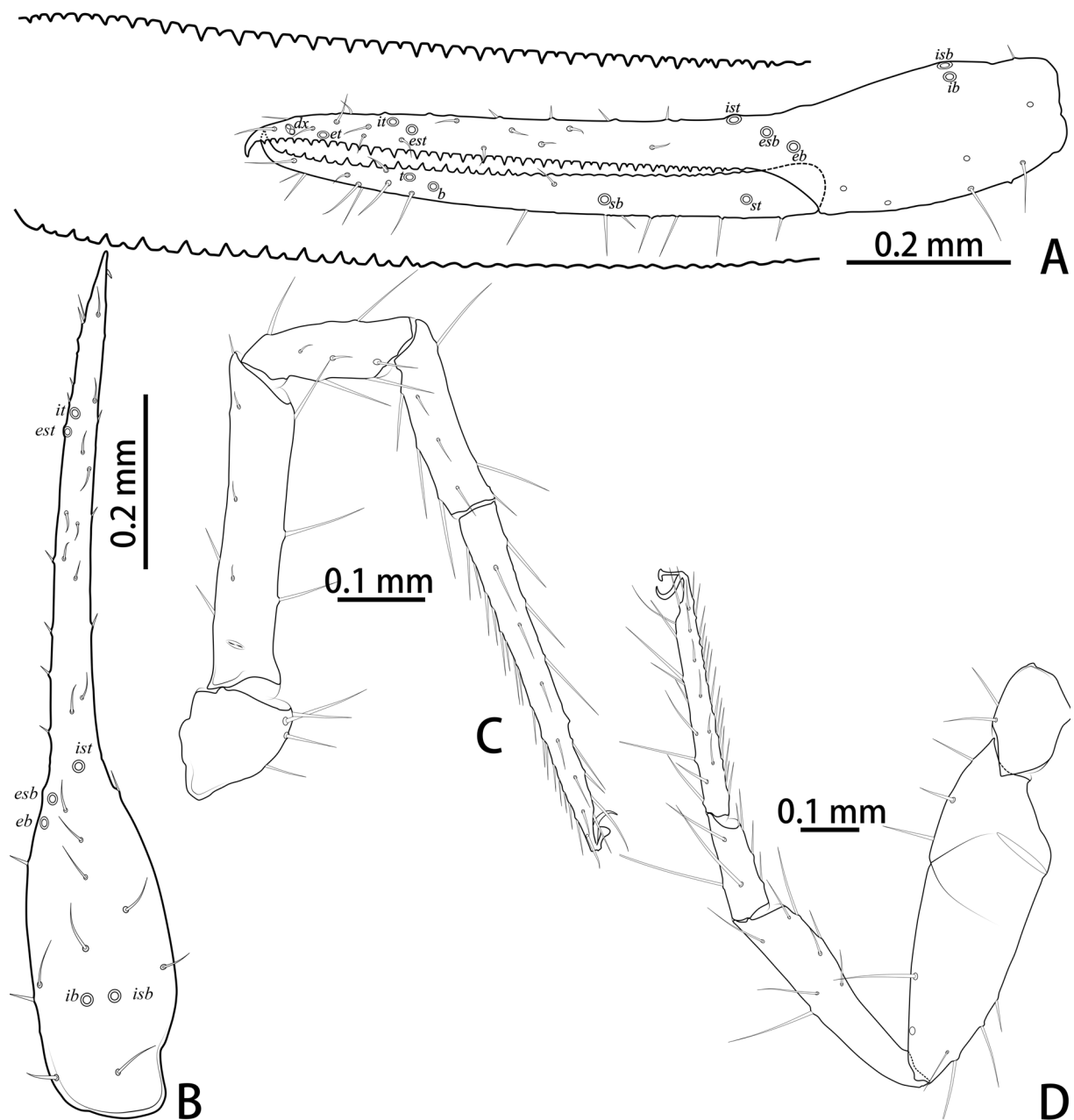


**Fig. 3.** *Tyrannochthonius baiseensis* sp. nov. A–G. Holotype, ♂ (Ps.-MHBG-GX2021072601). H. Paratype, ♀ (Ps.-MHBG-GX2021072602). A. Left chela, lateral view. B. Left chela, dorsal view. C. Left chelicera, dorsal view. D. Carapace, dorsal view. E. Carapace, dorsolateral view, indicate strongly weakly eyes (red arrow). F. Left pedipalp (minus chela), dorsal view. G. Male genital area, ventral view. H. Female genital area, ventral view.



**Fig. 4.** *Tyrannochthonius baiseensis* sp. nov., holotype, ♂ (Ps.-MHBU-GX2021072601). **A.** Carapace, dorsal view. **B.** Left chelicera, dorsal view, with details of teeth. **C.** Rallum. **D.** Coxal spines on coxae II, ventral view. **E.** Left pedipalp (minus chela), dorsal view.

fingers, apodeme complex of movable chelal finger slightly sclerotized. Fixed chelal finger and hand with eight trichobothria, movable chelal finger with four trichobothria, *ib* and *isb* situated close together, submedially on dorsum of chelal hand; *eb*, *esb* and *ist* at base of fixed chelal finger; *esb* slightly distal *eb* and *ist* slightly distal to *esb*; *it* slightly distal to *est*, situated subdistally; *et* slightly near to tip of fixed chelal finger, slightly close to chelal teeth; *dx* situated distal to *et*; *sb* slightly closer to *st* than to *b*; *b* and *t* situated subdistally, *it* slightly distal to *t* and *t* distal to *b*; *est* situated proximal to *t* and close to *it* (Figs 4A, 5A). Microsetae (chemosensory setae) present on dorsum of chelal hand (Figs 4B, 5B). Both chelal fingers with row of teeth, spaced regularly along margin, teeth smaller distally and proximally:

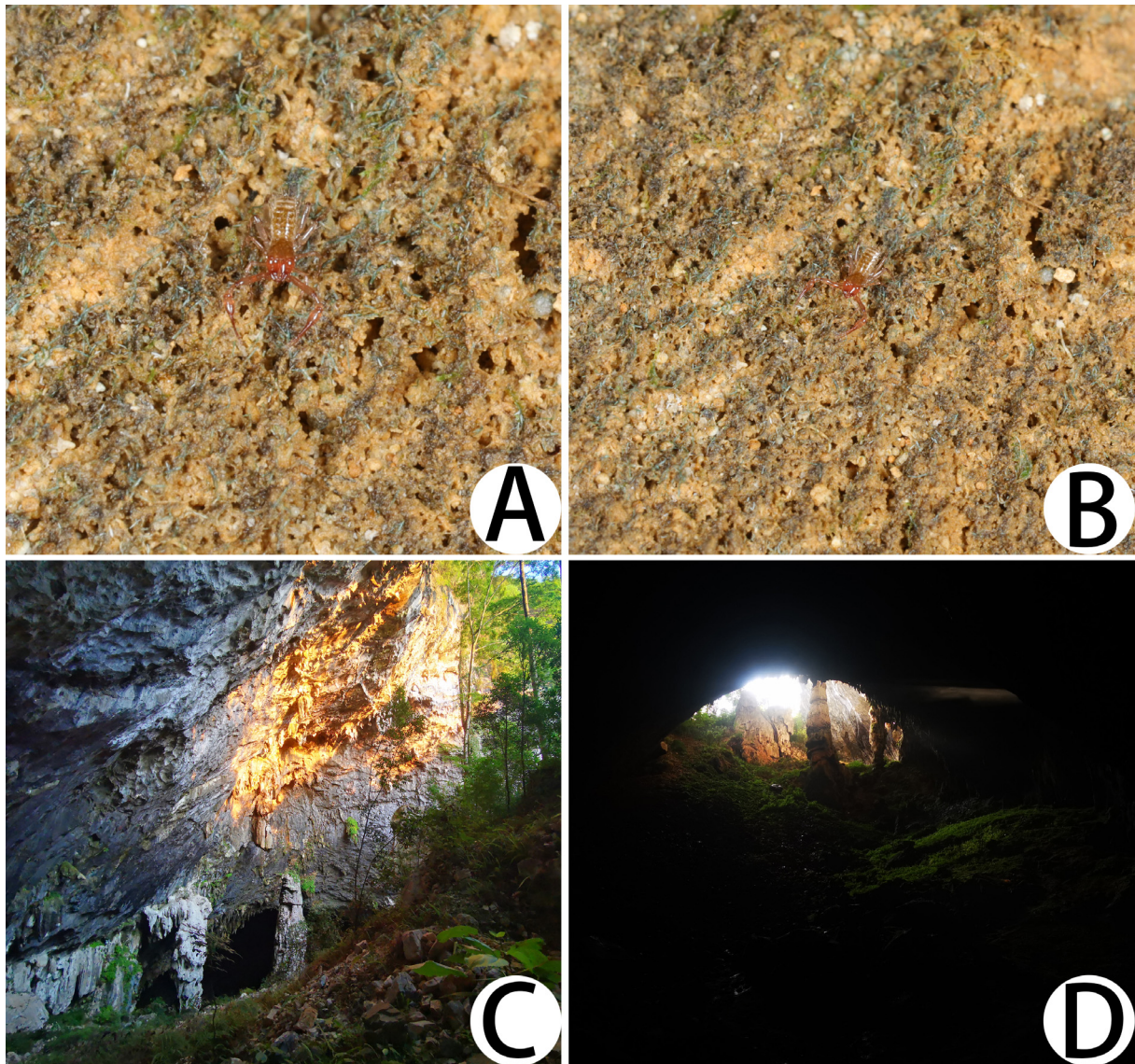


**Fig. 5.** *Tyrannochthonius baiseensis* sp. nov., holotype, ♂ (Ps.-MHBU-GX2021072601) **A.** Left chela, lateral view, with details of teeth and trichobothrial pattern. **B.** Left chela, dorsal view. **C.** Leg I, lateral view. **D.** Leg IV, lateral view. Abbreviations: see Material and methods.

fixed finger with 28 well-spaced, and pointed teeth and 25 intercalary microdenticles; movable finger with 11 well-spaced, pointed teeth, plus 11 intercalary microdenticles and 20 vestigial, rounded and contiguous basal teeth.

OPISTHOSOMA. Generally typical, pleural membrane finely granulated. All tergites and sternites undivided; setae uniseriate and acuminate. Tergal chaetotaxy I–XII: 4:4:6:5:7:8:9:10:7:5:T2T:0. Sternal chaetotaxy IV–XII: 12:12:12:12:14:14:12:-:2. Genital region: sternite II with nine setae scattered on median area, genital opening slit-like, sternite III with row of 14 setae (Fig. 3G).

LEGS (Fig. 5C–D). Fine granulation present on anterodorsal faces of femur IV and patella IV. Leg I: femur  $1.94 \times$  as long as patella; tarsus  $1.95 \times$  as long as tibia. Leg IV: femoropatella  $2.71 \times$  as long as deep; tibia  $4.67 \times$  as long as deep; with basal tactile setae on both tarsal segments: basitarsus  $2.71 \times$  as long as deep (TS = 0.33), telotarsus  $10.50 \times$  as long as deep and  $2.21 \times$  as long as basitarsus (TS = 0.26).



**Fig. 6.** Dayan Cave, type locality of *Tyrannochthonius baiseensis* sp. nov. **A–B.** *T. baiseensis* in its natural environment. **C.** Entrance. **D.** Inside the cave entrance.

Setae of leg I (trochanter to tibia) 4:10–11:7:10, setae of leg IV (trochanter to basitarsus) 2:3:6:8:7. Arolium not divided, slightly shorter than simple claws.

**Adult female** (paratype; Figs 2B, 3H)

Mostly same as males; tergal chaetotaxy I–XII: 4:4:5:5:6:7:7:8:9:8:T2T:0; sternal chaetotaxy IV–XII: 12:12:11:15:13:12:12:-:2. Genital region: sternite II with nine setae scattered on median area, sternite III with row of 12 setae.

**Dimensions** (length/breadth or, in the case of the legs, length/depth in mm; ratios in parentheses)

**Male**

Body length 1.75. Pedipalps: trochanter 0.22/0.13 (1.69), femur 0.69/0.13 (5.31), patella 0.32/0.14 (2.29), chela 0.95/0.16 (5.94), hand 0.31/0.16 (1.94), movable chelal finger length 0.66. Chelicera 0.46/0.21 (2.19), movable finger length 0.26. Carapace 0.49/0.45 (1.09). Leg I: trochanter 0.12/0.09 (1.33), femur 0.35/0.07 (5.00), patella 0.18/0.07 (2.57), tibia 0.20/0.05 (4.00), tarsus 0.39/0.04 (9.75). Leg IV: trochanter 0.18/0.12 (1.50), femoropatella 0.57/0.21 (2.71), tibia 0.42/0.09 (4.67), basitarsus 0.19/0.07 (2.71), telotarsus 0.42/0.04 (10.50).

**Female**

Body length 1.73. Pedipalps: trochanter 0.26/0.14 (1.86), femur 0.72/0.14 (5.14), patella 0.34/0.16 (2.13), chela 0.99/0.19 (5.21), hand 0.34/0.19 (1.79), movable chelal finger length 0.66. Chelicera 0.52/0.25 (2.08), movable finger length 0.30. Carapace 0.46/0.58 (0.79). Leg I: trochanter 0.15/0.11 (1.36), femur 0.38/0.07 (5.43), patella 0.20/0.07 (2.86), tibia 0.22/0.05 (4.40), tarsus 0.42/0.05 (8.40). Leg IV: trochanter 0.21/0.13 (1.61), femoropatella 0.62/0.23 (2.70), tibia 0.42/0.10 (4.20), basitarsus 0.19/0.07 (2.71), telotarsus 0.41/0.04 (10.25).

**Remarks**

*Tyrannochthonius baiseensis* sp. nov. most closely resembles *T. robustus* Beier, 1951 in the position of the trichobothrium (sb closer to st than b), the chaetotaxy of tergites (I–II each with four setae), and the number of eyes, but differs in several characters as follows: longer pedipalpal chela (0.99 mm (♀) compared to 0.79 mm (♀) in *T. robustus* Beier, 1951), longer pedipalpal femur (0.72 mm (♀) compared to 0.47 mm (♀) in *T. robustus* Beier, 1951), and the shape of epistome (small, rounded and obtuse compared to pointed, triangular in *T. robustus* Beier, 1951) (Beier 1951).

**Ecology**

The specimen was collected in the completely dark zone near the cave entrance (Fig. 6).

**Distribution**

Known only from the type locality, Dayan Cave (Guangxi, China).

*Tyrannochthonius chixingi* Gao, Wynne & Zhang, 2018

Fig. 1C

*Tyrannochthonius chixingi* Gao, Wynne & Zhang, 2018: 173–195, figs 1, 6a–b.

**Diagnosis and description**

For details see Gao *et al.* (2018).

**Vernacular name**

齿形暴伪蝎.

### Material examined

#### Holotype

CHINA • ♂; Guangxi, Guilin City, Xiufeng District, Maomaotou Cave, deep zone; 25.312811° N, 110.270178° E; 225 m a.s.l.; 15 Nov. 2016; J.J. Wynne leg.; MHBUS, Ps.-MHBUS-GX16121502.

#### Paratypes

CHINA • 1 ♂, 1 ♀; same data as for holotype; MHBUS, Ps.-MHBUS-GX16121503–04.

### Distribution

Maomaotou Cave (Guangxi, China).

#### *Tyrannochthonius fenghuangensis* sp. nov.

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Figs 1L, 7–11

### Diagnosis

(♂♀) Moderately sized troglomorphic species with elongated appendages; four eyes, anterior pair of eyes strongly reduced, posterior pair with eyespots; anterior margin of carapace thin, finely denticulated, epistome small, rounded and obtuse; posterior margin of carapace with 2 setae; tergites I–II each with four setae. Pedipalps slender, femur 5.40 (♂), 4.83–5.50 (♀) × as long as broad, length 0.54 (♂), 0.55–0.58 (♀); chela 6.08 (♂), 5.13–5.19 (♀) × as long as broad, length 0.79 (♂), 0.82–0.83 (♀); both chelal fingers with intercalary teeth; sb midway between st and b.

### Etymology

Named after the type locality, Fenghuang Township.

### Vernacular name

凤凰暴伪蝎.

### Type material

#### Holotype

CHINA • ♂; Guangxi, Hechi City, Bama Yao Autonomous County, Fenghuang Township, Unnamed Cave 3; 24.1936872° N, 107.390445° E; 467.6 m a.s.l.; 28 Jul. 2021; Zegang Feng, Hongru Xu, Liu Fu and Nana Zhan leg.; MHBUS, Ps.-MHBUS-GX2021072801.

#### Paratypes

CHINA • 2 ♀♀; same data as for holotype; MHBUS, Ps.-MHBUS-GX2021072802–03.

### Description

#### Adult male (Figs 7–11)

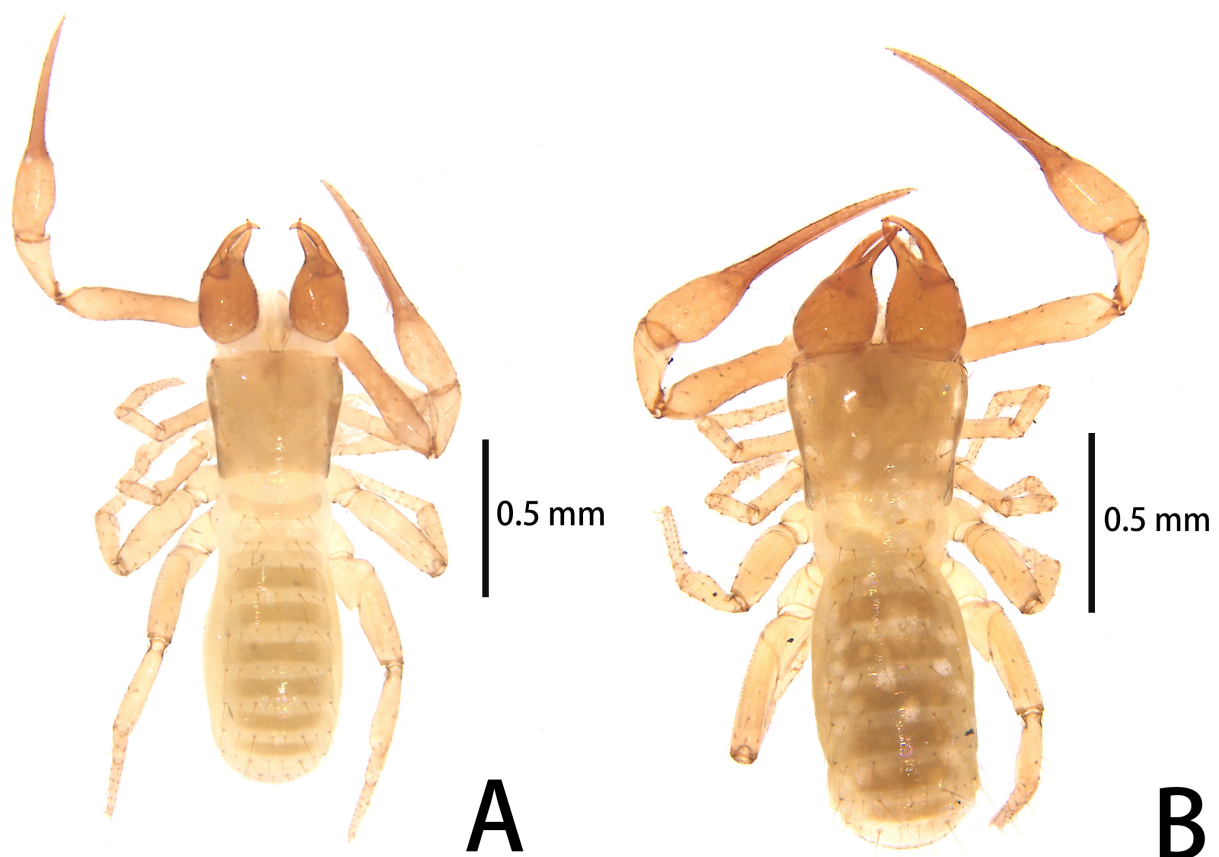
COLOR. Generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.

CEPHALOTHORAX (Figs 8D–E, 9A). Carapace nearly subquadrate, 1.18 × as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin slightly serrate; epistome small, rounded and obtuse; four eyes, anterior pair of eyes strongly reduced, posterior pair with eyespots; with 18 setae arranged s4s: 4:4:2:2, most setae acuminate, sturdy, long and gently curved, anterolateral setae much shorter than others; with three pairs

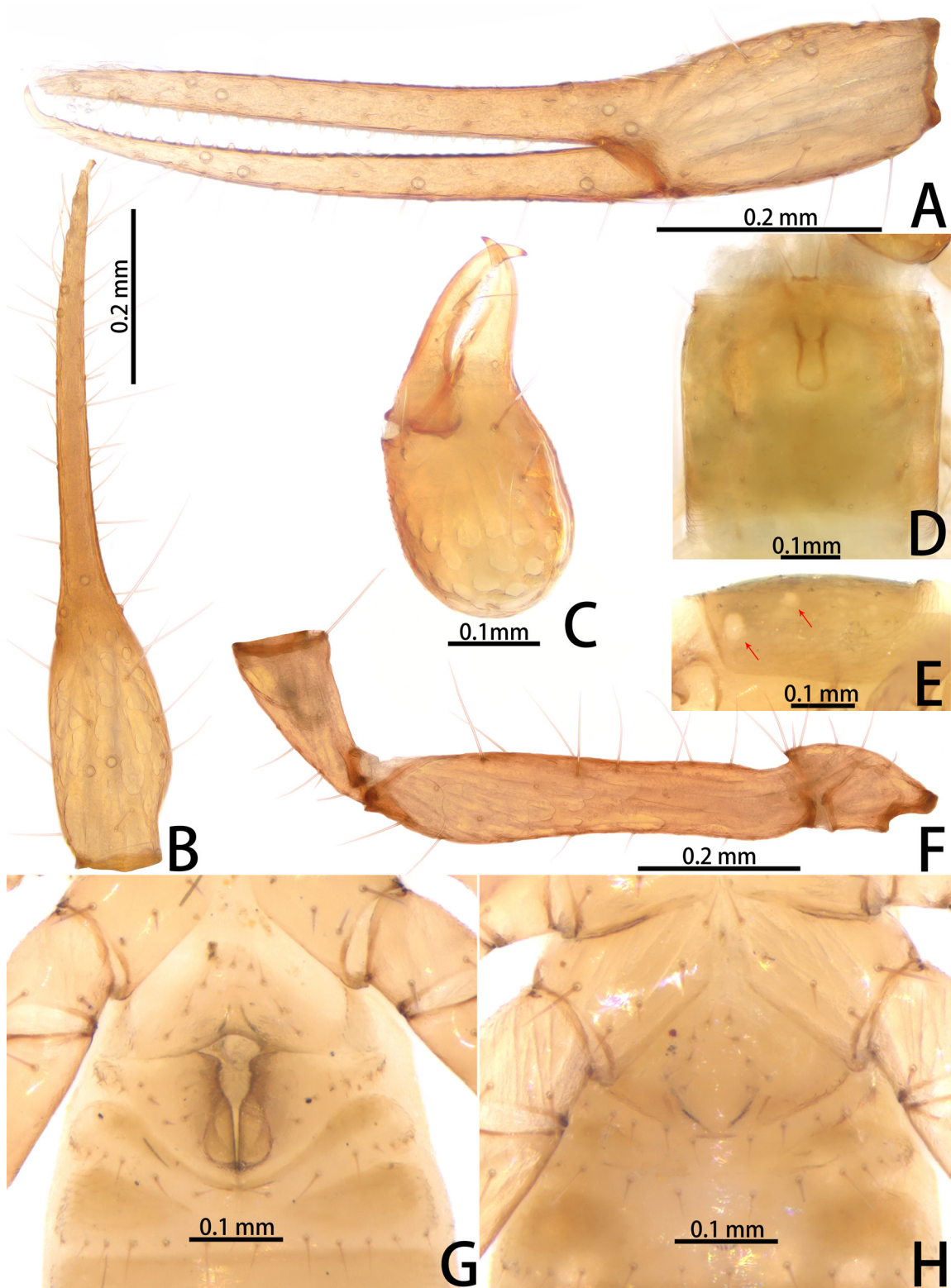
of lyrifissures, first and second pair situated middle and flank to setae of ocular row, third pair situated lateral to sole pair of setae of posterior row. Manducatory process with two acuminate distal setae, anterior seta more than  $\frac{1}{2}$  as long as medial seta; apex of coxa I with rounded anteromedial process; coxae II with seven terminally indented coxal spines on each side, set as oblique and arched row, central spines slightly longer than others (Fig. 9D); intercoxal tubercle absent; chaetotaxy of coxae: P 3, I 3, II 4, III 5, IV 5.

**CHELICERA** (Figs 8C, 9B). Almost as long as carapace,  $2.10 \times$  as long as broad; five setae and two lyrifissures (exterior condylar lyrifissure and exterior lyrifissure) present on hand, all setae acuminate, ventrobasal setae shorter than others; movable finger with one medial seta. Cheliceral hand with moderate wrinkle on both ventral and dorsal sides. Both fingers well provided with teeth, fixed finger with 13 teeth, distal one largest; movable finger with 12 contiguous small teeth; galea completely vestigial (Fig. 8C). Serrula exterior with 19 and serrula interior with 12 blades. Rallum with eight blades, distal one longest, with fine barbules and slightly set apart from other blades, latter tightly grouped and with long pinnae, some of which subdivided (Fig. 9C).

**PEDIPALP** (Figs 8A–B, F, 9E, 10A–B). Trochanter 1.82, femur 5.40, patella 2.00, chela 6.08, hand  $1.92 \times$  as long as broad; femur  $2.25 \times$  as long as patella; movable chelal finger  $2.20 \times$  as long as hand and  $0.70 \times$  as long as chela. Setae generally long and acuminate. Chelal hand not constricted towards fingers, apodeme complex of movable chelal finger slightly sclerotized. Fixed chelal finger and hand with eight trichobothria, movable chelal finger with four trichobothria, ib and isb situated close together,



**Fig. 7.** *Tyrannochthonius fenghuangensis* sp. nov. **A.** Holotype, ♂ (Ps.-MHBG-GX2021072801), dorsal view. **B.** Paratype, ♀ (Ps.-MHBG-GX2021072802), dorsal view.



**Fig. 8.** *Tyrannochthonius fenghuangensis* sp. nov. A–G. Holotype, ♂. (Ps.-MHBU-GX2021072801). H. Paratype, ♀ (Ps.-MHBU-GX2021072802). A. Left chela, lateral view. B. Left chela, dorsal view. C. Left chelicera, dorsal view. D. Carapace, dorsal view. E. Carapace, dorsolateral view, indicate strongly weakly eyes (red arrow). F. Left pedipalp (minus chela), dorsal view. G. Male genital area, ventral view. H. Female genital area, ventral view.

submedially on dorsum of chelal hand; eb, esb and ist at base of fixed chelal finger; esb slightly distal eb and ist slightly distal to esb; it slightly distal to est, situated subdistally; et slightly near to tip of fixed chelal finger, slightly close to chelal teeth; dx situated distal to et; sb midway between st and b; b and t situated subdistally, it slightly distal to t and t distal to est; est situated distal to b (Figs 8A, 10A). Microsetae (chemosensory setae) present on dorsum of chelal hand (Figs 8B, 10B). Both chelal fingers with row of teeth, spaced regularly along margin, teeth smaller distally and proximally: fixed finger with 24 well-spaced, and pointed teeth and 22 intercalary microdenticles; movable finger with 10 well-spaced, pointed teeth, plus 9 intercalary microdenticles and 13 vestigial, rounded and contiguous basal teeth.

OPISTHOSOMA. Generally typical, pleural membrane finely granulated. All tergites and sternites undivided; setae uniseriate and acuminate. Tergal chaetotaxy I–XII: 4:4:5:7:7:8:8:8:8:7:T2T:0. Sternal chaetotaxy IV–XII: 12:13:12:12:13:13:11:-:2. Genital region: sternite II with 11 setae scattered on median area, genital opening slit-like, sternite III with row of 16 setae (Fig. 8G).

LEGS (Fig. 10C–D). Fine granulation present on anterodorsal faces of femur IV and patella IV. Leg I: femur  $1.94 \times$  as long as patella; tarsus  $1.95 \times$  as long as tibia. Leg IV: femoropatella  $2.71 \times$  as long as deep; tibia  $4.67 \times$  as long as deep; with basal tactile setae on both tarsal segments: basitarsus  $2.71 \times$  as long as deep (TS = 0.33), telotarsus  $10.50 \times$  as long as deep and  $2.21 \times$  as long as basitarsus (TS = 0.26). Setae of leg I (trochanter to tibia) 4:10–11:7:10, setae of leg IV (trochanter to basitarsus) 2:3:6:8:7. Arolium not divided, slightly shorter than simple claws.

#### Adult females (paratypes; Figs 7B, 8H)

Mostly same as males; tergal chaetotaxy I–XII: 4:4:5:7–8:8:8–9:8–10:10–12:8–9:5–7:T2T:0; sternal chaetotaxy IV–XII: 11–12:12–14:11–12:12–13:13–16:13:9–12:-:2. Genital region: sternite II with 10 setae scattered on median area, sternite III with row of 12 setae.

**Dimensions** (length/breadth or, in the case of the legs, length/depth in mm; ratios in parentheses)

#### Male

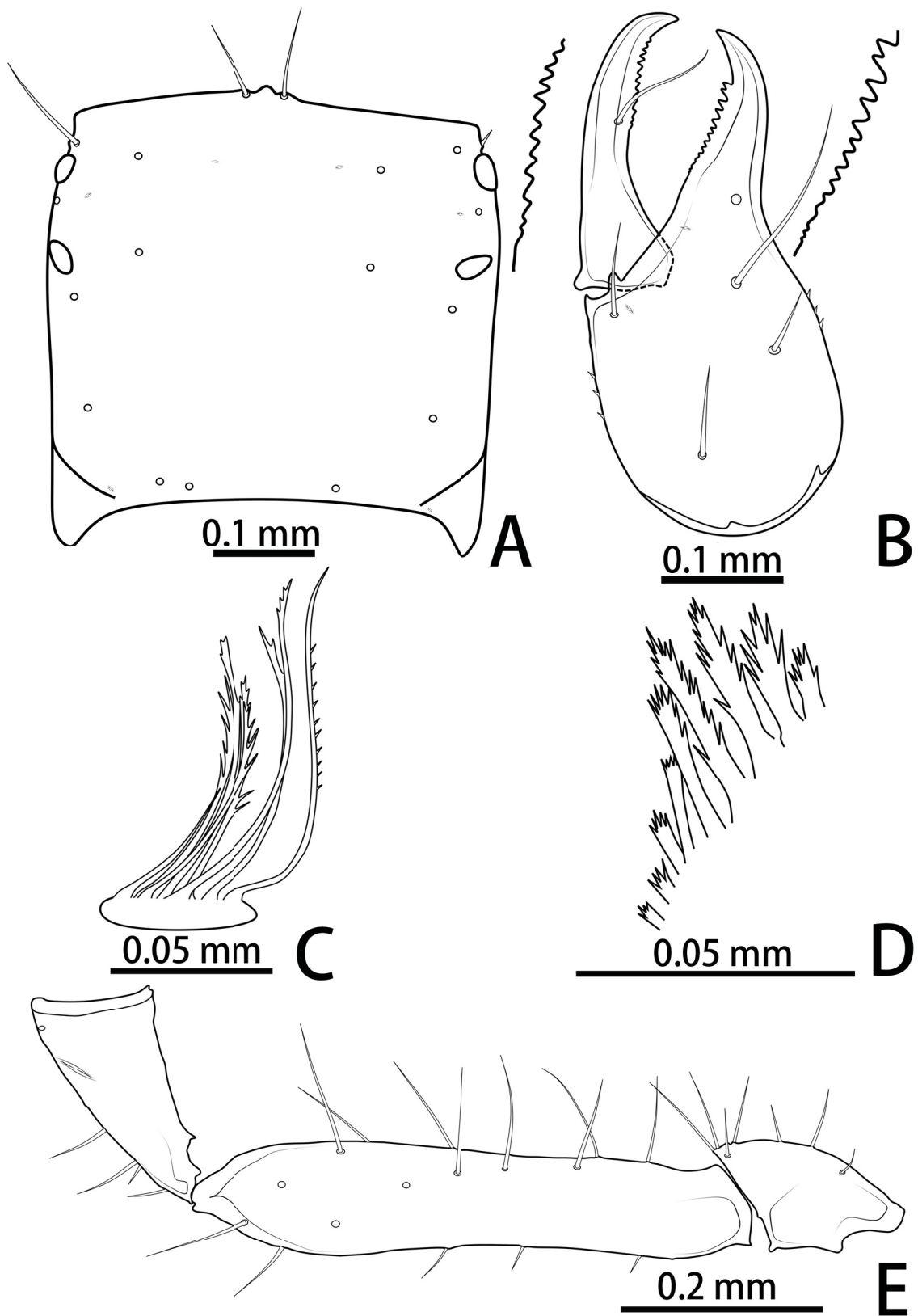
Body length 1.40. Pedipalps: trochanter 0.20/0.11 (1.82), femur 0.54/0.10 (5.40), patella 0.24/0.12 (2.00), chela 0.79/0.13 (6.08), hand 0.25/0.13 (1.94), movable chelal finger length 0.55. Chelicera 0.40/0.19 (2.10), movable finger length 0.23. Carapace 0.38/0.45 (0.84). Leg I: trochanter 0.12/0.09 (1.33), femur 0.29/0.05 (5.80), patella 0.14/0.05 (2.80), tibia 0.17/0.04 (4.25), tarsus 0.32/0.04 (8.00). Leg IV: trochanter 0.17/0.11 (1.54), femoropatella 0.48/0.19 (2.52), tibia 0.32/0.08 (4.00), basitarsus 0.14/0.06 (2.33), telotarsus 0.34/0.03 (11.33).

#### Females

Body length 1.42–1.45. Pedipalps: trochanter 0.20–0.21/0.11 (1.82–1.91), femur 0.55–0.58/0.10–0.12 (4.83–5.50), patella 0.27/0.12 (2.25), chela 0.82–0.83/0.16 (5.13–5.19), hand 0.26–0.27/0.16 (1.63–1.69), movable chelal finger length 0.57. Chelicera 0.43–0.45/0.22 (1.95–2.04), movable finger length 0.24–0.25. Carapace 0.39–0.48/0.48–0.49 (0.81–0.98). Leg I: trochanter 0.11–0.13/0.08–0.10 (1.30–1.38), femur 0.29–0.31/0.06 (4.83–5.17), patella 0.15–0.17/0.05–0.06 (2.83–3.00), tibia 0.16–0.17/0.04 (4.00–4.25), tarsus 0.34–0.35/0.04 (8.50–8.75). Leg IV: trochanter 0.13–0.18/0.10–0.11 (1.30–1.64), femoropatella 0.48–0.49/0.17–0.18 (2.72–2.82), tibia 0.32–0.35/0.08 (4.00–4.38), basitarsus 0.15–0.16/0.06 (2.50–2.67), telotarsus 0.34–0.35/0.03–0.04 (8.50–11.67).

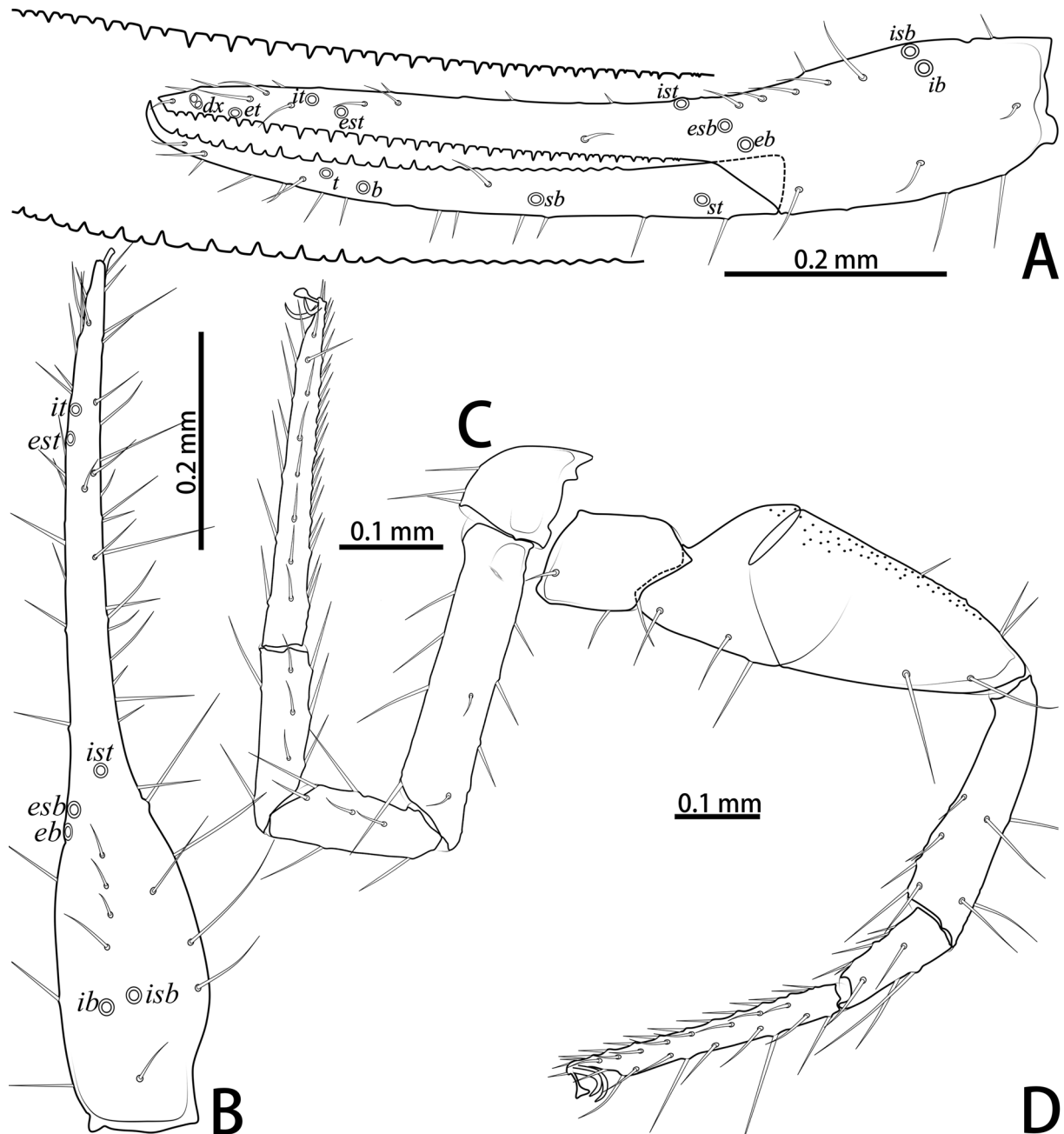
#### Remarks

*Tyrannochthonius fenghuangensis* sp. nov. differs from all other hypogean species of the genus from China except *Tyrannochthonius duo* by the presence of four eyes, anterior pair of eyes strongly reduced, posterior pair with eyespots. It differs from *T. duo* by its shorter and thicker pedipalpal chela (length 0.79 mm (♂), 0.82–0.83 mm (♀), 6.08 (♂), 5.13–5.19 (♀)  $\times$  as long as broad compared to length



**Fig. 9.** *Tyrannochthonius fenghuangensis* sp. nov., holotype, ♂ (Ps.-MHBU-GX2021072801). **A.** Carapace, dorsal view. **B.** Left chelicera, dorsal view, with details of teeth. **C.** Rallum. **D.** Coxal spines on coxae II, ventral view. **E.** Left pedipalp (minus chela), dorsal view.

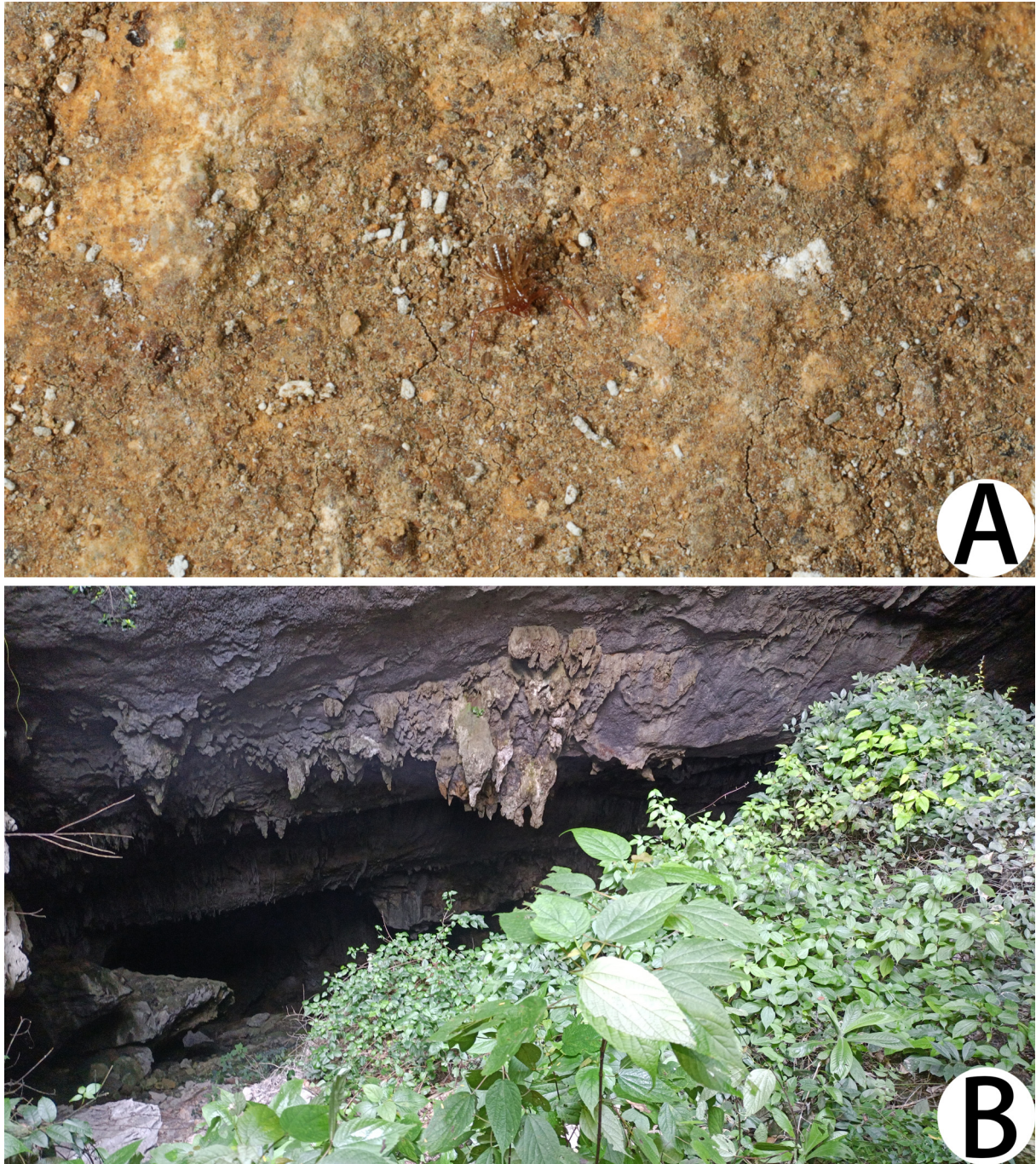
1.11 mm (♂), 1.17–1.18 mm (♀), 6.94 (♂), 5.85–6.56 (♀) × as long as broad in *T. duo*), shorter and thicker pedipalpal femur (length 0.54 mm (♂), 0.55–0.58 mm (♀), 5.40 (♂), 4.83–5.50 (♀) × as long as broad compared to length 0.76 mm (♂), 0.79–0.81 mm (♀), 5.85 (♂), 5.79–6.08 (♀) × as long as broad in *T. duo*), the shape of epistome (epistome small, rounded and obtuse vs epistome small, triangular in *T. duo*) and the position of trichobothrium (sb midway between st and b compared to sb closer to b than to st in *T. duo*) (Hou *et al.* 2023b).



**Fig. 10.** *Tyrannochthonius fenghuangensis* sp. nov., holotype, ♂ (Ps.-MHBUSGX2021072801). **A.** Left chela, lateral view, with details of teeth and trichobothrial pattern. **B.** Left chela, dorsal view. **C.** Leg I, lateral view. **D.** Leg IV, lateral view. Abbreviations: see Material and methods.

**Distribution**

Known only from the type locality, Unnamed Cave 3 (Guangxi, China).



**Fig. 11.** Unnamed Cave 3, type locality of *Tyrannochthonius fenghuangensis* sp. nov. **A.** *T. fenghuangensis* in its natural environment. **B.** Entrance.

*Tyrannochthonius laquensis* sp. nov.

urn:lsid:zoobank.org:act:D9943FDC-E713-4225-8EF0-3C0D533F082D

Figs 11, 12–15

**Diagnosis**

(♂♀) Moderately sized troglomorphic species with elongated appendages; carapace without eyes or eyespots; anterior margin of carapace thin, finely denticulated, epistome small, triangular; posterior margin of carapace with 2 setae; tergites I–IV each with four setae. Pedipalps slender, femur 7.13 (♂), 6.75 (♀) × as long as broad, length 1.07 (♂), 1.08 (♀); chela 7.14 (♂), 6.58 (♀) × as long as broad, length 1.50 (♂), 1.58 (♀); chelal fingers without intercalary teeth and movable chelal finger teeth markedly retrorse and almost contiguous; sb slightly closer to st than to b.

**Etymology**

Named after the type locality, Laqu Cave.

**Vernacular name**

拉丘暴伪蝎.

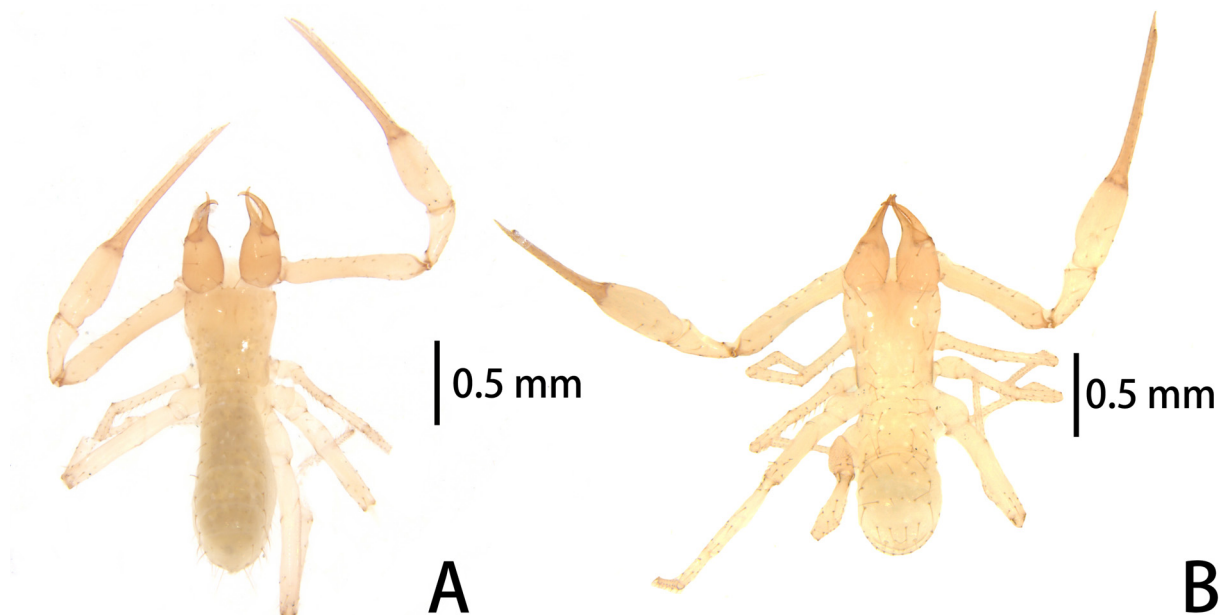
**Type material**

**Holotype**

CHINA • ♂; Guangxi, Hechi City, Donglan County, Wuzuan Town, Laqu Village, Laqu Cave; 24.358433° N, 107.300395° E; 467 m a.s.l.; 11 May. 2018; Zegang Feng and Weitong Wang leg.; MHBUS, Ps.-MHBUS-GX18051101.

**Paratype**

CHINA • ♀; same data as for holotype; MHBUS, Ps.-MHBUS-GX18051102.



**Fig. 12.** *Tyrannochthonius laquensis* sp. nov. **A.** Holotype, ♂ (Ps.-MHBUS-GX18051101), dorsal view. **B.** Paratype, ♀ (Ps.-MHBUS-GX18051102), dorsal view.

## Description

### Adult male (Figs 12–15)

**COLOR.** Generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.

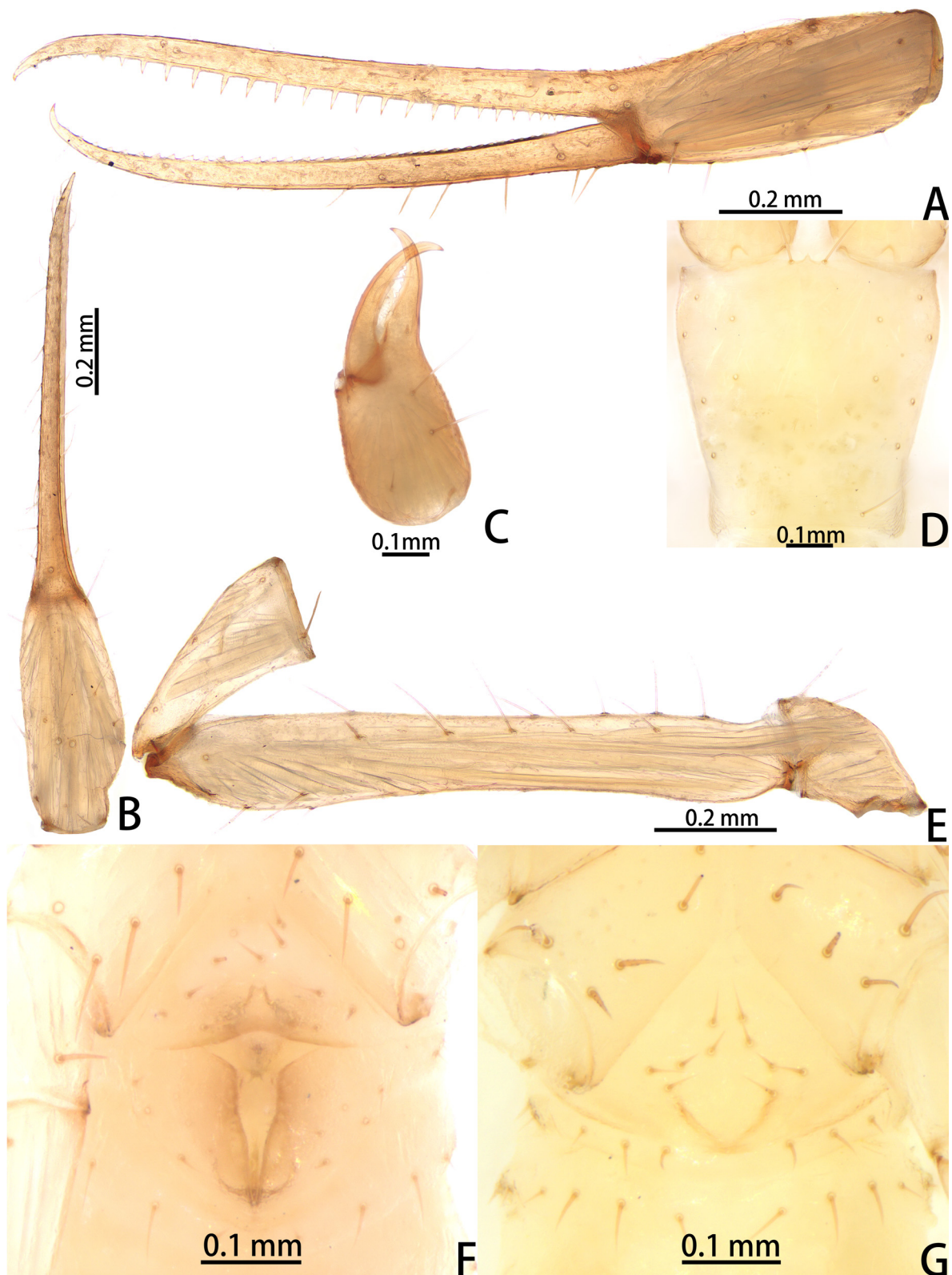
**CEPHALOTHORAX** (Figs 13D, 14A). Carapace nearly subquadrate,  $1.02 \times$  as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin slightly serrate; epistome small, triangular; without eyes or eyespots; with 18 setae arranged s4s: 4:4:2:2, most setae acuminate, sturdy, long and gently curved, anterolateral setae much shorter than others; with three pairs of lyrifissures, first and second pair situated middle and flank to setae of ocular row, third pair situated lateral to sole pair of setae of posterior row. Manducatory process with two acuminate distal setae, anterior seta more than  $\frac{1}{2}$  as long as medial seta; apex of coxa I with rounded anteromedial process; coxae II with nine terminally indented coxal spines on each side, set as oblique and arched row, central spines slightly longer than others (Fig. 14D); intercoxal tubercle absent; chaetotaxy of coxae: P 3, I 3, II 4, III 5, IV 5.

**CHELICERA** (Figs 13C, 14B). Almost as long as carapace,  $2.44 \times$  as long as broad; five setae and two lyrifissures (exterior condylar lyrifissure and exterior lyrifissure) present on hand, all setae acuminate, ventrobasal setae shorter than others; movable finger with one medial seta. Cheliceral hand with moderate wrinkle on both ventral and dorsal sides. Both fingers well provided with teeth, fixed finger with 12 teeth, distal one largest; movable finger with 10 contiguous small teeth; galea completely vestigial (Fig. 13C). Serrula exterior with 28 and serrula interior with 14 blades. Rallum with eight blades, distal one longest, with fine barbules and slightly set apart from other blades, latter tightly grouped and with long pinnae, some of which subdivided (Fig. 14C).

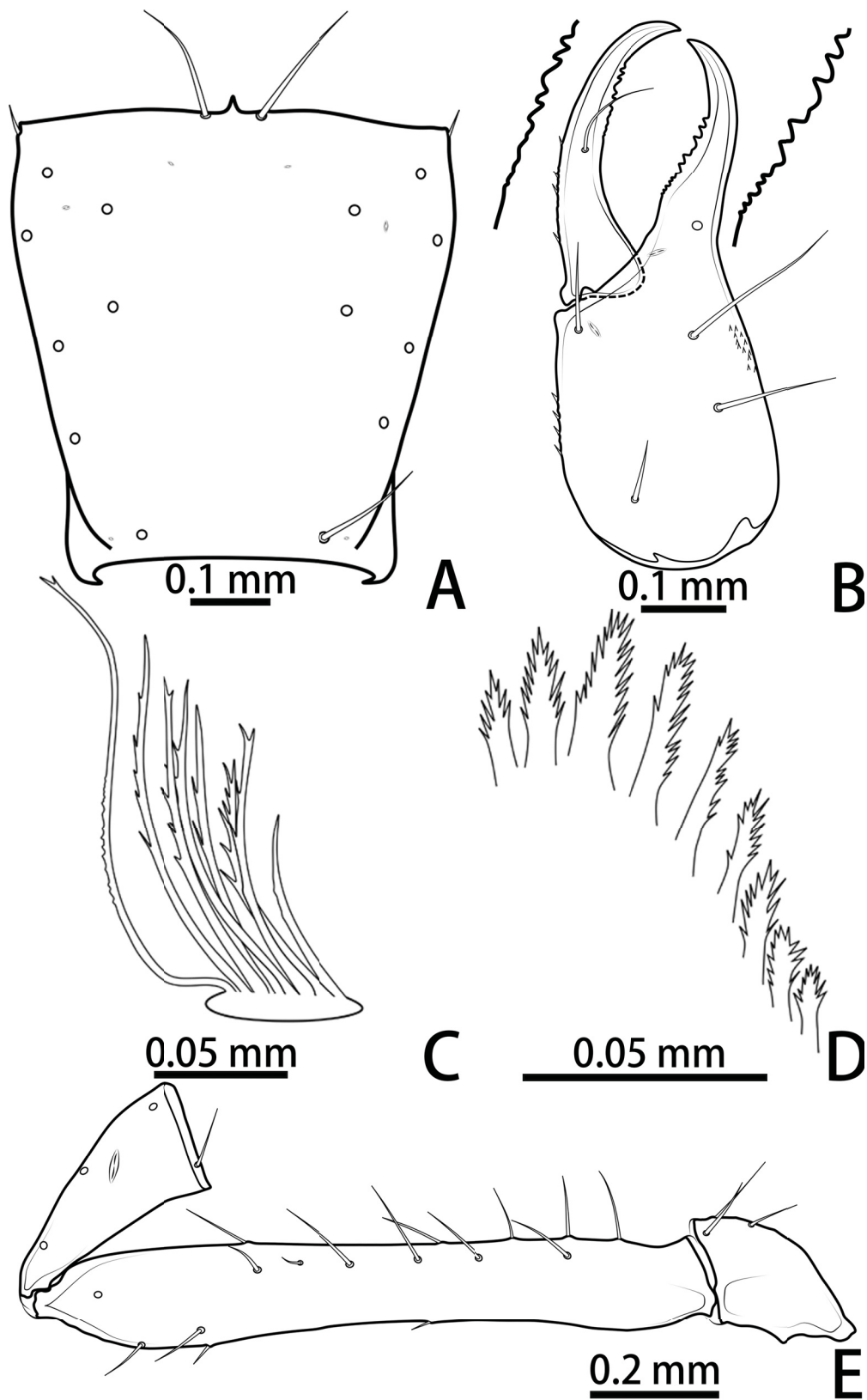
**PEDIPALP** (Figs 13A–B, F, 14E, 15A–B). Trochanter 1.75, femur 7.13, patella 2.33, chela 7.14, hand  $2.43 \times$  as long as broad; femur  $2.55 \times$  as long as patella; movable chelal finger  $1.88 \times$  as long as hand and  $0.64 \times$  as long as chela. Setae generally long and acuminate. Chelal hand not constricted towards fingers, apodeme complex of movable chelal finger slightly sclerotized. Fixed chelal finger and hand with eight trichobothria, movable chelal finger with four trichobothria, ib and isb situated close together, submedially on dorsum of chelal hand; eb, esb and ist at base of fixed chelal finger; esb slightly distal eb and ist slightly distal to esb; it slightly distal to est, situated subdistally; et slightly near to tip of fixed chelal finger, slightly close to chelal teeth; dx situated distal to et; sb slightly closer to st than to b; b and t situated subdistally, it slightly distal to t and t distal to est; est situated at same level as t, and distal to b (Figs 13A, 15A). Microsetae (chemosensory setae) present on dorsum of chelal hand (Figs 13B, 15B). Both chelal fingers with row of teeth, spaced regularly along margin, teeth smaller distally and proximally: fixed finger with 24 well-spaced, pointed and slightly retrorse macrodenticles; movable finger with 36 markedly retrorse and almost contiguous pointed teeth.

**OPISTHOSOMA.** Generally typical, pleural membrane finely granulated. All tergites and sternites undivided; setae uniseriate and acuminate. Tergal chaetotaxy I–XII: 4:4:4:4:4:4:5:5:5:4:T2T:0. Sternal chaetotaxy IV–XII: 12:8:8:10:9:9:8:-:2. Genital region: sternite II with nine setae scattered on median area, genital opening slit-like, sternite III with row of 14 setae (Fig. 13F).

**LEGS** (Fig. 15C–D). Fine granulation present on anterodorsal faces of femur IV and patella IV. Leg I: femur  $1.82 \times$  as long as patella; tarsus  $2.11 \times$  as long as tibia. Leg IV: femoropatella  $3.96 \times$  as long as deep; tibia  $6.60 \times$  as long as deep; with basal tactile setae on both tarsal segments: basitarsus  $4.00 \times$  as long as deep (TS = 0.34), telotarsus  $15.40 \times$  as long as deep and  $2.75 \times$  as long as basitarsus (TS = 0.28). Setae of leg I (trochanter to tibia) 4:17:12:13, setae of leg IV (trochanter to basitarsus) 1:4:7:11:14. Arolium not divided, slightly shorter than simple claws.



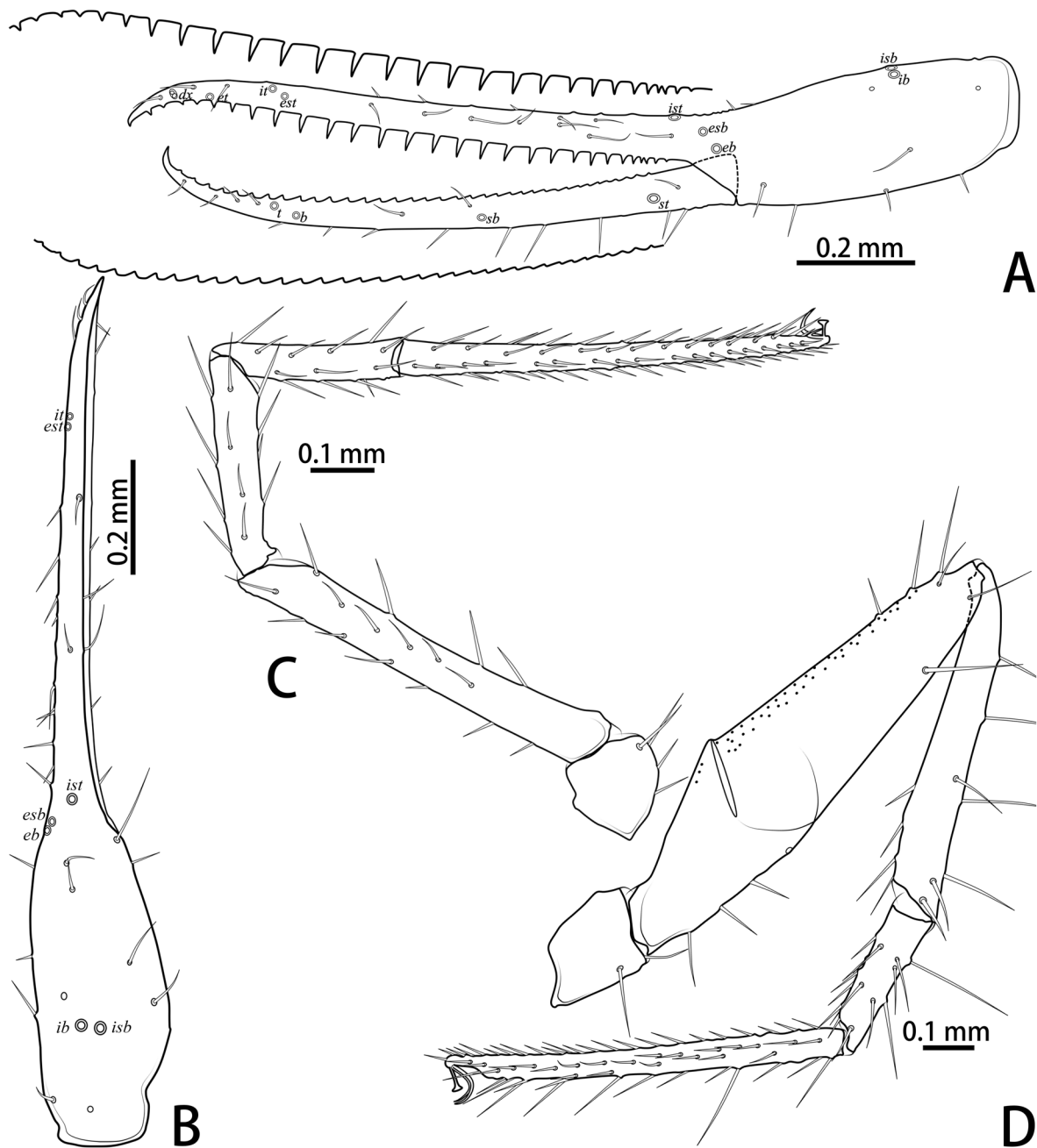
**Fig. 13.** *Tyrannochthonius laquiensis* sp. nov. **A–F.** Holotype, ♂ (Ps.-MHBU-GX18051101). **G.** Paratype, ♀ (Ps.-MHBU-GX18051102). **A.** Left chela, lateral view. **B.** Left chela, dorsal view. **C.** Left chelicera, dorsal view. **D.** Carapace, dorsal view. **E.** Left pedipalp (minus chela), dorsal view. **F.** Male genital area, ventral view. **G.** Female genital area, ventral view.



**Fig. 14.** *Tyrannochthonius laquensis* sp. nov., holotype, ♂ (Ps.-MHBV-GX18051101). **A.** Carapace, dorsal view. **B.** Left chelicera, dorsal view, with details of teeth. **C.** Rallum. **D.** Coxal spines on coxae II, ventral view. **E.** Left pedipalp (minus chela), dorsal view.

**Adult females** (paratypes; Figs 12B, 13G)

Mostly same as males; tergal chaetotaxy I–XII: 4:4:4:4:4:4:4:5:6:4:T2T:0; sternal chaetotaxy IV–XII: 12:10:9:9:7:10:10:-:2. Genital region: sternite II with 10 setae scattered on median area, sternite III with row of 12 setae.



**Fig. 15.** *Tyrannochthonius laquiensis* sp. nov., holotype, ♂ (Ps.-MHBG-GX18051101). **A.** Left chela, lateral view, with details of teeth and trichobothrial pattern. **B.** Left chela, dorsal view. **C.** Leg I, lateral view. **D.** Leg IV, lateral view. Abbreviations: see Material and methods.

**Dimensions** (length/breadth or, in the case of the legs, length/depth in mm; ratios in parentheses)

**Male**

Body length 1.75. Pedipalps: trochanter 0.28/0.16 (1.75), femur 1.07/0.15 (7.13), patella 0.42/0.18 (2.33), chela 1.50/0.21 (7.14), hand 0.51/0.21 (2.43), movable chelal finger length 0.96. Chelicera 0.61/0.25 (2.44), movable finger length 0.33. Carapace 0.56/0.55 (1.02). Leg I: trochanter 0.19/0.11 (1.73), femur 0.62/0.08 (7.75), patella 0.34/0.07 (4.86), tibia 0.28/0.05 (5.60), tarsus 0.59/0.05 (11.80). Leg IV: trochanter 0.24/0.13 (1.85), femoropatella 0.95/0.24 (3.96), tibia 0.66/0.10 (6.60), basitarsus 0.28/0.07 (4.00), telotarsus 0.77/0.05 (15.40).

**Female**

Body length 1.76. Pedipalps: trochanter 0.29/0.17 (1.71), femur 1.08/0.16 (6.75), patella 0.40/0.19 (2.11), chela 1.58/0.24 (6.58), hand 0.53/0.24 (2.21), movable chelal finger length 1.02. Chelicera 0.65/0.25 (2.48), movable finger length 0.36. Carapace 0.64/0.58 (1.10). Leg I: trochanter 0.20/0.14 (1.43), femur 0.64/0.08 (8.00), patella 0.37/0.08 (4.63), tibia 0.30/0.06 (5.00), tarsus 0.70/0.06 (11.67). Leg IV: trochanter 0.24/0.14 (1.71), femoropatella 0.85/0.19 (4.47), tibia 0.57/0.10 (5.70), basitarsus 0.25/0.07 (3.57), telotarsus 0.73/0.05 (14.60).

**Remarks**

*Tyrannochthonius laquiensis* sp. nov. differs from all other hypogean species of the genus from China except *T. tiani* and *T. nanxingensis* by both chelal fingers lacking intercalary teeth, the presence of four setae on tergites I–III, and carapace without eyes or eyespots. It differs from *T. tiani* and *T. nanxingensis* by its shorter and thicker pedipalpal chela (length 1.50 mm (♂), 1.58 mm (♀), 7.14 (♂), 6.58 (♀) × as long as broad compared to length 1.79 mm (♀), 9.42 (♀) × as long as broad in *T. tiani* and length 1.92–1.97 mm (♂), 1.85 mm (♀), 7.04–7.11 (♂), 7.12 (♀) × as long as broad in *T. nanxingensis*) and the position of trichobothrium (sb slightly closer to st than to b compared to sb closer to b than st in *T. tiani* and *T. nanxingensis*) (Hou *et al.* 2023b; Sun *et al.* 2025)

**Distribution**

Known only from the type locality, Laqiu Cave (Guangxi, China).

*Tyrannochthonius longulimembrum* sp. nov.

urn:lsid:zoobank.org:act:4304E479-6BBA-47D9-B60C-83FC270A6091

Figs 1N, 16–20

**Diagnosis**

(♀) Moderately sized troglomorphic species with elongated appendages; carapace without eyes or eyespots; anterior margin of carapace thin, finely denticulated, epistome pointed, triangular; posterior margin of carapace with 2 setae; tergites I–III each with two setae, tergite IV with four setae. Pedipalps slender, femur 7.69 (♀) × as long as broad, length 1.23 (♀); chela 8.25 (♀) × as long as broad, length 1.65 (♀); both chelal fingers with intercalary teeth; sb midway between st and b.

**Etymology**

The specific name is a noun derived from the Latin words ‘*longulus*’ and ‘*membrum*’, meaning ‘rather long’ and ‘member’, which refers to the elongated pedipalps and legs.

**Vernacular name**

长肢暴伪蝎.

## Type material

### Holotype

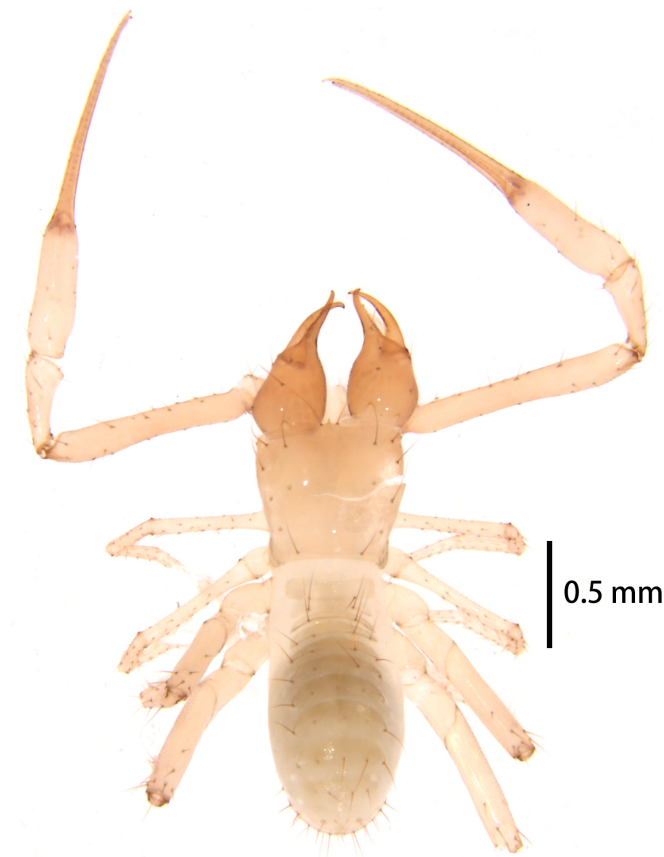
CHINA • ♀; Guangxi, Baise City, Tiandong County, Silin Town, Guangyang Village, Guangyang Cave; 23.518475° N, 107.393634° E; 363 m a.s.l.; 6 Oct. 2019; Zegang Feng and Lingchen Zhao leg.; MHBUSPs.-MHBUSGX2019100601.

## Description

### Adult female (Figs 16–20)

**COLOR.** Generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.

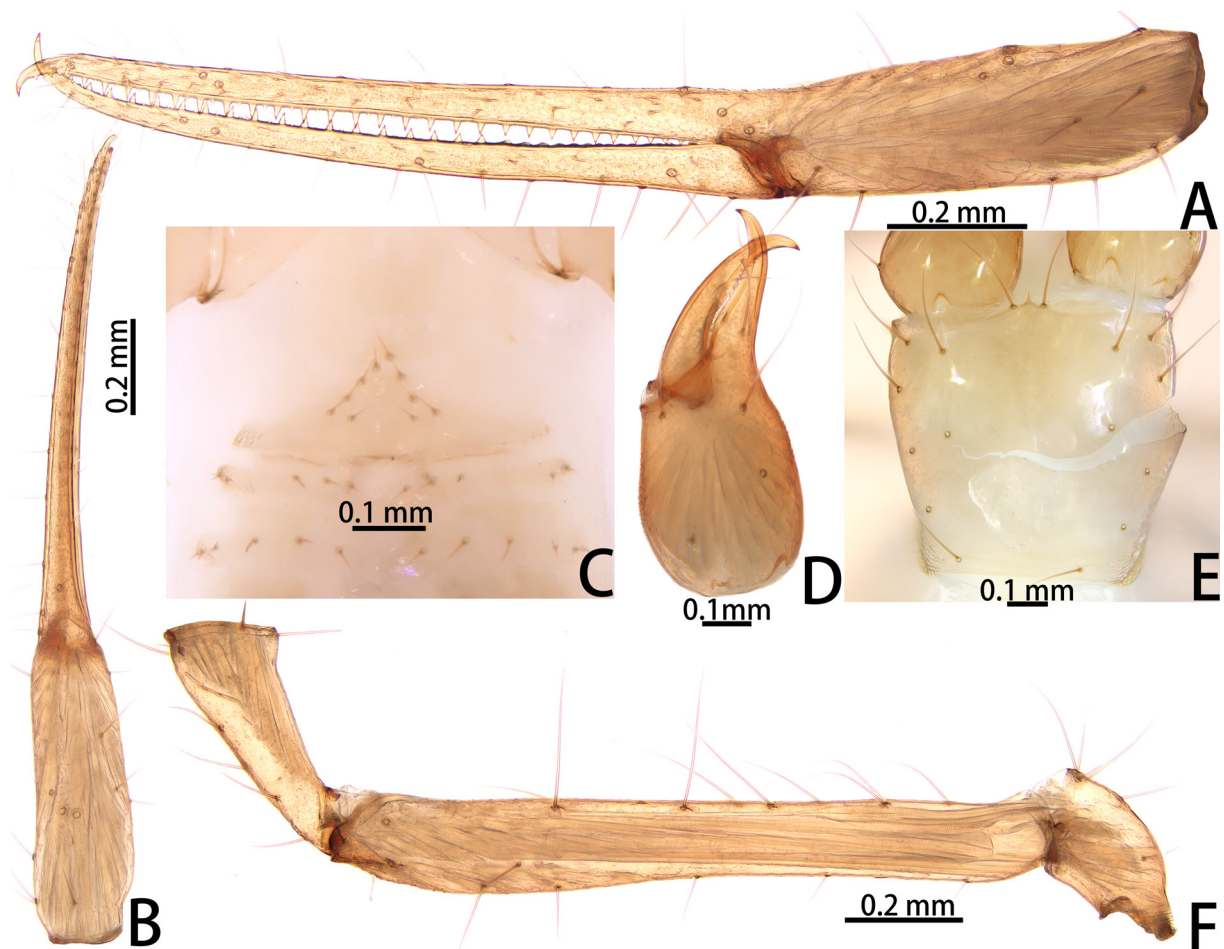
**CEPHALOTHORAX** (Figs 17E, 18A). Carapace nearly subquadrate,  $0.96 \times$  as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin slightly serrate; epistome pointed, triangular; without eyes or eyespots; with 18 setae arranged s4s: 4:4:2:2, most setae acuminate, sturdy, long and gently curved, anterolateral setae much shorter than others; with three pairs of lyrifissures, first and second pair situated middle and flank to setae of ocular row, third pair situated lateral to sole pair of setae of posterior row. Manducatory process with two acuminate distal setae, anterior seta more than  $\frac{1}{2}$  as long as medial seta; apex of coxa I with rounded anteromedial process; coxae II with 10 terminally indented coxal spines on each side, set as oblique and arched row, central spines slightly longer than others (Fig. 18D); intercoxal tubercle absent; chaetotaxy of coxae: P 3, I 3, II 4, III 5, IV 5.



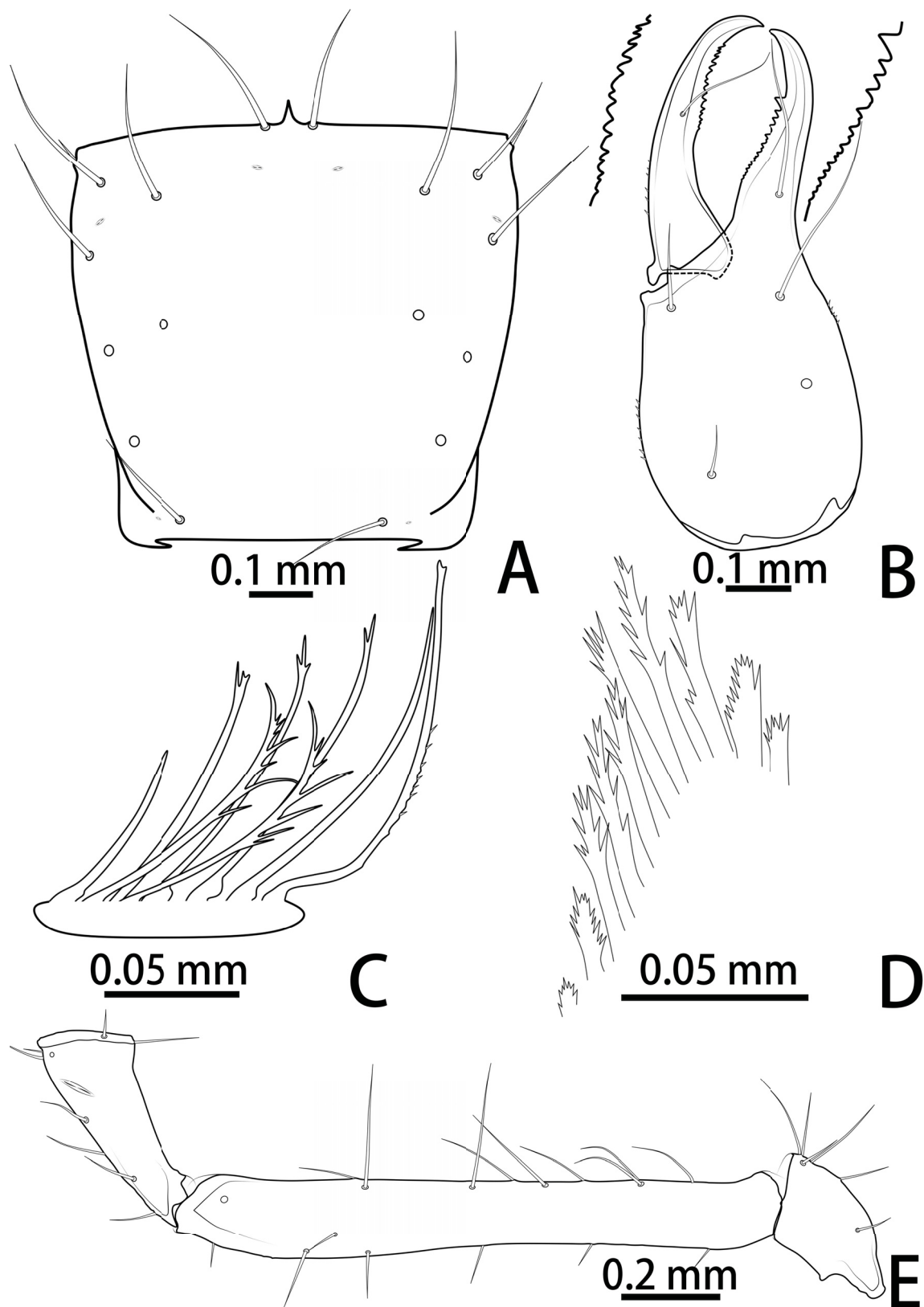
**Fig. 16.** *Tyranochthonius longulimembrum* sp. nov., holotype, ♀ (Ps.-MHBUSGX2019100601), dorsal view.

CHELICERA (Figs 17D, 18B). Almost as long as carapace,  $2.30 \times$  as long as broad; five setae and two lyrifissures (exterior condylar lyrifissure and exterior lyrifissure) present on hand, all setae acuminate, ventrobasal setae shorter than others; movable finger with one medial seta. Cheliceral hand with moderate wrinkle on both ventral and dorsal sides. Both fingers well provided with teeth, fixed finger with 17 teeth, distal one largest; movable finger with 15 contiguous small teeth; galea completely vestigial (Fig. 17D). Serrula exterior with 27 and serrula interior with 11 blades. Rallum with eight blades, distal one longest, with fine barbules and slightly set apart from other blades, latter tightly grouped and with long pinnae, some of which subdivided (Fig. 18C).

PEDIPALP (Figs 17A–B, F, 18E, 19A–B). Trochanter 1.65, femur 7.69, patella 2.56, chela 8.25, hand  $3.05 \times$  as long as broad; femur  $2.67 \times$  as long as patella; movable chelal finger  $1.72 \times$  as long as hand and  $0.64 \times$  as long as chela. Setae generally long and acuminate. Chelal hand not constricted towards fingers, apodeme complex of movable chelal finger slightly sclerotized. Fixed chelal finger and hand with eight trichobothria, movable chelal finger with four trichobothria, ib and isb situated close together, submedially on dorsum of chelal hand; eb, esb and ist at base of fixed chelal finger; esb slightly distal eb and ist slightly distal to esb; it slightly distal to est, situated subdistally; et slightly near to tip of fixed chelal finger, slightly close to chelal teeth; dx situated distal to et; sb midway between st and b; b and t situated subdistally, t slightly distal to it and est distal to b (Figs 17A, 19A). Microsetae (chemosensory



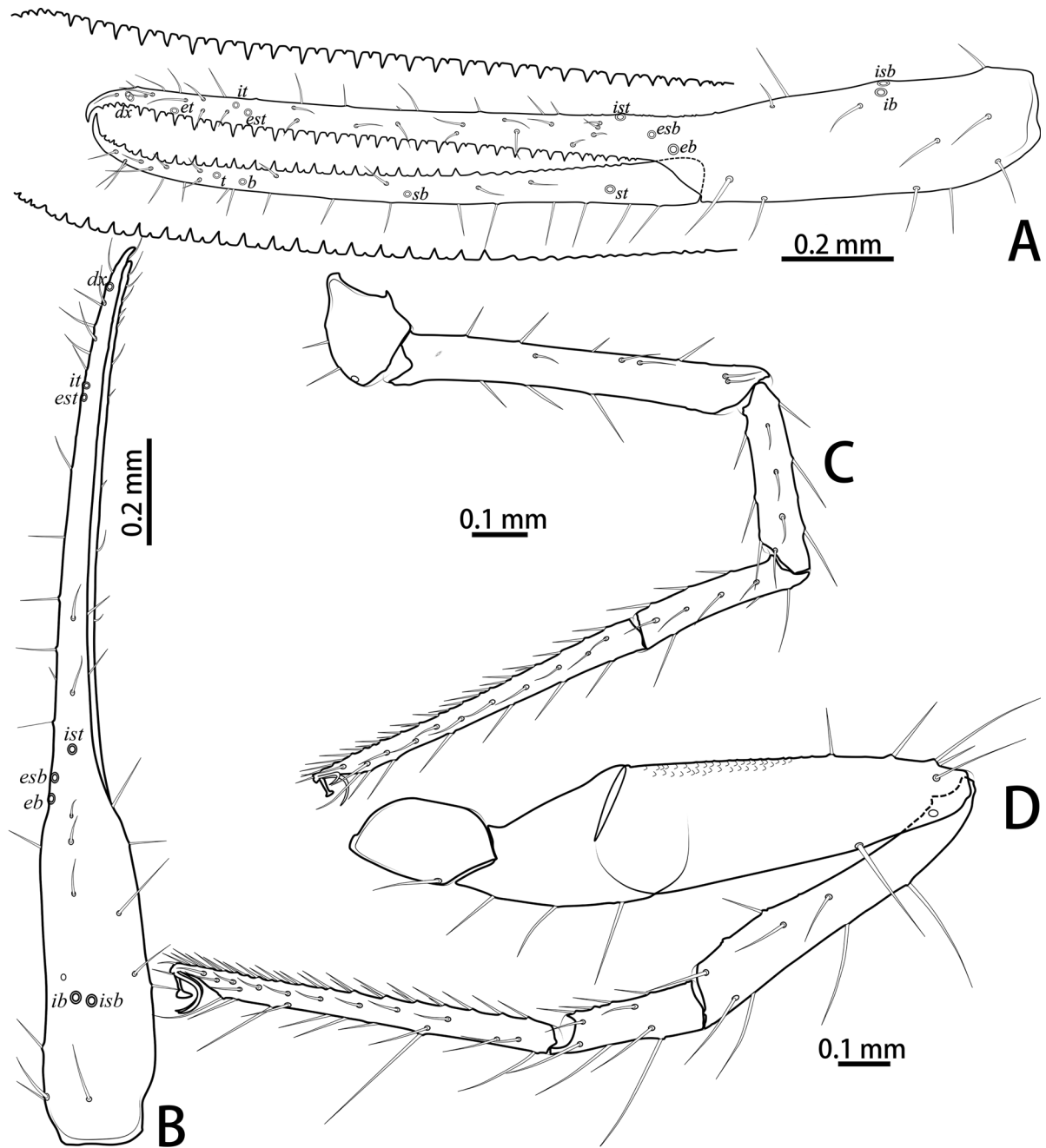
**Fig. 17.** *Tyrannochthonius longulimembrum* sp. nov., holotype, ♀ (Ps.-MHBU-GX2019100601). **A.** Left chela, lateral view. **B.** Left chela, dorsal view. **C.** Female genital area, ventral view. **D.** Left chelicera, dorsal view. **E.** Carapace, dorsal view. **F.** Left pedipalp (minus chela), dorsal view.



**Fig. 18.** *Tyrannochthonius longulimembrum* sp. nov., holotype, ♀ (Ps.-MHBG-GX2019100601). **A.** Carapace, dorsal view. **B.** Left chelicera, dorsal view, with details of teeth. **C.** Rallum. **D.** Coxal spines on coxae II, ventral view. **E.** Left pedipalp (minus chela), dorsal view.

setae) present on dorsum of chelal hand (Figs 17B, 19B). Both chelal fingers with row of teeth, spaced regularly along the margin, teeth smaller distally and proximally: fixed finger with 31 well-spaced, and pointed teeth and 28 intercalary microdenticles; movable finger with 20 well-spaced, pointed teeth, plus 15 intercalary microdenticles and 15 vestigial, rounded and contiguous basal teeth.

OPISTHOSOMA. Generally typical, pleural membrane finely granulated. All tergites and sternites undivided; setae uniseriate and acuminate. Tergal chaetotaxy I–XII: 2:2:2:4:4:4:5:5:5:4:T2T:0. Sternal



**Fig. 19.** *Tyrannochthonius longulimembrum* sp. nov., holotype, ♀ (Ps.-MHBU-GX2019100601). **A.** Left chela, lateral view, with details of teeth and trichobothrial pattern. **B.** Left chela, dorsal view. **C.** Leg I, lateral view. **D.** Leg IV, lateral view. Abbreviations: see Material and methods.



**Fig. 20.** Guangyang Cave, type locality of *Tyrannochthonius longulimembrum* sp. nov. **A.** Entrance. **B.** Inside the cave entrance.

chaetotaxy IV–XII: 12:8:9:9:10:9:9:-:2. Genital region: sternite II with 10 setae scattered on median area, genital opening slit-like, sternite III with row of 12 setae (Fig. 17C).

LEGS (Fig. 19C–D). Fine granulation present on anterodorsal faces of femur IV and patella IV. Leg I: femur  $1.91 \times$  as long as patella; tarsus  $2.00 \times$  as long as tibia. Leg IV: femoropatella  $4.30 \times$  as long as deep; tibia  $6.09 \times$  as long as deep; with basal tactile setae on both tarsal segments: basitarsus  $3.33 \times$  as long as deep (TS = 0.33), telotarsus  $15.00 \times$  as long as deep and  $2.50 \times$  as long as basitarsus (TS = 0.33). Setae of leg I (trochanter to tibia) 3:12:10:10, setae of leg IV (trochanter to basitarsus) 1:3:7:10:10. Arolium not divided, slightly shorter than the simple claws.

**Dimensions** (length/breadth or, in the case of the legs, length/depth in mm; ratios in parentheses)

**Female**

Body length 2.04. Pedipalps: trochanter 0.33/0.20 (1.65), femur 1.23/0.16 (7.69), patella 0.46/0.18 (2.56), chela 1.65/0.20 (8.25), hand 0.61/0.20 (3.05), movable chelal finger length 1.05. Chelicera 0.76/0.33 (2.30), movable finger length 0.40. Carapace 0.66/0.69 (0.96). Leg I: trochanter 0.19/0.15 (1.27), femur 0.67/0.09 (7.44), patella 0.35/0.08 (4.38), tibia 0.32/0.06 (5.33), tarsus 0.64/0.06 (10.67). Leg IV: trochanter 0.21/0.15 (1.40), femoropatella 0.99/0.23 (4.30), tibia 0.67/0.11 (6.09), basitarsus 0.30/0.09 (3.33), telotarsus 0.75/0.05 (15.00).

**Remarks**

*Tyrannochthonius longulimembrum* sp. nov. most closely resembles *T. ganshuanensis* in the presence of two setae on tergites I–II, carapace without eyes or eyespots and both chelal fingers with intercalary teeth, but differs in several characters as follows: longer and thinner pedipalpal chela (length 1.65 mm (♀),  $8.25 \times$  as long as broad compared to length 1.21–1.44 mm (♀),  $6.90\text{--}7.30 \times$  as long as broad in *T. ganshuanensis*) and longer and thinner pedipalpal femur (length 1.23 mm (♀),  $7.69 \times$  as long as broad compared to length 0.95–0.97 mm (♀),  $0.95\text{--}0.97 \times$  as long as broad in *T. ganshuanensis*) (Mahnert 2009).

**Distribution**

Known only from the type locality, Guangyang Cave (Guangxi, China).

*Tyrannochthonius miridentatus* sp. nov.

urn:lsid:zoobank.org:act:77F8DD22-F3A8-451C-BCA5-079F34901B51

Figs 1G, 21–24

**Diagnosis**

(♀) Moderately sized troglomorphic species with elongated appendages; carapace without eyes or eyespots; anterior margin of carapace thin, finely denticulated, epistome small and pointed, triangular; posterior margin of carapace with 2 setae; tergites I–IV each with four setae. Pedipalps slender, femur  $5.50\text{--}5.85 \times$  as long as broad, length 0.76–0.77 mm (♀); chela  $5.60\text{--}6.00 \times$  as long as broad, length 1.12–1.14 mm (♀); both chelal fingers without intercalary teeth; sb slightly closer to st than to b.

**Etymology**

The specific name is an adjective derived from a combination of the Latin words ‘*mirus*’ and ‘*dentatus*’, meaning ‘remarkable’ and ‘toothed’, respectively, which refers to the distinctly heteromorphic chelal teeth.

**Vernacular name**

异齿暴伪蝎.

**Type material**

**Holotype**

CHINA • ♀; Guangxi, Hechi City, Fengshan County, Fengcheng Town, Songren Village, Xi'an Cave; 24.565644° N, 107.037218° E; 526 m a.s.l.; 5 Oct. 2019; Zegang Feng and Lingchen Zhao leg.; MHBUS, Ps.-MHBUS-GX2019100501.

**Paratypes**

CHINA • 2 ♀♀; same data as for holotype; MHBUS, Ps.-MHBUS-GX2019100502–03.

**Description**

**Adult females** (Figs 21–24)

COLOR. Generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.

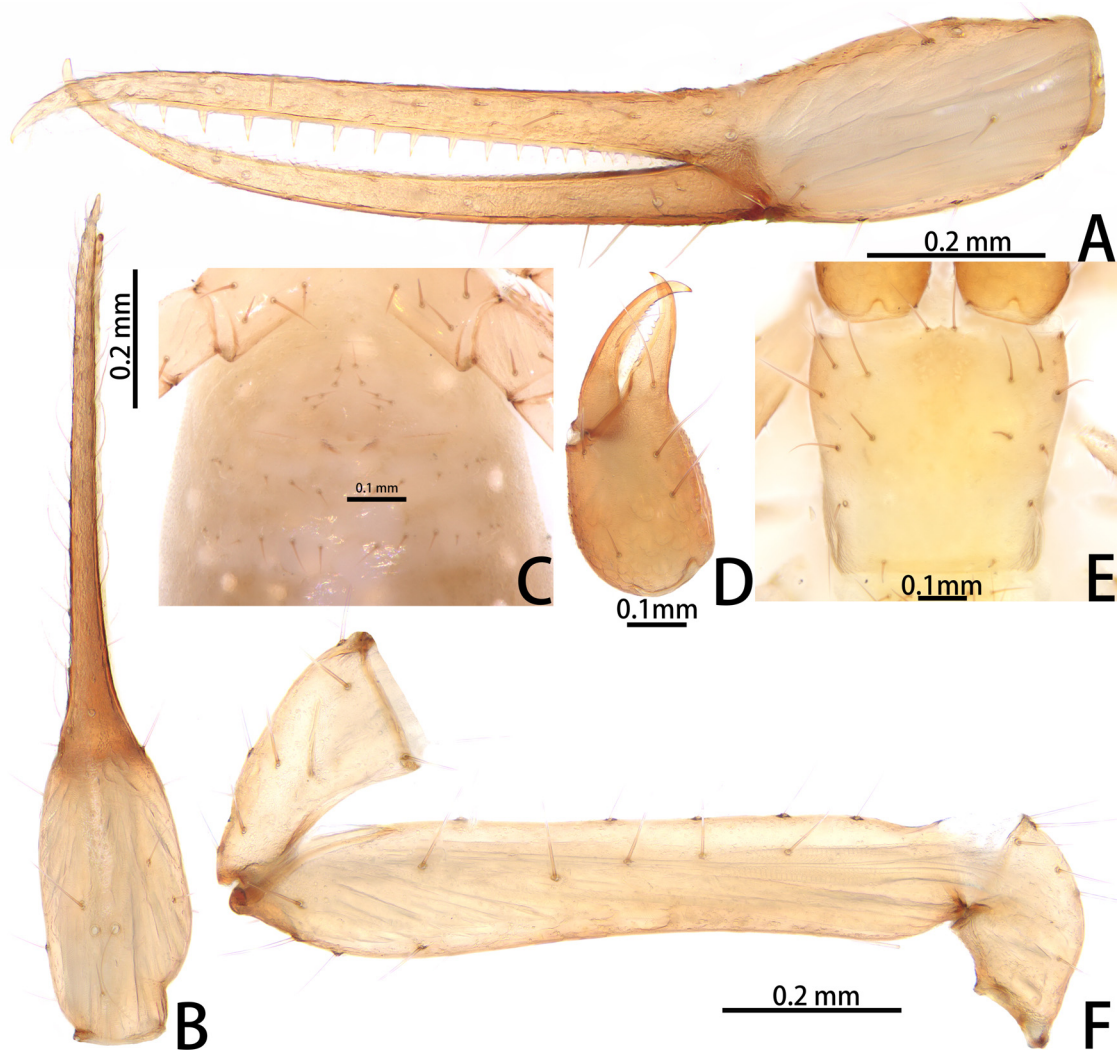
CEPHALOTHORAX (Figs 22E, 23A). Carapace nearly subquadrate, 0.94–0.96 × as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin slightly serrate; epistome small and pointed, triangular; without eyes or eyespots; with 18 setae arranged s4s: 4:4:2:2, most setae acuminate, sturdy, long and gently curved,



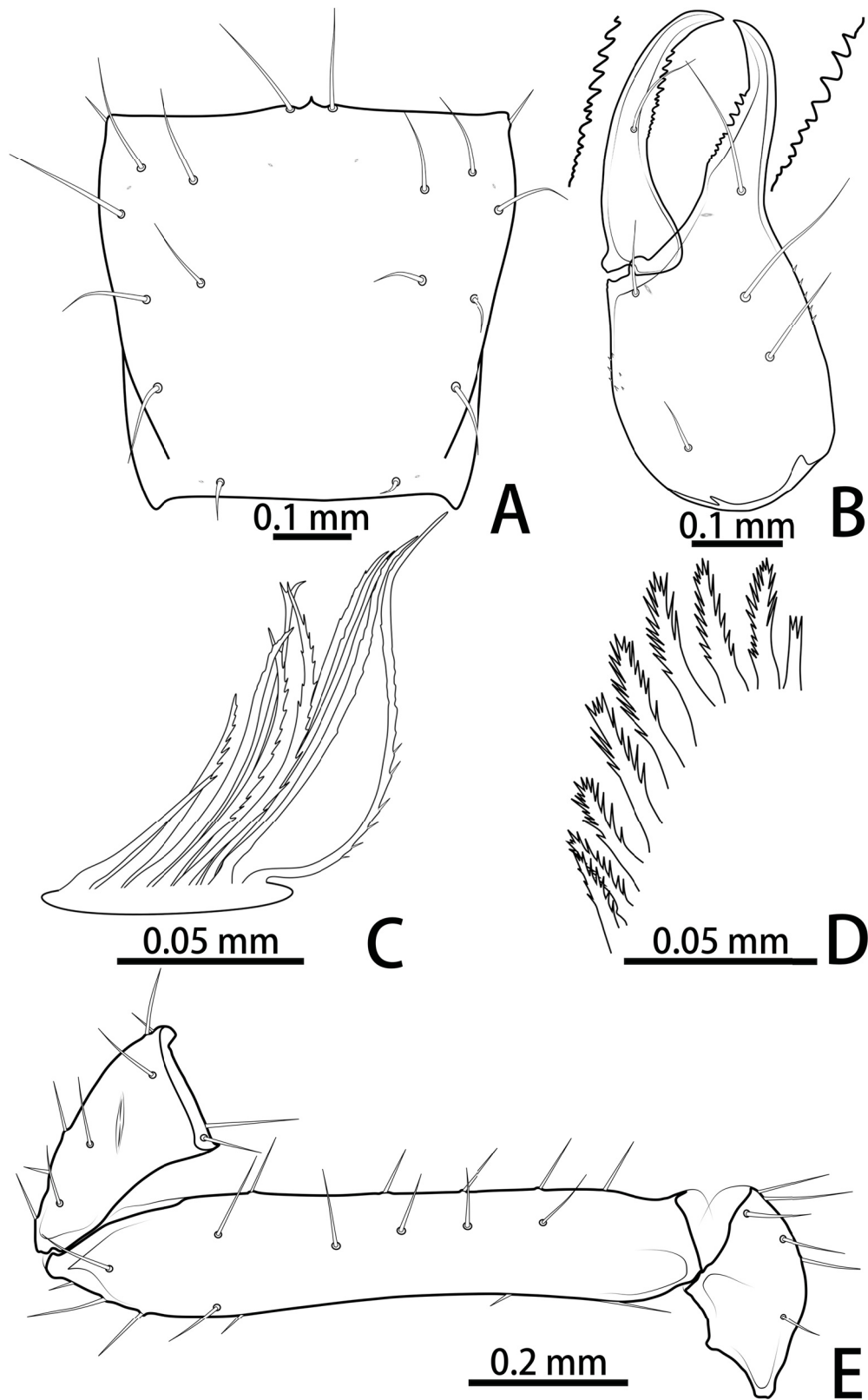
**Fig. 21.** *Tyrannochthonius miridentatus* sp. nov., holotype, ♀ (Ps.-MHBUS-GX2019100501), dorsal view.

anterolateral setae much shorter than others; with three pairs of lyrifissures, first and second pair situated middle and flank to setae of ocular row, third pair situated lateral to sole pair of setae of posterior row. Manducatory process with two acuminate distal setae, anterior seta more than  $\frac{1}{2}$  as long as medial seta; apex of coxa I with rounded anteromedial process; coxae II with seven terminally indented coxal spines on each side, set as oblique and arched row, central spines slightly longer than others (Fig. 23D); intercoxal tubercle absent; chaetotaxy of coxae: P 3, I 3, II 4, III 5, IV 5.

CHELICERA (Figs 22D, 23B). Almost as long as carapace,  $1.92\text{--}2.38 \times$  as long as broad; five setae and two lyrifissures (exterior condylar lyrifissure and exterior lyrifissure) present on hand, all setae acuminate, ventrobasal setae shorter than others; movable finger with one medial seta. Cheliceral hand with moderate wrinkle on both ventral and dorsal sides. Both fingers well provided with teeth, fixed finger with 10–11 teeth, distal one largest; movable finger with 12–14 contiguous small teeth; galea completely vestigial (Fig. 22D). Serrula exterior with 20–27 and serrula interior with 12 blades. Rallum with nine blades, distal one longest, with fine barbules and slightly set apart from other blades, latter tightly grouped and with long pinnae, some of which subdivided (Fig. 23C).

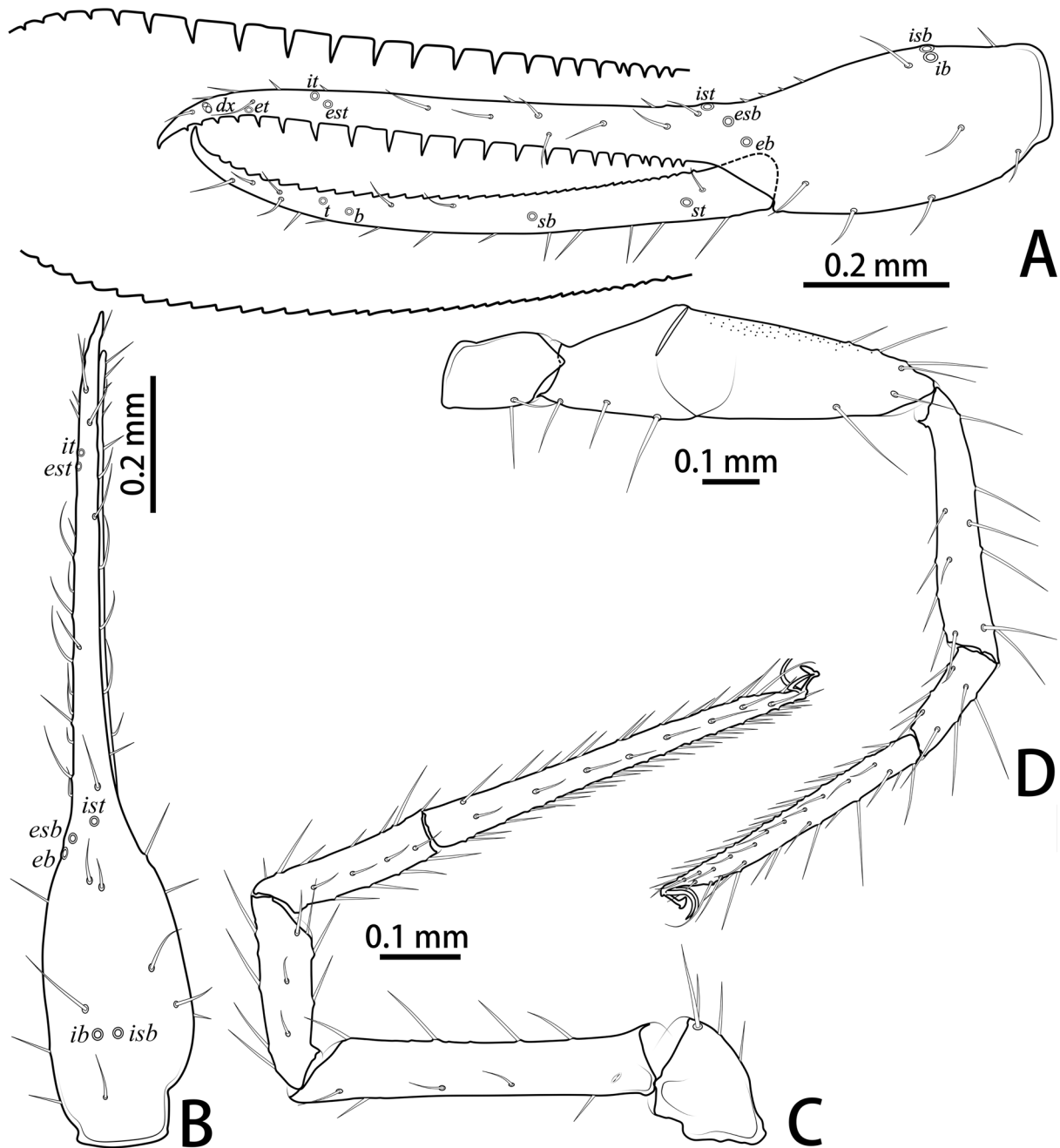


**Fig. 22.** *Tyrannochthonius miridentatus* sp. nov., holotype, ♀ (Ps.-MHBU-GX2019100501). **A.** Left chela, lateral view. **B.** Left chela, dorsal view. **C.** Female genital area, ventral view. **D.** Left chelicera, dorsal view. **E.** Carapace, dorsal view. **F.** Left pedipalp (minus chela), dorsal view.



**Fig. 23.** *Tyrannochthonius miridentatus* sp. nov., holotype, ♀ (Ps.-MHBU-GX2019100501). **A.** Carapace, dorsal view. **B.** Left chelicera, dorsal view, with details of teeth. **C.** Rallum. **D.** Coxal spines on coxae II, ventral view. **E.** Left pedipalp (minus chela), dorsal view.

PEDIPALP (Figs 22A–B, F, 23E, 24A–B). Trochanter 1.64–1.69, femur 5.50–5.85, patella 1.88–2.00, chela 5.60–6.00, hand 1.90–2.05 × as long as broad; femur 2.41–2.53 × as long as patella; movable chelal finger 1.87–2.03 × as long as hand and 0.73–0.77 × as long as chela. Setae generally long and acuminate. Chelal hand not constricted towards fingers, apodeme complex of movable chelal finger slightly sclerotized. Fixed chelal finger and hand with eight trichobothria, movable chelal finger with four trichobothria, *ib* and *isb* situated close together, submedially on dorsum of chelal hand; *eb*, *esb* and *ist* at base of fixed chelal finger; *esb* slightly distal to *eb* and *ist* slightly distal to *esb*; *it* slightly distal to *est*,



**Fig. 24.** *Tyrannochthonius miridentatus* sp. nov., holotype, ♀ (Ps.-MHBG-GX2019100501). **A.** Left chela, lateral view, with details of teeth and trichobothrial pattern. **B.** Left chela, dorsal view. **C.** Leg I, lateral view. **D.** Leg IV, lateral view. Abbreviations: see Material and methods.

situated subdistally; et slightly near to tip of fixed chelal finger, slightly close to chelal teeth; dx situated distal to et; sb slightly closer to st than to b; b and t situated subdistally, it slightly distal to t; est situated at same level as t, and distal to b (Figs 22A, 24A). Microsetae (chemosensory setae) present on dorsum of chelal hand (Figs 22B, 24B). Both chelal fingers with a row of teeth, spaced regularly along margin, teeth smaller distally and proximally: fixed finger with 23–25 well-spaced, and pointed macrodenticles; movable finger with 30–32 contiguous remarkably retrorse and pointed teeth, plus 5–6 vestigial, rounded and contiguous basal teeth.

**OPISTHOSOMA.** Generally typical, pleural membrane finely granulated. All tergites and sternites undivided; setae uniseriate and acuminate. Tergal chaetotaxy I–XII: 4:4:4:4:4:4:4:5:5:6:5–7:4:T2T:0. Sternal chaetotaxy IV–XII: 12:9–12:10–11:9–10:10:10–11:9–10:-:2. Genital region: sternite II with 10 setae scattered on median area, genital opening slit-like, sternite III with row of 10–12 setae (Fig. 22C).

**LEGS** (Fig. 24C–D). Fine granulation present on anterodorsal faces of femur IV and patella IV. Leg I: femur 1.61–1.87 × as long as patella; tarsus 2.19–2.47 × as long as tibia. Leg IV: femoropatella 3.45–3.72 × as long as deep; tibia 5.50–5.88 × as long as deep; with basal tactile setae on both tarsal segments: basitarsus 3.00–4.00 × as long as deep (TS = 0.29–0.33), telotarsus 10.20–12.25 × as long as deep and 2.40–2.72 × as long as basitarsus (TS = 0.26–0.31). Setae of leg I (trochanter to tibia) 3–4:10–11:10:9–15, setae of leg IV (trochanter to basitarsus) 2:3–4:6–7:11–12:9–10. Arolium not divided, slightly shorter than simple claws.

**Dimensions** (length/breadth or, in the case of the legs, length/depth in mm; ratios in parentheses)

#### Females

Body length 1.52–1.92. Pedipalps: trochanter 0.22–0.23/0.13–0.14 (1.64–1.69), femur 0.76–0.77/0.13–0.14 (5.50–5.85), patella 0.30–0.32/0.15–0.17 (1.88–2.00), chela 1.12–1.14/0.19–0.20 (5.60–6.00), hand 0.38–0.39/0.19–0.20 (1.90–2.05), movable chelal finger length 0.73–0.77. Chelicera 0.46–0.50/0.21–0.24 (1.92–2.38), movable finger length 0.26–0.28. Carapace 0.46–0.47/0.49 (0.94–0.96). Leg I: trochanter 0.15–0.16/0.09–0.11 (1.36–1.67), femur 0.42–0.44/0.07–0.08 (5.50–6.14), patella 0.23–0.26/0.06 (3.83–4.33), tibia 0.19–0.22/0.05–0.06 (3.67–4.20), tarsus 0.46–0.49/0.04–0.05 (9.2–11.75). Leg IV: trochanter 0.19–0.21/0.12–0.14 (1.50–1.75), femoropatella 0.65–0.69/0.18–0.20 (3.45–3.72), tibia 0.44–0.47/0.08 (5.50–5.88), basitarsus 0.18–0.20/0.05–0.06 (3.00–4.00), telotarsus 0.48–0.51/0.04–0.05 (10.20–12.25).

#### Remarks

*Tyrannochthonius miridentatus* sp. nov. differs from all other hypogean species of the genus except *T. quattuor* by the movable finger of pedipalpal chela exhibits a continuous and strongly retrorse teeth, except for the few most distal ones, sb slightly closer to st than to b, the presence of four setae on tergites I–IV, epistome triangular and carapace without eyes or eyespots. It differs from *T. quattuor* by its shorter and thicker pedipalpal chela (length 1.12–1.14 mm (♀), 5.60–6.00 (♀) × as long as broad compared to length 1.74–1.86 mm (♀), 6.89–7.25 (♀) × as long as broad in *T. quattuor*) and shorter and thicker pedipalpal femur (length 0.76–0.77 mm (♀), 5.50–5.85 (♀) × as long as broad compared to compared to length 1.24–1.32 mm (♀), 7.33–7.75 (♀) × as long as broad in *T. quattuor*) (Hou *et al.* 2023b).

#### Distribution

Known only from the type locality, Xi'an Cave (Guangxi, China).

*Tyrannochthonius rudongyanensis* Sun, Guo & Zhang, 2025

Fig. 1B

*Tyrannochthonius rudongyanensis* Sun, Guo & Zhang, 2025: 117–123, figs 2–5.

**Diagnosis and description**

For details see Sun *et al.* (2025).

**Vernacular name**

乳洞岩暴伪蝎.

**Material examined**

**Holotype**

CHINA • ♂; Guangxi, Guilin City, Xing'an County, Rudongyan Cave; 25.574192° N, 110.620256° E; 240 m a.s.l.; 10 Oct. 2019; Zegang Feng and Lingchen Zhao leg.; MHBUS, Ps.-MHBUS-GX2019101001.

**Paratypes**

CHINA • 2 ♀♀; same data as for holotype; MHBUS, Ps.-MHBUS-GX2019101002–03; CHINA • 3 ♀♀; Guangxi, Guilin City, Xing'an County, Rudongyan Cave; 25.570469° N, 110.627489° E; 213 m a.s.l.; 4 Feb. 2023; Xiangbo Guo, Jianzhou Sun, Tao Zheng and Songtao Shi leg.; MHBUS, Ps.-MHBUS-GX2023020401–03.

**Distribution**

Rudongyan Cave (Guangxi, China).

*Tyrannochthonius shenlongensis* sp. nov.

urn:lsid:zoobank.org:act:3F46460A-87B2-4B81-B1B3-F241F830565D

Figs 1F, 25–29

**Diagnosis**

(♂♀) Moderately sized troglomorphic species with elongated appendages; carapace without eyes or eyespots; anterior margin of carapace thin, finely denticulated, epistome small, triangular; posterior margin of carapace with 2 setae; tergites I–II each with two setae, tergites III–IV each with four setae. Pedipalps slender, femur 6.36 (♂), 6.00–6.17 (♀) × as long as broad, length 0.70 (♂), 0.66–0.74 (♀); chela 6.71 (♂), 6.71–6.80 (♀) × as long as broad, length 0.94 (♂), 0.94–1.02 (♀); both chelal fingers with intercalary teeth; sb closer to st than b.

**Etymology**

Named after the type locality, Shenlong Cave.

**Vernacular name**

神龙暴伪蝎.

**Type material**

**Holotype**

CHINA • ♂; Guangxi, Hechi City, Huanjiang Maonan Autonomous County, Dacai Township, Shenlong Cave; 24.773162° N, 108.385965° E; 201.2 m a.s.l.; 31 Jul. 2021; Zegang Feng, Hongru Xu, Liu Fu and Nana Zhan leg.; MHBUS, Ps.-MHBUS-GX2021073101.

### Paratypes

CHINA • 2 ♀♀; same data as for holotype; MHBU, Ps.-MHBU-GX2021073102–03.

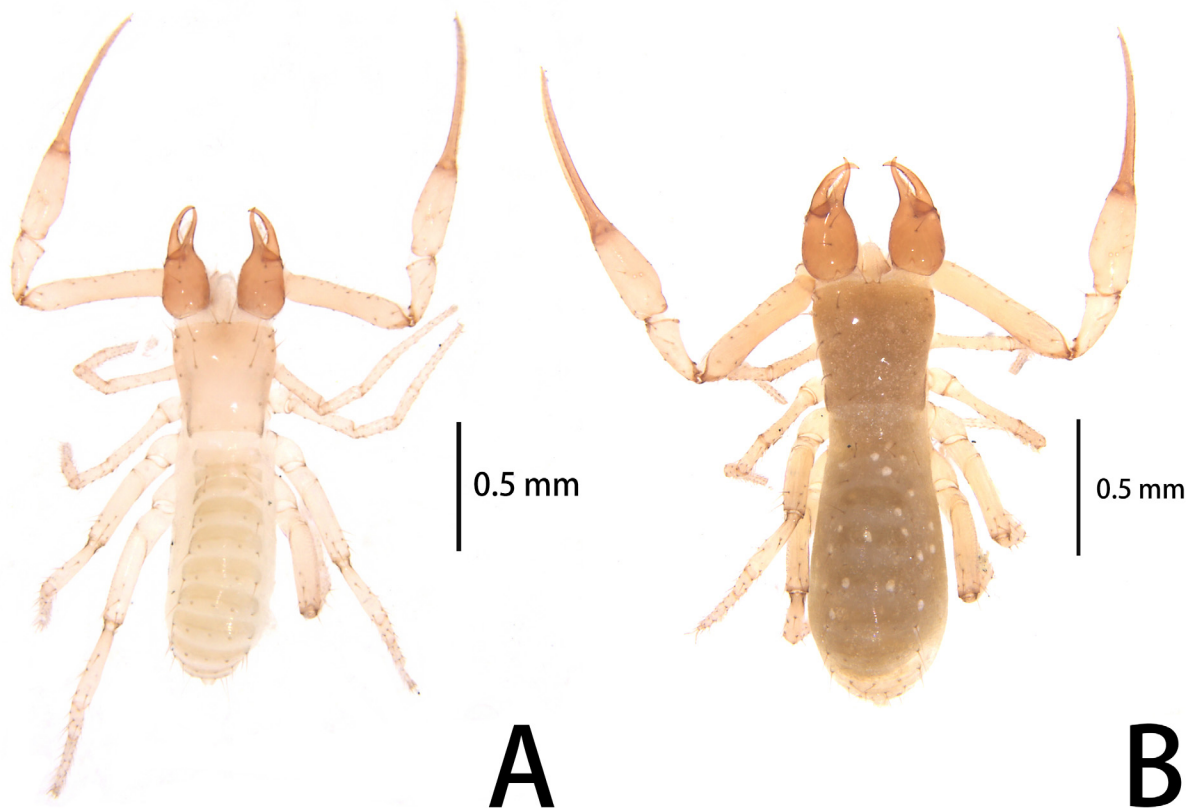
### Description

#### Adult male (Figs 25–29)

COLOR. Generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.

CEPHALOTHORAX (Figs 26D, 27A). Carapace nearly subquadrate,  $1.05 \times$  as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin slightly serrate; epistome small, triangular; carapace without eyes or eyespots; with 18 setae arranged s4s: 4:4:2:2, most setae acuminate, sturdy, long and gently curved, anterolateral setae much shorter than others; with three pairs of lyrifissures, first and second pair situated middle and flank to setae of ocular row, third pair situated lateral to the sole pair of setae of posterior row. Manducatory process with two acuminate distal setae, anterior seta more than  $\frac{1}{2}$  as long as medial seta; apex of coxa I with rounded anteromedial process; coxae II with 8–10 terminally indented coxal spines on each side, set as oblique and arched row, central spines slightly longer than others (Fig. 27D); intercoxal tubercle absent; chaetotaxy of coxae: P 3, I 3, II 4, III 5, IV 5.

CHELICERA (Figs 26C, 27B). Almost as long as carapace,  $2.44 \times$  as long as broad; five setae and two lyrifissures (exterior condylar lyrifissure and exterior lyrifissure) present on hand, all setae acuminate,



**Fig. 25.** *Tyrannochthonius shenlongensis* sp. nov. **A.** Holotype, ♂ (Ps.-MHBU-GX2021073101), dorsal view. **B.** Paratype, ♀ (Ps.-MHBU-GX2021073102), dorsal view.

ventrobasal setae shorter than others; movable finger with one medial seta. Cheliceral hand with moderate wrinkle on both ventral and dorsal sides. Both fingers well provided with teeth, fixed finger with 13 teeth, distal one largest; movable finger with 13 contiguous small teeth; galea completely vestigial (Fig. 26C). Serrula exterior with 23 and serrula interior with 13 blades. Rallum with eight blades, distal one longest, with fine barbules and slightly set apart from other blades, latter tightly grouped and with long pinnae, some of which subdivided (Fig. 27C).

PEDIPALP (Figs 26A–B, E, 27E, 28A–B). Trochanter 1.64, femur 6.36, patella 2.17, chela 6.71, hand  $2.50 \times$  as long as broad; femur  $2.69 \times$  as long as patella; movable chelal finger  $1.74 \times$  as long as hand and  $0.65 \times$  as long as chela. Setae generally long and acuminate. Chelal hand not constricted towards fingers, apodeme complex of movable chelal finger slightly sclerotized. Fixed chelal finger and hand with eight trichobothria, movable chelal finger with four trichobothria, ib and isb situated close together, submedially on dorsum of chelal hand; eb, esb and ist at base of fixed chelal finger; esb slightly distal eb and ist slightly distal to esb; it slightly distal to est, situated subdistally; et slightly near to tip of fixed chelal finger, slightly close to chelal teeth; dx situated distal to et; sb closer to st than b; b and t situated subdistally, t slightly distal to it and est slightly distal to b (Figs 26A, 28A). Microsetae (chemosensory setae) present on dorsum of chelal hand (Figs 26B, 28B). Both chelal fingers with row of teeth, spaced regularly along margin, teeth smaller distally and proximally: fixed finger with 32 well-spaced, slightly retrorse and pointed teeth and 19 intercalary microdenticles; movable finger with 24 almost contiguous, slightly retrorse and pointed teeth, plus nine intercalary microdenticles and six vestigial, rounded and contiguous basal teeth.

OPISTHOSOMA. Generally typical, pleural membrane finely granulated. All tergites and sternites undivided; setae uniseriate and acuminate. Tergal chaetotaxy I–XII: 2:2:4:4:4:4:4:5:5:5:4:T2T:0. Sternal chaetotaxy IV–XII: 12:7:7:9:8:9:9:-:2. Genital region: sternite II with nine setae scattered on median area, genital opening slit-like, sternite III with row of 16 setae (Fig. 26G).

LEGS (Fig. 28C–D). Fine granulation present on anterodorsal faces of femur IV and patella IV. Leg I: femur  $1.94 \times$  as long as patella; tarsus  $2.11 \times$  as long as tibia. Leg IV: femoropatella  $2.94 \times$  as long as deep; tibia  $4.63 \times$  as long as deep; with basal tactile setae on both tarsal segments: basitarsus  $2.83 \times$  as long as deep (TS = 0.21), telotarsus  $14.00 \times$  as long as deep and  $2.47 \times$  as long as basitarsus (TS = 0.33). Setae of leg I (trochanter to tibia) 4:11:11:11, setae of leg IV (trochanter to basitarsus) 3:3:6:10:8. Arolium not divided, slightly shorter than simple claws.

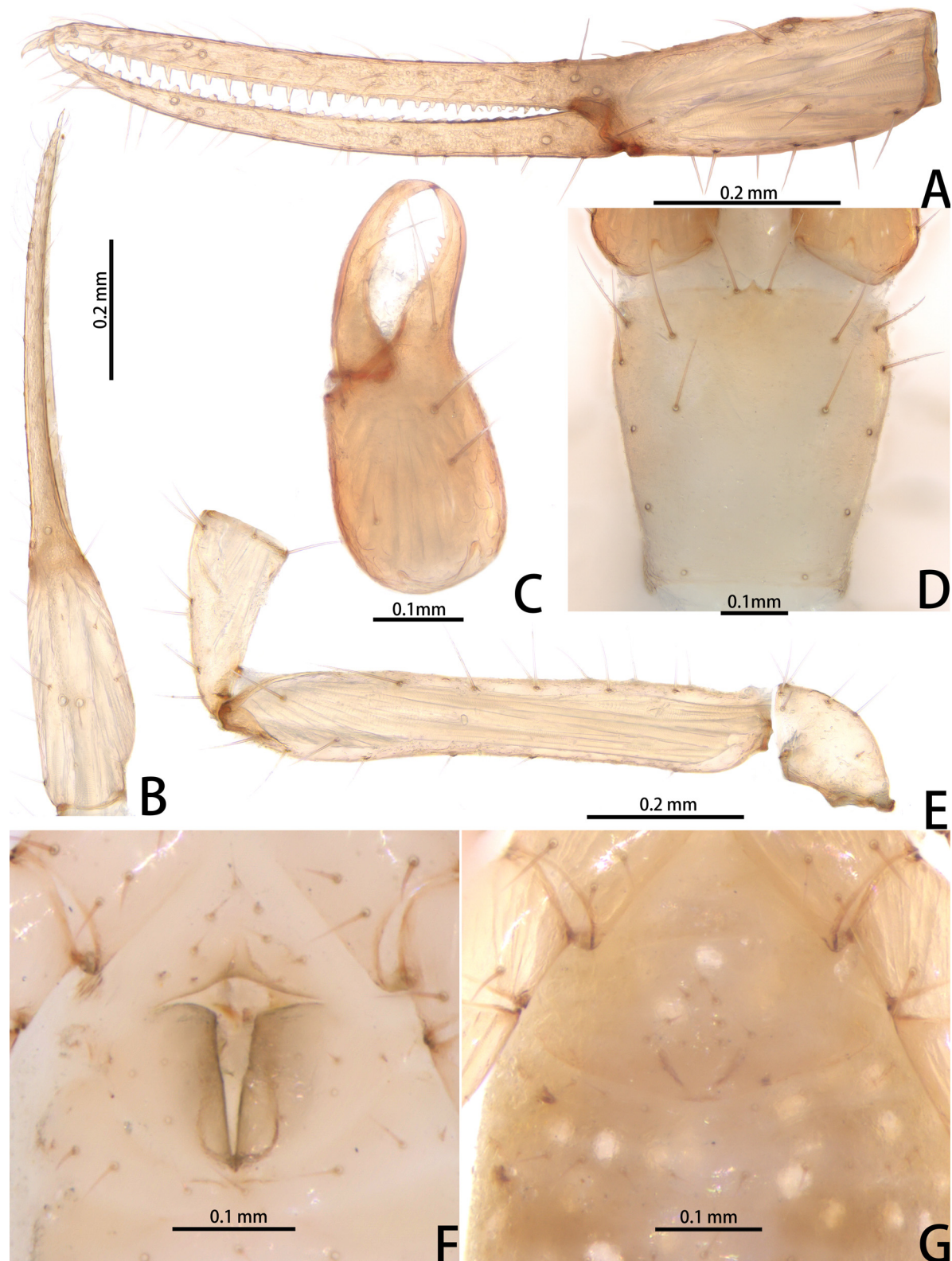
#### **Adult females** (paratypes; Figs 25B, 26G)

Mostly same as males; tergal chaetotaxy I–XII: 2:2:4:4:4:4:4:5:5:5:4:T2T:0; sternal chaetotaxy IV–XII: 11–12:7–8:7–8:8–8:9:9:9:-:2. Genital region: sternite II with nine setae scattered on median area, sternite III with row of 10–12 setae.

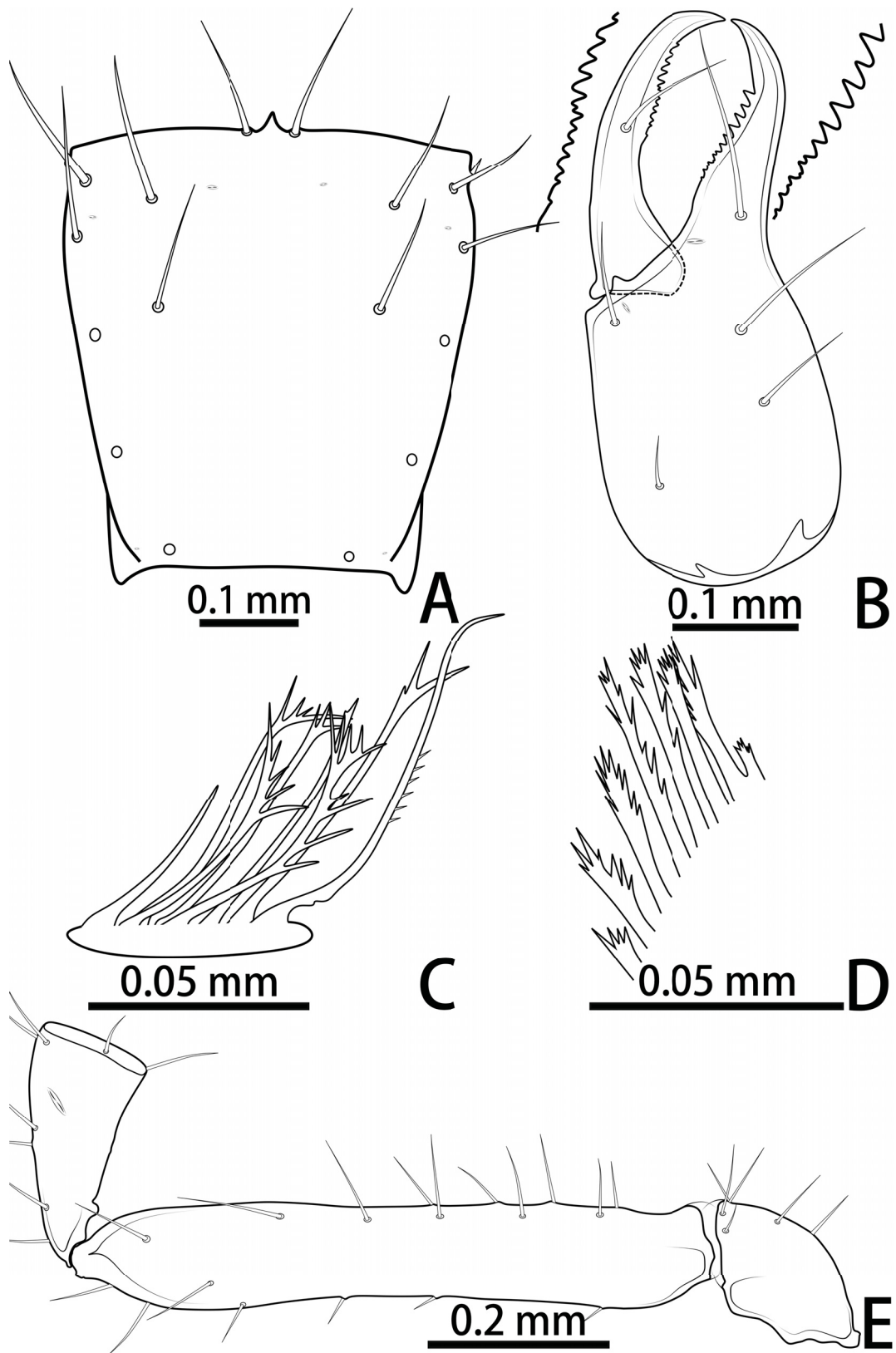
**Dimensions** (length/breadth or, in the case of the legs, length/depth in mm; ratios in parentheses)

#### **Male**

Body length 1.40. Pedipalps: trochanter 0.20/0.11 (1.82), femur 0.54/0.10 (5.40), patella 0.24/0.12 (2.00), chela 0.79/0.13 (6.08), hand 0.25/0.13 (1.94), movable chelal finger length 0.55. Chelicera 0.40/0.19 (2.10), movable finger length 0.23. Carapace 0.38/0.45 (0.84). Leg I: trochanter 0.12/0.09 (1.33), femur 0.29/0.05 (5.80), patella 0.14/0.05 (2.80), tibia 0.17/0.04 (4.25), tarsus 0.32/0.04 (8.00). Leg IV: trochanter 0.17/0.11 (1.54), femoropatella 0.48/0.19 (2.52), tibia 0.32/0.08 (4.00), basitarsus 0.14/0.06 (2.33), telotarsus 0.34/0.03 (11.33).



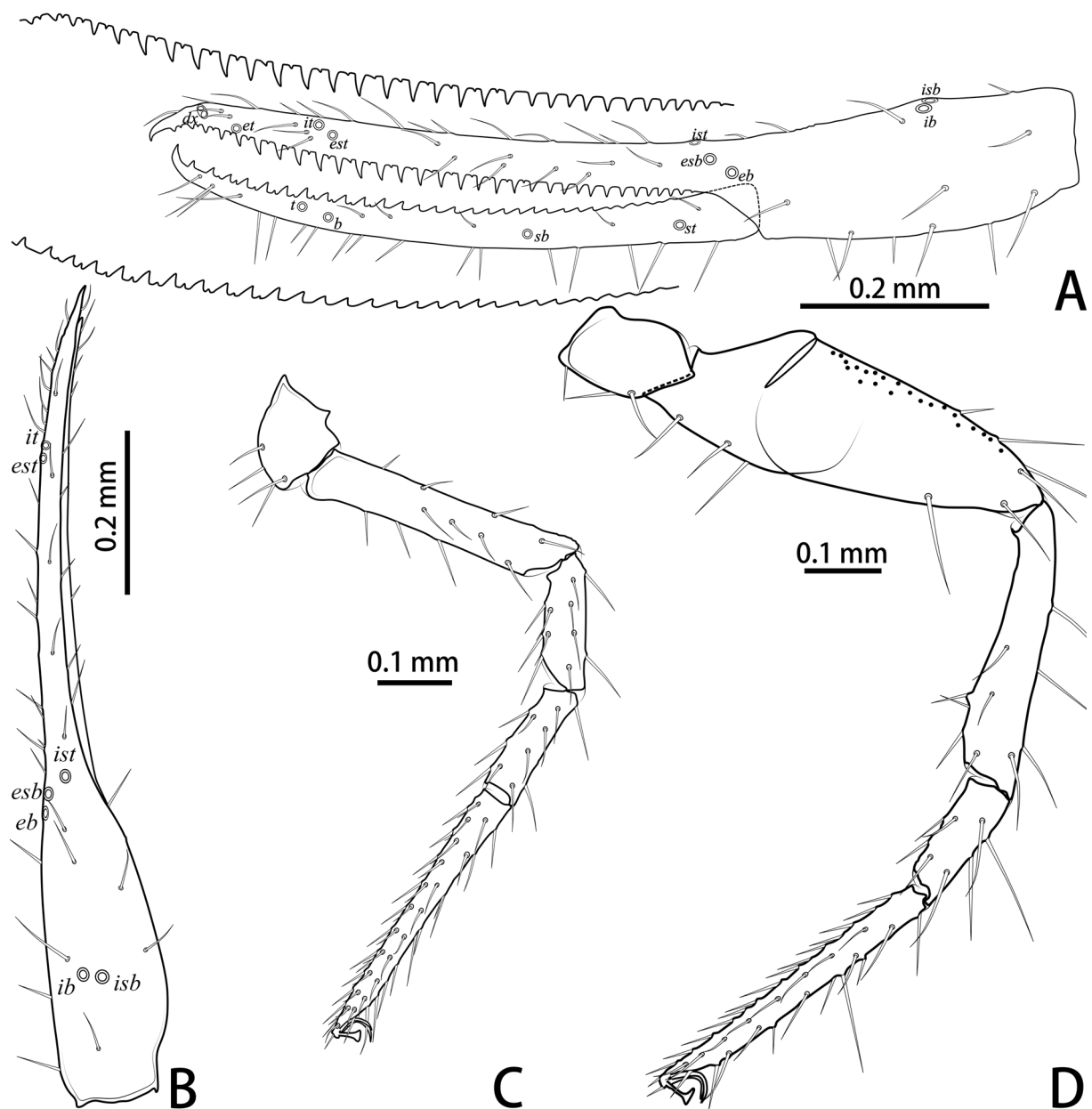
**Fig. 26.** *Tyrannochthonius shenlongensis* sp. nov. **A–F.** Holotype, ♂ (Ps.-MHBU-GX2021073101). **G.** Paratype, ♀ (Ps.-MHBU-GX2021073102). **A.** Left chela, lateral view. **B.** Left chela, dorsal view. **C.** Left chelicera, dorsal view. **D.** Carapace, dorsal view. **E.** Left pedipalp (minus chela), dorsal view. **F.** Male genital area, ventral view. **G.** Female genital area, ventral view.



**Fig. 27.** *Tyrannochthonius shenlongensis* sp. nov., holotype, ♂ (Ps.-MHBU-GX2021073101). **A.** Carapace, dorsal view. **B.** Left chelicera, dorsal view, with details of teeth. **C.** Rallum. **D.** Coxal spines on coxae II, ventral view. **E.** Left pedipalp (minus chela), dorsal view.

**Females**

Body length 1.42–1.45. Pedipalps: trochanter 0.20–0.21/0.11 (1.82–1.91), femur 0.55–0.58/0.10–0.12 (4.83–5.50), patella 0.27/0.12 (2.25), chela 0.82–0.83/0.16 (5.13–5.19), hand 0.26–0.27/0.16 (1.63–1.69), movable chelal finger length 0.57. Chelicera 0.43–0.45/0.22 (1.95–2.04), movable finger length 0.24–0.25. Carapace 0.39–0.48/0.48–0.49 (0.81–0.98). Leg I: trochanter 0.11–0.13/0.08–0.10 (1.30–1.38), femur 0.29–0.31/0.06 (4.83–5.17), patella 0.15–0.17/0.05–0.06 (2.83–3.00), tibia 0.16–0.17/0.04 (4.00–4.25), tarsus 0.34–0.35/0.04 (8.50–8.75). Leg IV: trochanter 0.13–0.18/0.10–0.11 (1.30–1.64), femoropatella 0.48–0.49/0.17–0.18 (2.72–2.82), tibia 0.32–0.35/0.08 (4.00–4.38), basitarsus 0.15–0.16/0.06 (2.50–2.67), telotarsus 0.34–0.35/0.03–0.04 (8.50–11.67).



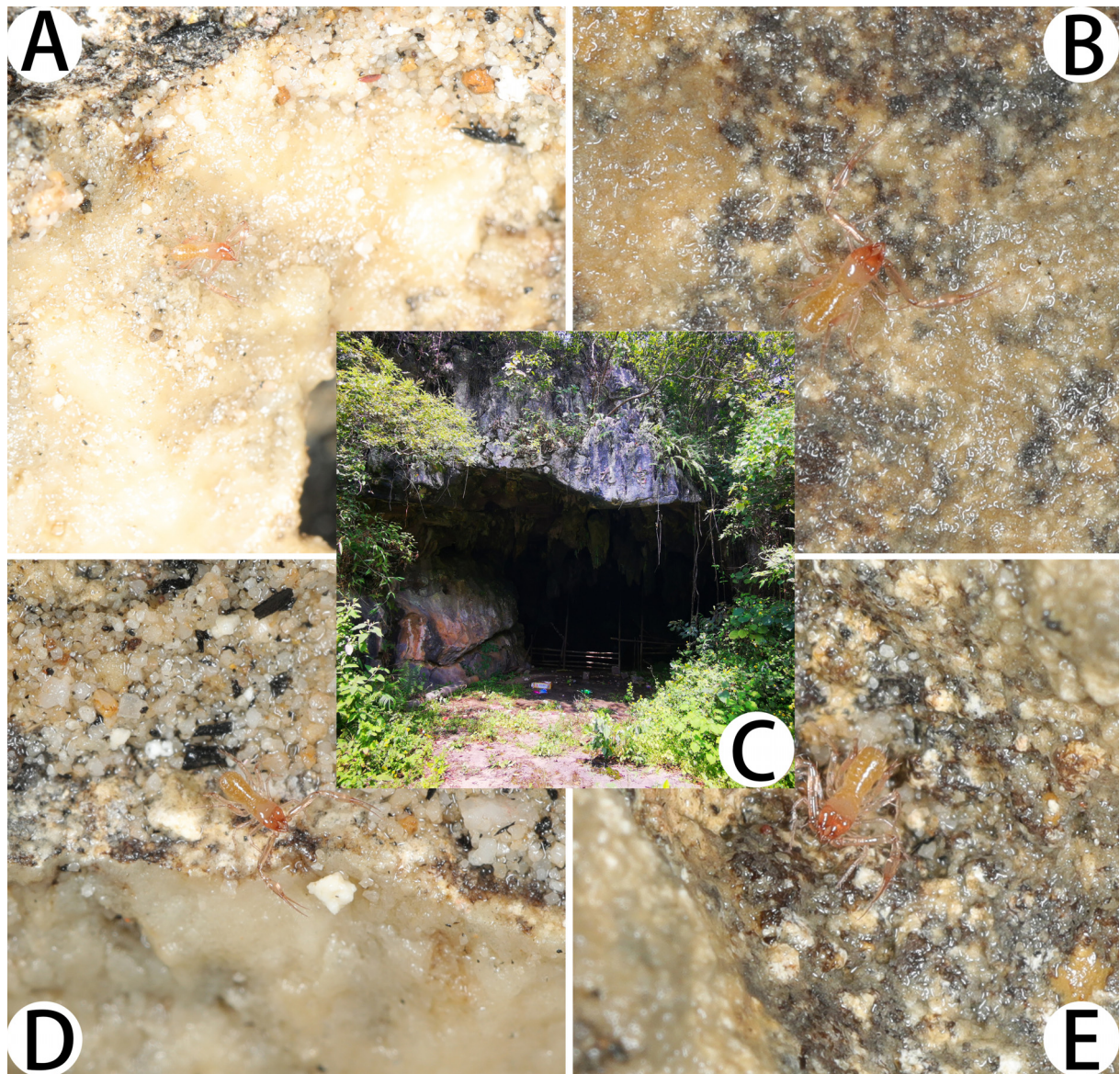
**Fig. 28.** *Tyrannochthonius shenlongensis* sp. nov., holotype, ♂ (Ps.-MHBV-GX2021073101). **A.** Left chela, lateral view, with details of teeth and trichobothrial pattern. **B.** Left chela, dorsal view. **C.** Leg I, lateral view. **D.** Leg IV, lateral view. Abbreviations: see Material and methods.

### Remarks

*Tyrannochthonius shenlongensis* sp. nov. most closely resembles *T. akaelus* in the both chelal fingers with intercalary teeth, tergites I–II each with two setae, tergites III–IV each with four setae, tergite X with four setae; epistome small, triangular and carapace without eyes or eyespots, but differs in several characters as follows: shorter and thicker pedipalpal chela (length 0.94–1.02 mm (♀), 6.71–6.80 (♀) × as long as broad compared to length 1.28 mm (♀), 7.53 (♀) × as long as broad in *T. akaelus*) and shorter and thicker pedipalpal femur (length 0.66–0.74 mm (♀), 6.00–6.17 (♀) × as long as broad compared to length 0.90 mm (♀), 6.42 (♀) × as long as broad in *T. akaelus*) and the position of trichobothrium (sb closer to st than b compared to sb situated midway between st and b in *T. akaelus*) (Mahnert 2009).

### Distribution

Known only from the type locality, Shenlong Cave (Guangxi, China).



**Fig. 29.** Shenlong Cave, type locality of *Tyrannochthonius shenlongensis* sp. nov. A–B, D–E. *T. shenlongensis* in its natural environment. C. Entrance.

*Tyrannochthonius tiani* Sun, Guo & Zhang, 2025  
Fig. 1D

*Tyrannochthonius tiani* Sun, Guo & Zhang, 2025: 123–127, figs 6–8.

**Diagnosis and description**

For details see Sun *et al.* (2025).

**Vernacular name**

田氏暴伪蝎.

**Material examined**

**Holotype**

CHINA • ♀; Guangxi, Hechi City, Huanjiang County, The Mulun National Nature Reserve, Ganxiao Cave; 25.18312° N, 108.03124° E; 695 m a.s.l.; 8 Dec. 2023; Mingyi Tian leg.; MHBUS, Ps.-MHBUS-GX2023120801.

**Distribution**

Ganxiao Cave (Guangxi, China).

*Tyrannochthonius xianguensis* sp. nov.

urn:lsid:zoobank.org:act:714F40F5-E81B-4AC8-89BF-8C6191CC42DA

Figs 1K, 30–34

**Diagnosis**

(♀) Moderately sized troglomorphic species with elongated appendages; carapace without eyes or eyespots; anterior margin of carapace thin, finely denticulated, epistome small, triangular; posterior margin of carapace with 2 setae; tergites I–II each with four setae, tergites III–IV each with more four setae. Pedipalps slender, femur 4.89 (♀) × as long as broad, length 0.44 (♀); chela 5.25 (♀) × as long as broad, length 0.63 (♀); both chelal fingers without intercalary teeth; sb closer to st than b.

**Etymology**

Named after the type locality, Xiangu Cave.

**Vernacular name**

仙姑暴伪蝎.

**Type material**

**Holotype**

CHINA • ♀; Guangxi, Hechi City, Yizhou District, Xiayan Village, Xiangu Cave; 24.501836° N, 108.713608° E; 124 m a.s.l.; 5 Oct. 2019; Zegang Feng and Lingchen Zhao leg.; MHBUS, Ps.-MHBUS-GX2019100501.

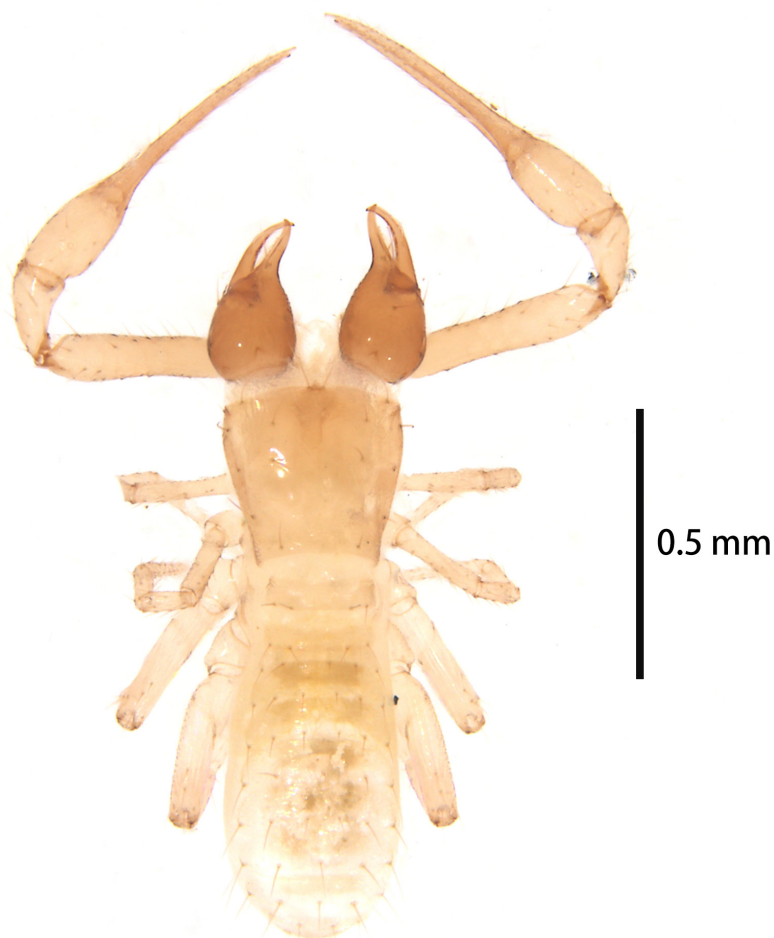
**Description**

**Adult female** (Figs 30–34)

COLOR. Generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.

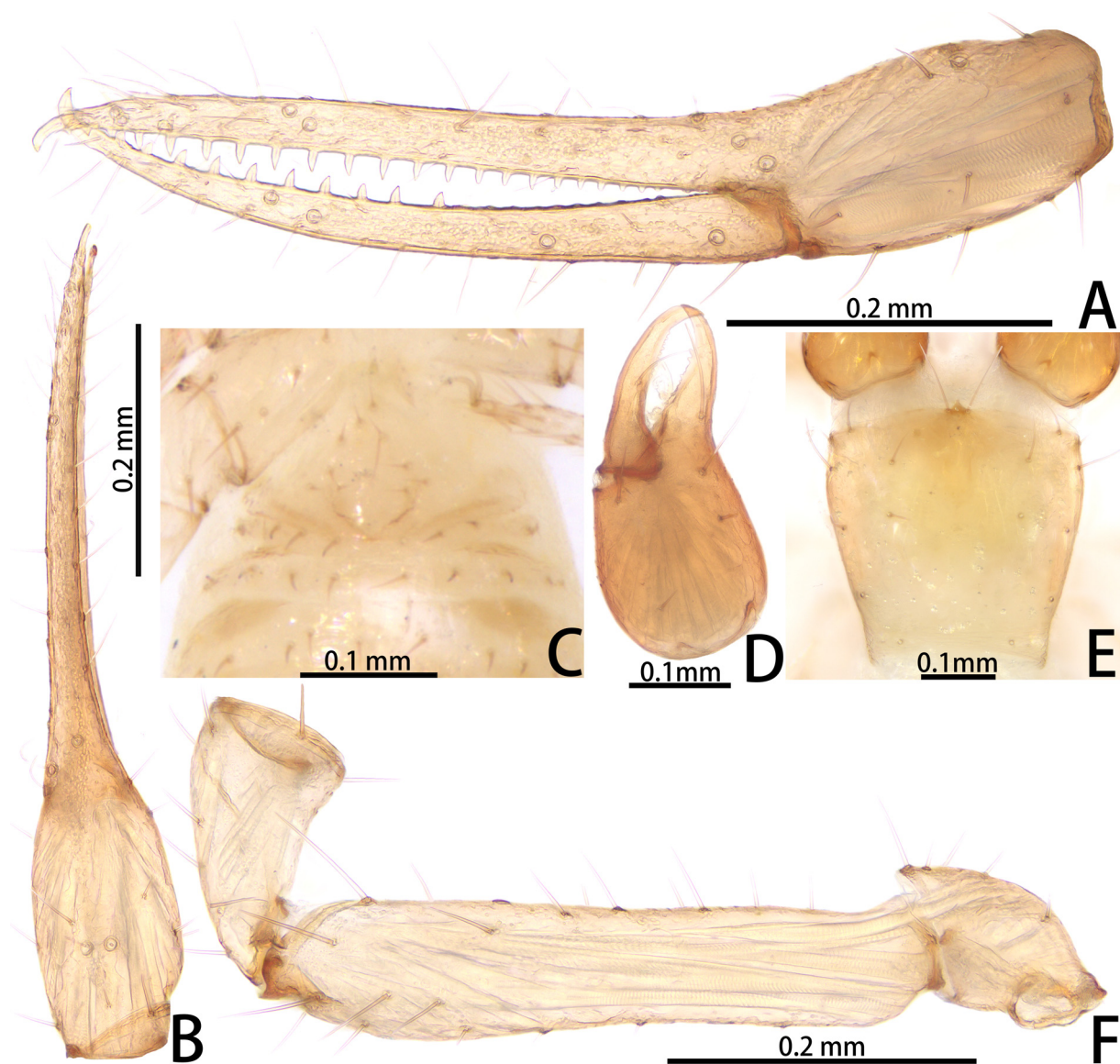
**CEPHALOTHORAX** (Figs 31E, 32A). Carapace nearly subquadrate,  $0.94 \times$  as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin slightly serrate; epistome small, triangular; without eyes or eyespots; with 18 setae arranged s4s: 4:4:2:2, most setae acuminate, sturdy, long and gently curved, anterolateral setae much shorter than others; with three pairs of lyrifissures, first and second pair situated middle and flank to setae of ocular row, third pair situated lateral to sole pair of setae of posterior row. Manducatory process with two acuminate distal setae, anterior seta more than  $\frac{1}{2}$  as long as medial seta; apex of coxa I with a rounded anteromedial process; coxae II with six or eight terminally indented coxal spines, set as oblique and arched row, central spines slightly longer than others (Fig. 32D); intercoxal tubercle absent; chaetotaxy of coxae: P 3, I 3, II 4, III 5, IV 5.

**CHELICERA** (Figs 31D, 32B). Almost as long as carapace,  $1.83 \times$  as long as broad; five setae and two lyrifissures (exterior condylar lyrifissure and exterior lyrifissure) present on hand, all setae acuminate, ventrobasal setae shorter than others; movable finger with one medial seta. Cheliceral hand with moderate wrinkle on both ventral and dorsal sides. Both fingers well provided with teeth, fixed finger with 13 teeth, distal one largest; movable finger with nine contiguous small teeth; galea completely vestigial (Fig. 31D). Serrula exterior with 18 and serrula interior with 12 blades. Rallum with eight blades, distal one longest, with fine barbules and slightly set apart from other blades, latter tightly grouped and with long pinnae, some of which subdivided (Fig. 32C).

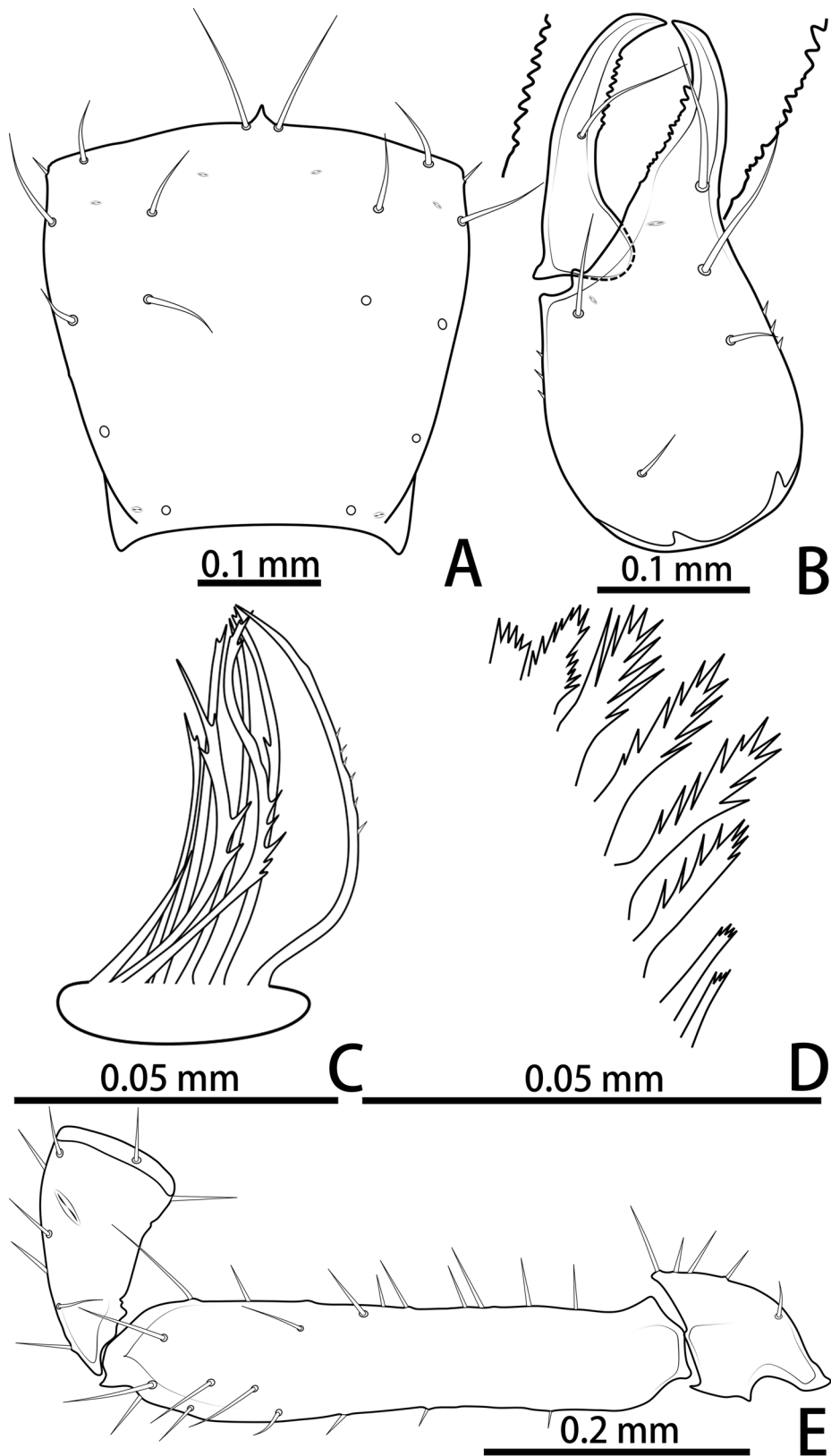


**Fig. 30.** *Tyrannochthonius xianguensis* sp. nov., holotype, ♀ (Ps.-MHBU-GX2019100501), dorsal view.

PEDIPALP (Figs 31A–B, F, 32E, 33A–B). Trochanter 1.75, femur 4.89, patella 2.11, chela 5.25, hand  $1.67 \times$  as long as broad; femur  $2.32 \times$  as long as patella; movable chelal finger  $2.25 \times$  as long as hand and  $0.71 \times$  as long as chela. Setae generally long and acuminate. Chelal hand not constricted towards fingers, apodeme complex of movable chelal finger slightly sclerotized. Fixed chelal finger and hand with eight trichobothria, movable chelal finger with four trichobothria, ib and isb situated close together, submedially on dorsum of chelal hand; eb, esb and ist at base of fixed chelal finger; esb slightly distal eb and ist slightly distal to esb; it slightly distal to est, situated subdistally; et slightly near to tip of fixed chelal finger, slightly close to chelal teeth; dx situated distal to et; sb closer to st than b; b and t situated subdistally, t slightly distal to it and est distal to b (Figs 31A, 33A). Microsetae (chemosensory setae) present on dorsum of chelal hand (Figs 31B, 33B). Both chelal fingers with row of teeth, spaced regularly along the margin, teeth smaller distally and proximally: fixed finger with 25 well-spaced, slightly retrorse



**Fig. 31.** *Tyrannochthonius xianguensis* sp. nov., holotype, ♀ (Ps.-MHBG-GX2019100501). **A.** Left chela, lateral view. **B.** Left chela, dorsal view. **C.** Female genital area, ventral view. **D.** Left chelicera, dorsal view. **E.** Carapace, dorsal view. **F.** Left pedipalp (minus chela), dorsal view.

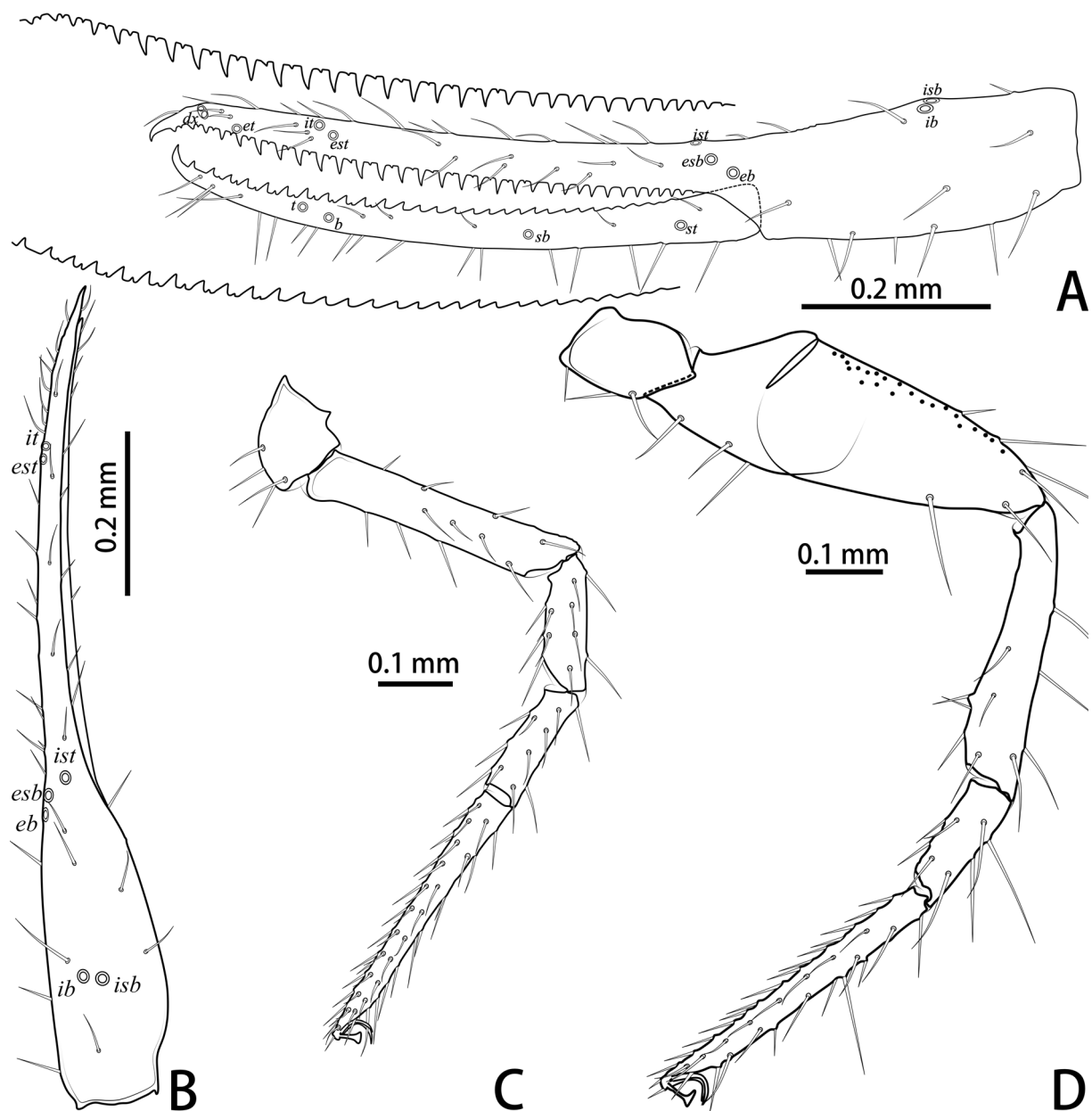


**Fig. 32.** *Tyrannochthonius xianguensis* sp. nov., holotype, ♀ (Ps.-MHBU-GX2019100501). **A.** Carapace, dorsal view. **B.** Left chelicera, dorsal view, with details of teeth. **C.** Rallum. **D.** Coxal spines on coxae II, ventral view. **E.** Left pedipalp (minus chela), dorsal view.

and pointed teeth; movable finger with 11 well-spaced, pointed teeth, plus 12 vestigial, rounded and contiguous basal teeth.

OPISTHOSOMA. Generally typical, pleural membrane finely granulated. All tergites and sternites undivided; setae uniseriate and acuminate. Tergal chaetotaxy I–XII: 4:4:5:6:6:5:6:5:5:4:T2T:0. Sternal chaetotaxy IV–XII: 10:11:9:9:8:9:7:-:2. Genital region: sternite II with 10 setae scattered on median area, genital opening slit-like, sternite III with row of 12 setae (Fig. 31C).

LEGS (Fig. 33C–D). Fine granulation present on anterodorsal faces of femur IV and patella IV. Leg I: femur 1.92 × as long as patella; tarsus 2.08 × as long as tibia. Leg IV: femoropatella 2.42 × as long as



**Fig. 33.** *Tyrannochthonius xianguensis* sp. nov., holotype, ♀ (Ps.-MHBU-GX2019100501). **A.** Left chela, lateral view, with details of teeth and trichobothrial pattern. **B.** Left chela, dorsal view. **C.** Leg I, lateral view. **D.** Leg IV, lateral view. Abbreviations: see Material and methods.

deep; tibia  $4.20 \times$  as long as deep; with basal tactile setae on both tarsal segments: basitarsus  $3.00 \times$  as long as deep (TS = 0.32), telotarsus  $8.00 \times$  as long as deep and  $2.00 \times$  as long as basitarsus (TS = 0.29). Setae of leg I (trochanter to tibia) 2:10:9:11, setae of leg IV (trochanter to basitarsus) 2:3:6:11:10. Arolium not divided, slightly shorter than simple claws.

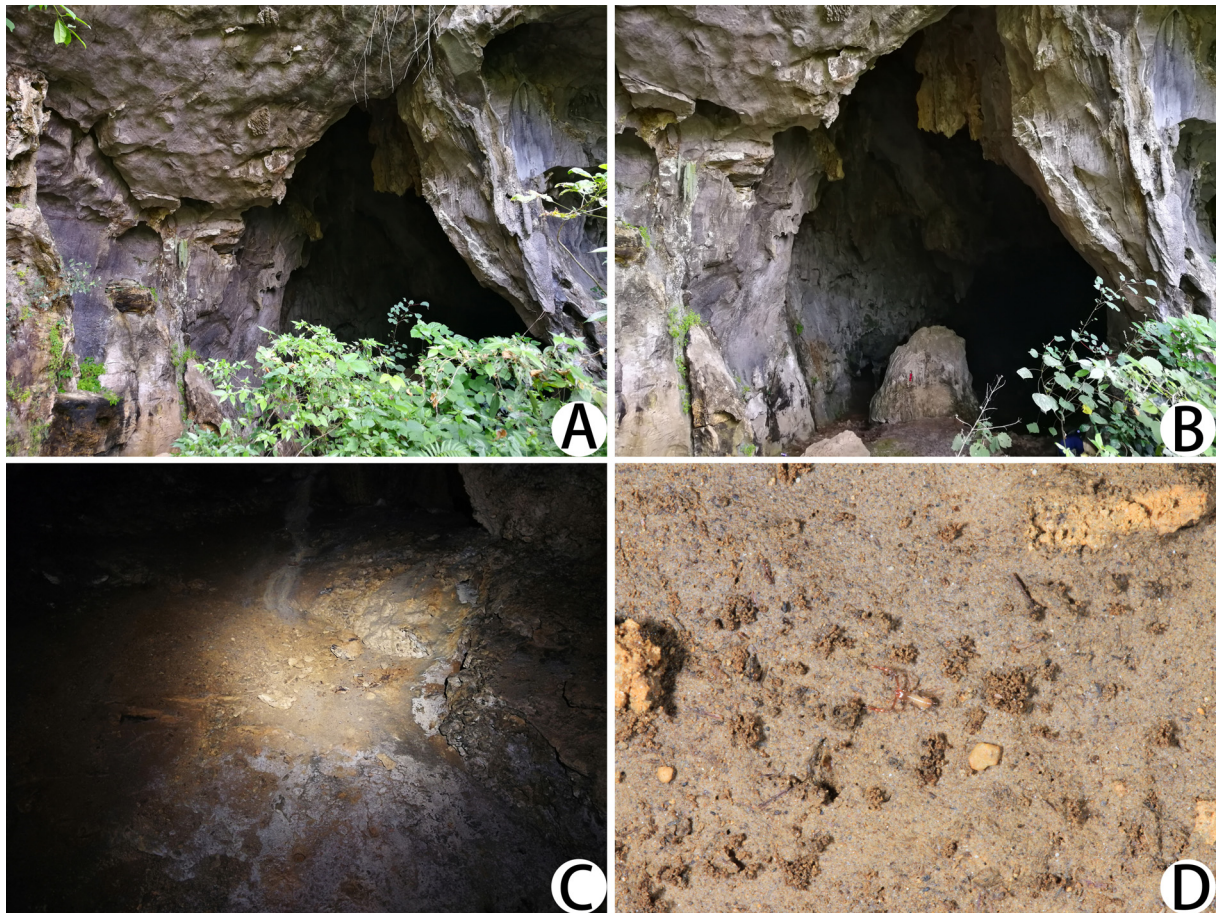
**Dimensions** (length/breadth or, in the case of the legs, length/depth in mm; ratios in parentheses)

**Female**

Body length 1.04. Pedipalps: trochanter 0.14/0.08 (1.75), femur 0.44/0.09 (4.89), patella 0.19/0.09 (2.11), chela 0.63/0.12 (5.25), hand 0.20/0.12 (1.67), movable chelal finger length 0.45. Chelicera 0.33/0.18 (1.83), movable finger length 0.18. Carapace 0.32/0.34 (0.94). Leg I: trochanter 0.09/0.07 (1.29), femur 0.23/0.04 (5.75), patella 0.12/0.04 (3.00), tibia 0.12/0.03 (4.00), tarsus 0.25/0.03 (8.33). Leg IV: trochanter 0.11/0.07 (1.57), femoropatella 0.29/0.12 (2.42), tibia 0.29/0.12 (2.42), basitarsus 0.12/0.04 (3.00), telotarsus 0.24/0.03 (8.00).

**Remarks**

*Tyrannochthonius xianguensis* sp. nov. most closely resembles *T. xinzhaiensis* by the tergites I–II each with four setae, both chelal fingers without intercalary teeth, trichobothrium sb closer to st than b and carapace without eyes or eyespots, but differs in several characters as follows: shorter and thicker



**Fig. 34.** Xianggu Cave, type locality of *Tyrannochthonius xianguensis* sp. nov. **A–B.** Entrance. **C.** Area where the specimen of *T. xianguensis* was collected. **D.** *T. xianguensis*, ♀ (Ps.-MHBU-GX2019100501) in its natural environment.

pedipalpal chela (length 0.63 mm (♀), 5.25 (♀) × as long as broad compared to length 1.61–1.64 mm (♀), 6.42–6.44 (♀) × as long as broad in *T. xinzhaiensis*) and shorter and thicker pedipalpal femur (length 0.44 mm (♀), 4.89 (♀) × as long as broad compared to length 1.14–1.18 mm (♀), 6.71–6.77 (♀) × as long as broad in *T. xinzhaiensis*) and tergites III–IV each with more four setae (vs tergites III–IV each with four setae in *T. xinzhaiensis*) (Li 2022).

### Distribution

Known only from the type locality, Xiangu Cave (Guangxi, China).

### *Tyrannochthonius xiannvyanensis* sp. nov.

urn:lsid:zoobank.org:act:732B6785-C1B6-4F71-B9D1-526839238FCB

Figs 1J, 35–39

### Diagnosis

(♂♀) Moderately sized troglomorphic species with elongated appendages; four eyes, anterior pair of eyes reduced, posterior pair of eyespots; anterior margin of carapace thin, finely denticulated, epistome small, rounded and obtuse; posterior margin of carapace with 2 setae; tergites I–IV each with four setae. Pedipalps slender, femur 6.53–6.80 (♂), 6.75–7.27 (♀) × as long as broad, length 0.98–1.02 (♂), 1.08–1.09 (♀); chela 7.21–7.33 (♂), 6.77–6.91 (♀) × as long as broad, length 1.32–1.37 (♂), 1.45–1.49 (♀); both chelal fingers with intercalary teeth; sb midway between st and b.

### Etymology

Named after the type locality, Xiannvyan Cave.

### Vernacular name

仙女暴伪蝎.

### Type material

#### Holotype

CHINA • ♂; Guangxi, Hechi City, Yizhou District, Qingyuan Town, Yankou Village, Xiannvyan Cave; 24.488011° N, 108.567428° E; 150 m a.s.l.; 4 Oct. 2019; Zegang Feng and Lingchen Zhao leg.; MHBUS, Ps.-MHBUS-GX2019100401.

#### Paratypes

CHINA • 1 ♂, 2 ♀♀; same data as for holotype; MHBUS, Ps.-MHBUS-GX2019100402–04.

### Description

#### Adult male (Figs 35–39)

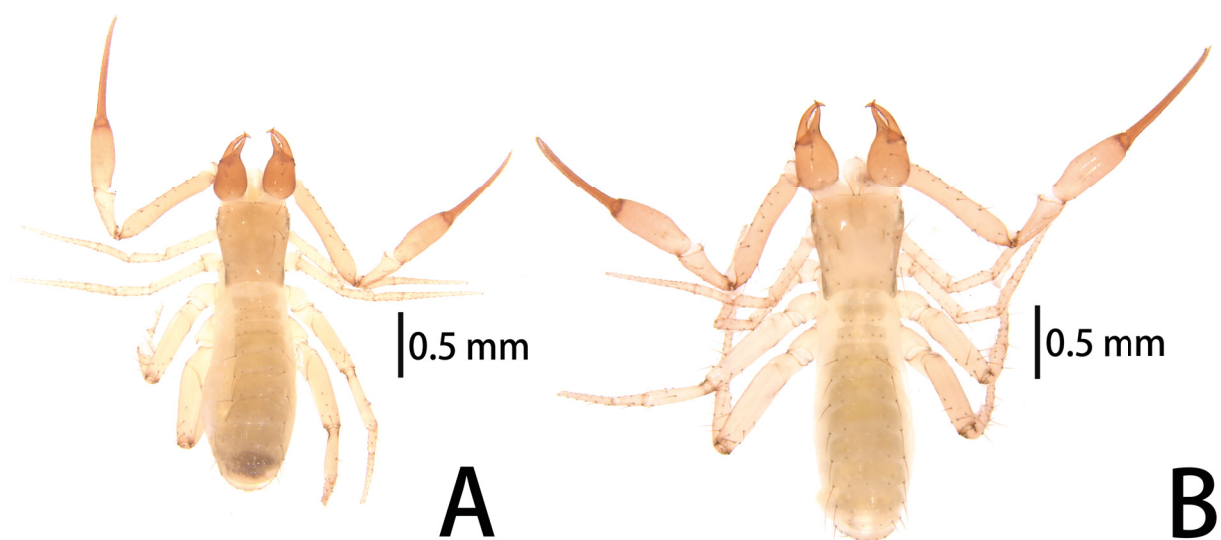
COLOR. Generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.

CEPHALOTHORAX (Figs 36D, 37A). Carapace nearly subquadrate, 1.04 × as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin slightly serrate; epistome small, rounded and obtuse; four eyes, anterior pair of eyes reduced, posterior pair of eyespots; with 18 setae arranged s4s: 4: 4: 2: 2, most setae acuminate, sturdy, long and gently curved, anterolateral setae much shorter than others; with three pairs of lyrifissures, first and second pair situated middle and flank to the setae of ocular row, third pair situated lateral to sole pair of setae of posterior row. Manducatory process with two acuminate distal setae,

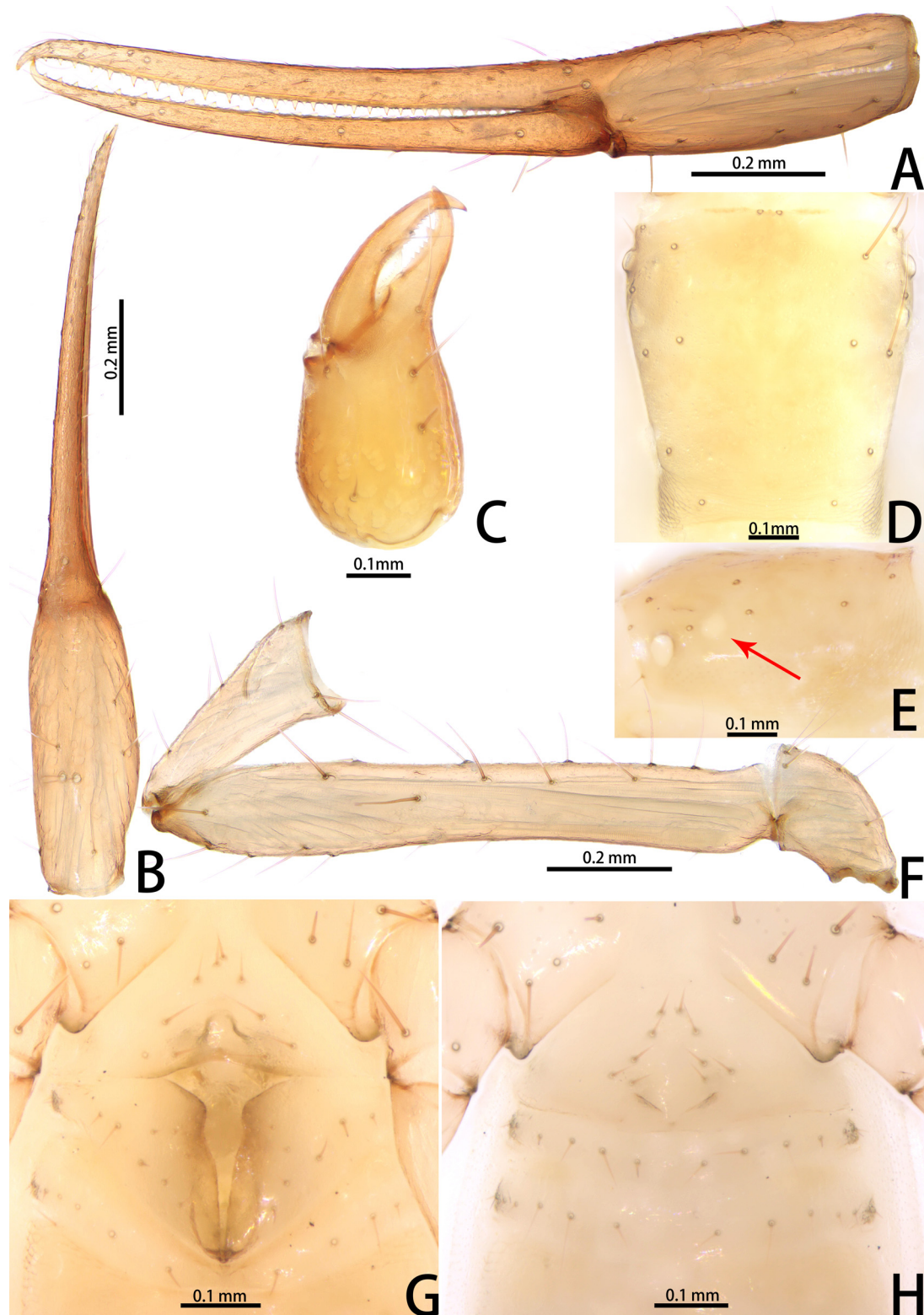
anterior seta more than  $\frac{1}{2}$  as long as medial seta; apex of coxa I with a rounded anteromedial process; coxae II with 12 terminally indented coxal spines on each side, set as an oblique and arched row, central spines slightly longer than others (Fig. 37D); intercoxal tubercle absent; chaetotaxy of coxae: P 3, I 3, II 4, III 5, IV 5.

**CHELICERA** (Figs 36C, 37B). Almost as long as carapace,  $1.79\text{--}1.86 \times$  as long as broad; five setae and two lyrifissures (exterior condylar lyrifissure and exterior lyrifissure) present on hand, all setae acuminate, ventrobasal setae shorter than others; movable finger with one medial seta. Cheliceral hand with moderate wrinkle on both ventral and dorsal sides. Both fingers well provided with teeth, fixed finger with 9–12 teeth, distal one largest; movable finger with 10–15 contiguous small teeth; galea completely vestigial (Fig. 36C). Serrula exterior with 20–22 and serrula interior with 12–13 blades. Rallum with eight blades, distal one longest, with fine barbules and slightly set apart from other blades, latter tightly grouped and with long pinnae, some of which subdivided (Fig. 37C).

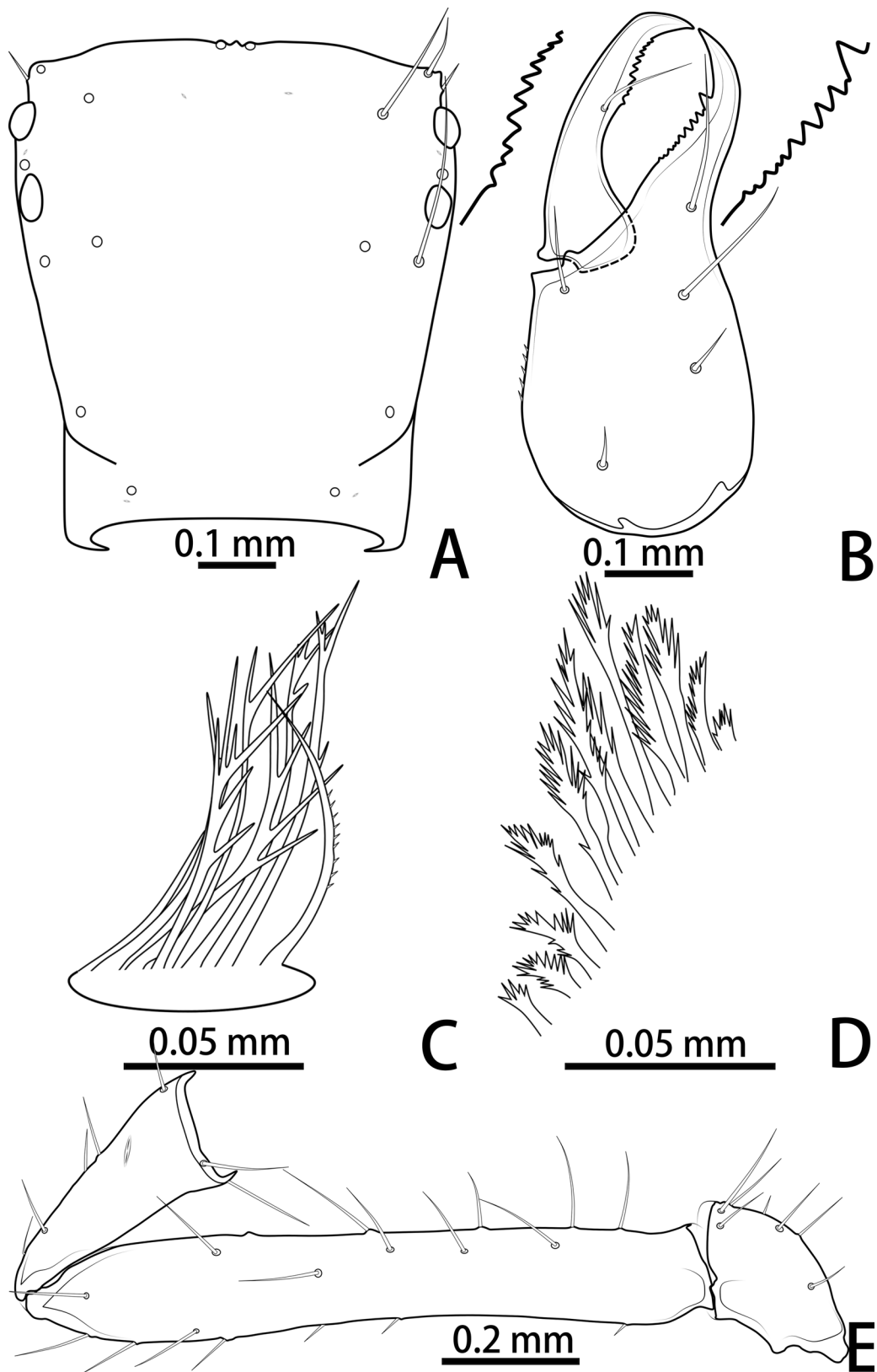
**PEDIPALP** (Figs 36A–B, F, 37E, 38A–B). Trochanter 1.63–1.81, femur 6.53–6.80, patella 2.29–2.69, chela 7.21–7.33, hand  $2.50\text{--}2.68 \times$  as long as broad; femur  $2.37\text{--}2.51 \times$  as long as patella; movable chelal finger  $1.71\text{--}1.93 \times$  as long as hand and  $0.64\text{--}0.65 \times$  as long as chela. Setae generally long and acuminate. Chelal hand not constricted towards fingers, apodeme complex of movable chelal finger slightly sclerotized. Fixed chelal finger and hand with eight trichobothria, movable chelal finger with four trichobothria, ib and isb situated close together, submedially on dorsum of chelal hand; eb, esb and ist at base of fixed chelal finger; esb slightly distal eb and ist slightly distal to esb; it slightly distal to est, situated subdistally; et slightly near to tip of fixed chelal finger, slightly close to chelal teeth; dx situated distal to et; sb midway between st and b; b and t situated subdistally, it slightly distal to t and t distal to est; est slightly distal to b (Figs 36A, 38A). Microsetae (chemosensory setae) present on dorsum of chelal hand (Figs 36B, 38B). Both chelal fingers with row of teeth, spaced regularly along margin, teeth smaller distally and proximally: fixed finger with 30–34 well-spaced, slightly retrorse and pointed teeth and 25–26 intercalary microdenticles; movable finger with 20–24 almost contiguous, slightly retrorse and pointed teeth, plus 9–14 intercalary microdenticles and 6–10 vestigial, rounded and contiguous basal teeth.



**Fig. 35.** *Tyrannochthonius xiannvyanensis* sp. nov. **A.** Holotype, ♂ (Ps.-MHBU-GX2019100401), dorsal view. **B.** Paratype, ♀ (Ps.-MHBU-GX2019100403), dorsal view.



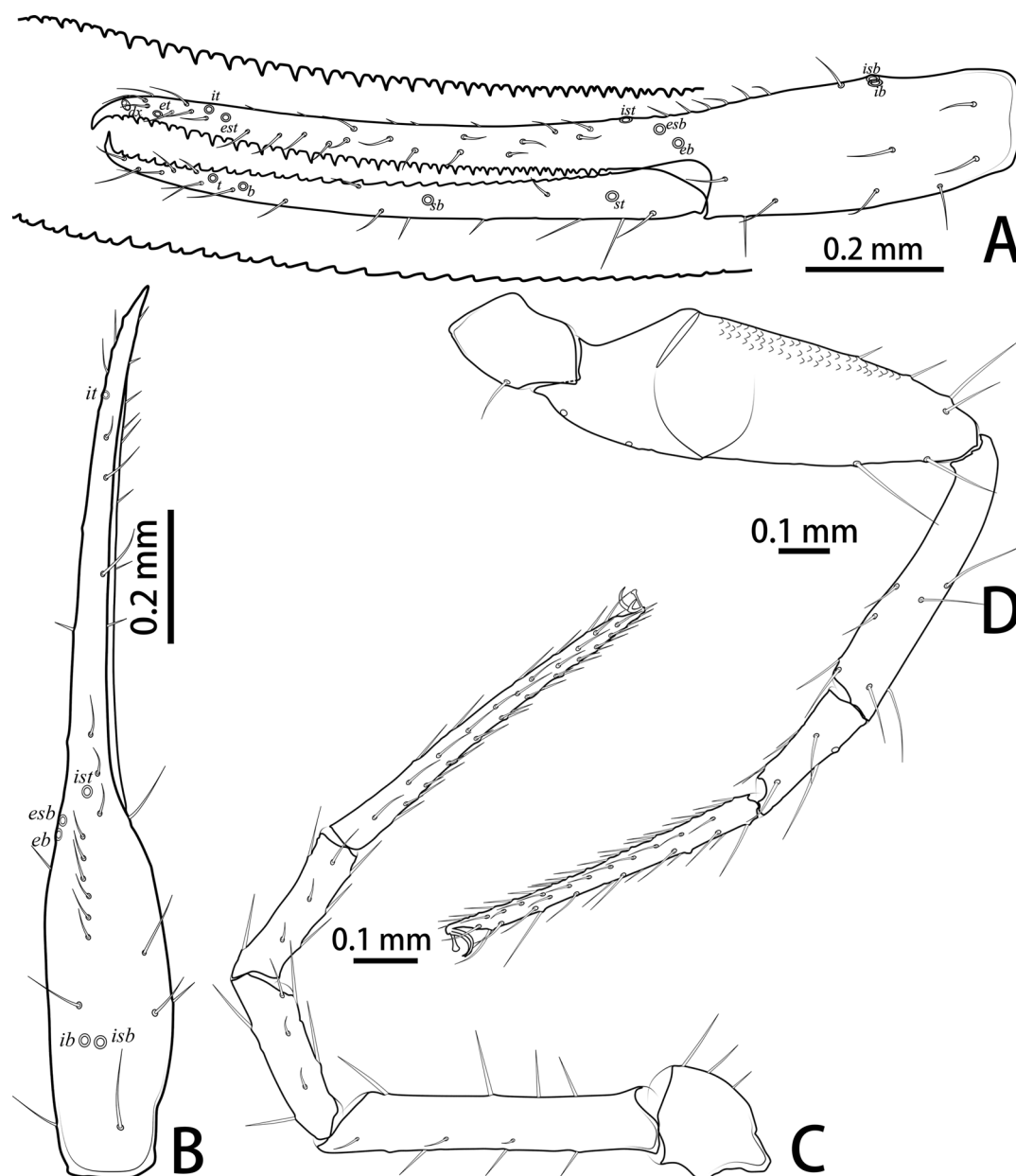
**Fig. 36.** *Tyrannochthonius xiannvyanensis* sp. nov. A–F. Holotype, ♂ (Ps.-MHBU-GX2019100401). G. Paratype, ♀ (Ps.-MHBU-GX2019100403). A. Left chela, lateral view. B. Left chela, dorsal view. C. Left chelicera, dorsal view. D. Carapace, dorsal view. E. Carapace, dorsolateral view, indicate eyespot (red arrow). F. Left pedipalp (minus chela), dorsal view. G. Male genital area, ventral view. H. Female genital area, ventral view.



**Fig. 37.** *Tyrannochthonius xiannvyanensis* sp. nov., holotype, ♂ (Ps.-MHBG-GX2019100401). **A.** Carapace, dorsal view. **B.** Left chelicera, dorsal view, with details of teeth. **C.** Rallum. **D.** Coxal spines on coxae II, ventral view. **E.** Left pedipalp (minus chela), dorsal view.

OPISTHOSOMA. Generally typical, pleural membrane finely granulated. All tergites and sternites undivided; setae uniseriate and acuminate. Tergal chaetotaxy I–XII: 4:4:4:4:4:4:4:5:5:6:5:6:4–6:T2T:0. Sternal chaetotaxy IV–XII: 12:8–10:6–8:6–8:7–9:9:9:-:2. Genital region: sternite II with 9–10 setae scattered on median area, genital opening slit-like, sternite III with row of 14–16 setae (Fig. 36G).

LEGS (Fig. 38C–D). Fine granulation present on anterodorsal faces of femur IV and patella IV. Leg I: femur  $1.93\text{--}2.00 \times$  as long as patella; tarsus  $2.25\text{--}2.32 \times$  as long as tibia. Leg IV: femoropatella  $2.79\text{--}2.90 \times$  as long as deep; tibia  $5.27\text{--}5.36 \times$  as long as deep; with basal tactile setae on both tarsal segments: basitarsus  $2.67\text{--}2.78 \times$  as long as deep (TS = 0.24–0.33), telotarsus  $10.83\text{--}13.00 \times$  as long as deep and  $2.60\text{--}2.71 \times$  as long as basitarsus (TS = 0.18–0.23). Setae of leg I (trochanter to tibia) 3: 10–11: 7–8:

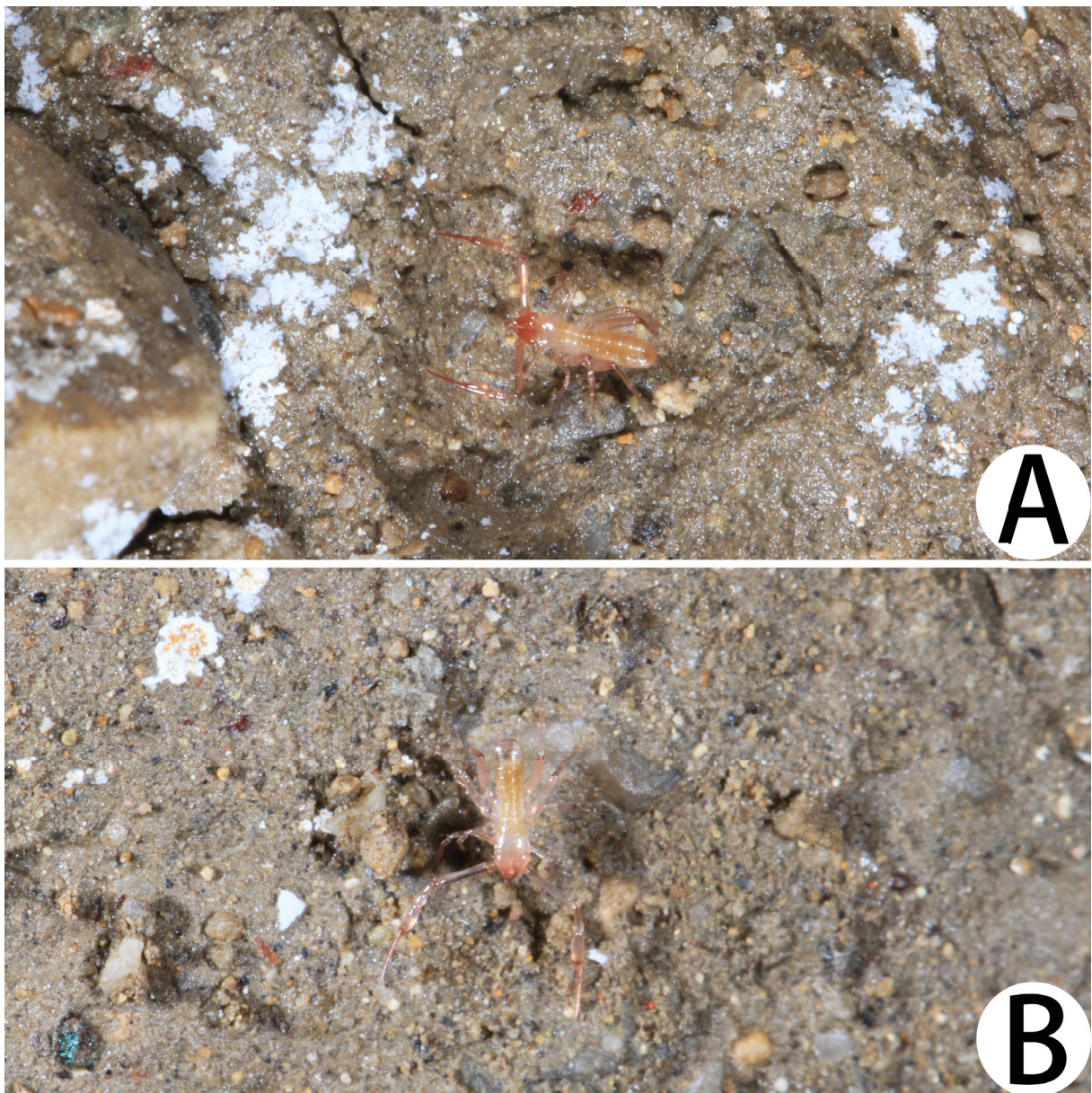


**Fig. 38.** *Tyrannochthonius xiannvyanensis* sp. nov., holotype ♂ (Ps.-MHBG-GX2019100401). **A.** Left chela, lateral view, with details of teeth and trichobothrial pattern. **B.** Left chela, dorsal view. **C.** Leg I, lateral view. **D.** Leg IV, lateral view. Abbreviations: see Material and methods.

8–10, setae of leg IV (trochanter to basitarsus) 1–2: 3: 6: 8–9: 8–9. Arolium not divided, slightly shorter than simple claws.

**Adult females** (paratypes; Figs 35B, 36H)

Mostly same as males; tergal chaetotaxy I–XII: 4:4:4:4:4:4:4:5:6:4:T2T:0; sternal chaetotaxy IV–XII: 10–12:10–11:6–8:8–9:9–10:9–10:9:–:2. Genital region: sternite II with 10 setae scattered on median area, sternite III with row of 12 setae.



**Fig. 39.** Xiannvyan Cave, type locality of *Tyrannochthonius xiannvyanensis* sp. nov. A–B. *T. xiannvyanensis* in its natural environment.

**Dimensions** (length/breadth or, in the case of the legs, length/depth in mm; ratios in parentheses)

**Males**

Body length 1.85–2.13. Pedipalps: trochanter 0.26–0.29/0.16 (1.63–1.81), femur 0.98–1.02/0.15 (6.53–6.80), patella 0.39–0.43/0.16–0.17 (2.29–2.69), chela 1.32–1.37/0.18–0.19 (7.21–7.33), hand 0.45–0.51/0.18–0.19 (2.50–2.68), movable chelal finger length 0.87. Chelicera 0.52–0.54/0.29 (1.79–1.86), movable finger length 0.30. Carapace 0.58–0.59/0.56–0.57 (1.04). Leg I: trochanter 0.18–0.21/0.14–0.15 (1.29–1.40), femur 0.52–0.56/0.09 (5.78–6.22), patella 0.26–0.29/0.07–0.08 (3.63–3.71), tibia 0.25–0.28/0.06 (4.17–4.67), tarsus 0.58–0.63/0.05–0.06 (10.50–11.60). Leg IV: trochanter 0.26–0.27/0.16–0.18 (1.44–1.69), femoropatella 0.81–0.90/0.29–0.31 (2.79–2.90), tibia 0.58–0.59/0.11 (5.27–5.36), basitarsus 0.24–0.25/0.09 (2.67–2.78), telotarsus 0.65/0.05–0.06 (10.83–13.00).

**Females**

Body length 1.90–2.26. Pedipalps: trochanter 0.29–0.32/0.17 (1.71–1.88), femur 1.08–1.09/0.15–0.16 (6.75–7.27), patella 0.43–0.45/0.18–0.19 (2.37–2.39), chela 1.45–1.49/0.21–0.22 (6.77–6.91), hand 0.53–0.59/0.21–0.22 (2.52–2.68), movable chelal finger length 0.92–0.94. Chelicera 0.59–0.61/0.30–0.32 (1.84–2.03), movable finger length 0.30–0.31. Carapace 0.63–0.64/0.60–0.61 (1.03–1.07). Leg I: trochanter 0.21–0.22/0.16 (1.32–1.38), femur 0.55–0.56/0.10 (5.50–5.60), patella 0.28–0.29/0.08 (3.50–3.63), tibia 0.28–0.29/0.07 (4.00–4.14), tarsus 0.63–0.65/0.06 (10.50–10.83). Leg IV: trochanter 0.27–0.28/0.17–0.18 (1.5–1.65), femoropatella 0.90–0.92/0.30–0.31 (2.96–3.00), tibia 0.53–0.60/0.10–0.12 (5.00–5.30), basitarsus 0.27/0.09 (3.00), telotarsus 0.67–0.68/0.05–0.06 (11.33–13.40).

**Remarks**

*Tyrannochthonius xiannvyanensis* sp. nov. most closely resembles *T. fenghuangensis* sp. nov. in the position of trichobothrium sb (sb midway between st and b), the shape of epistome (small, rounded and obtuse) and carapace with four eyes, anterior pair of eyes reduced, posterior pair of eyespots, but differs in several characters as follows: longer and thinner pedipalpal chela (length 1.32–1.37 mm (♂), 1.45–1.49 mm (♀), 7.21–7.33 (♂), 6.77–6.91 (♀) × as long as broad compared to length 0.79 mm (♂), 0.82–0.83 mm (♀), 6.08 (♂), 5.13–5.19 (♀) × as long as broad in *T. fenghuangensis*) and longer and thinner pedipalpal femur (length 0.98–1.02 mm (♂), 1.08–1.09 (♀), 6.53–6.80 (♂), 6.75–7.27 (♀) × as long as broad compared to length 0.54 mm (♂), 0.55–0.58 mm (♀), 5.40 (♂), 4.83–5.50 (♀) × as long as broad in *T. fenghuangensis*).

**Distribution**

Known only from the type locality, Xiannvyan Cave (Guangxi, China).

*Tyrannochthonius xiaoi* sp. nov.

urn:lsid:zoobank.org:act:DECB1715-F328-41F5-971E-22E85EF9BF78

Figs 1A, 40–44

**Diagnosis**

(♂♀) Moderately sized troglomorphic species with elongated appendages; four eyes, anterior pair of eyes reduced, posterior pair of eyespots; anterior margin of carapace thin, finely denticulated, epistome small, triangular; posterior margin of carapace with 2 setae; tergites I–IV each with four setae. Pedipalps slender, femur 4.54–4.75 (♂), 4.57–4.92 (♀) × as long as broad, length 0.56–0.59 (♂), 0.64 (♀); chela 5.23–5.67 (♂), 5.00–5.28 (♀) × as long as broad, length 0.84–0.89 (♂), 0.95 (♀); both chelal fingers with intercalary teeth; sb closer to st than b.

### Etymology

This species is named after Jiewen Xiao, who participated in field work and collected some of the specimens.

### Vernacular name

肖氏暴伪蝎.

### Type material

#### Holotype

CHINA • ♂; Guangxi, Guilin City, Xing'an County, cave without name (Unnamed Cave 1); 25.581534° N, 110.62378374° E; 229 m a.s.l.; 30 Nov. 2023; Jiewen Xiao leg.; MHBUS, Ps.-MHBUS-GX2023113002.

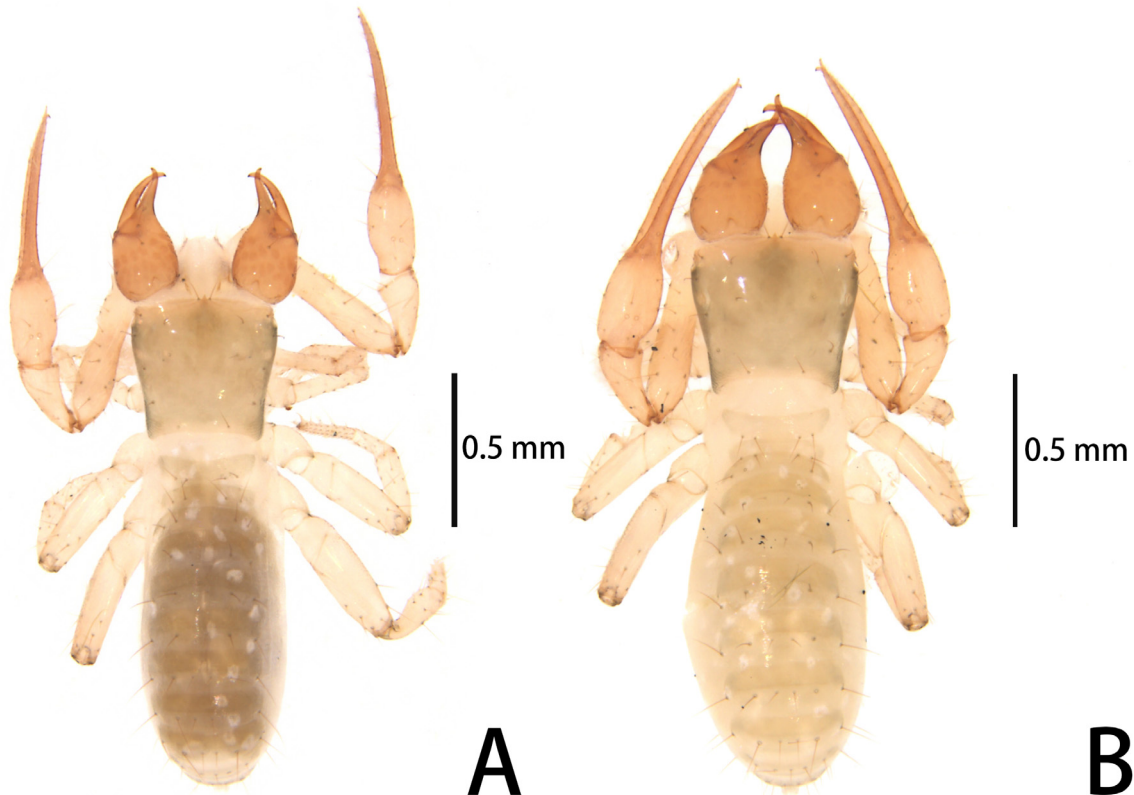
#### Paratypes

CHINA • 1 ♂, 2 ♀♀; same data as for holotype; MHBUS, Ps.-MHBUS-GX2023113003–05.

### Description

#### Adult males (Figs 40–44)

COLOR. Generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.



**Fig. 40.** *Tyrannochthonius xiaoi* sp. nov. **A.** Holotype, ♂ (Ps.-MHBUS-GX2023113002), dorsal view. **B.** Paratype, ♀ (Ps.-MHBUS-GX2023113004), dorsal view.

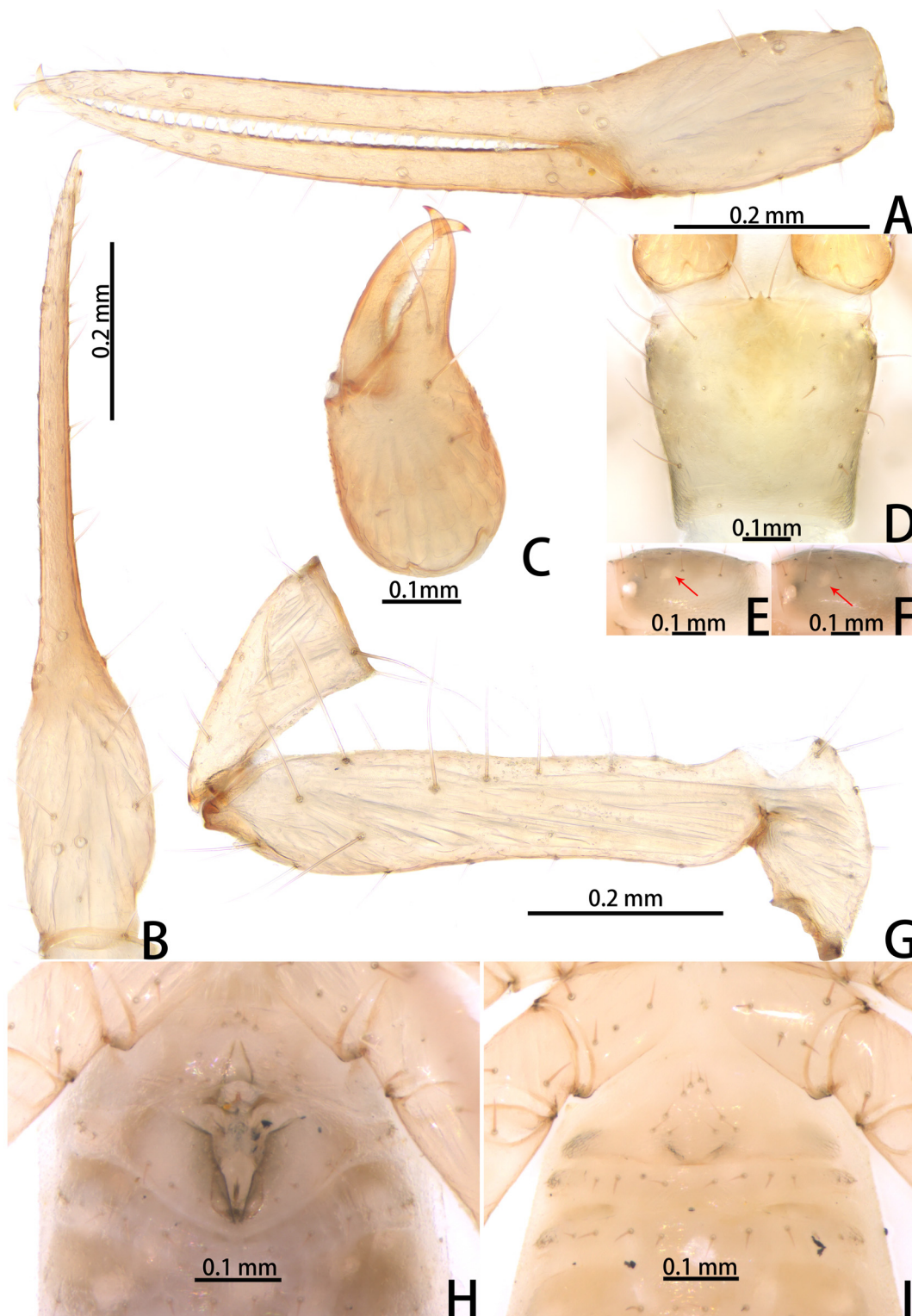
**CEPHALOTHORAX** (Figs 41D, 42A). Carapace nearly subquadrate,  $0.89\text{--}0.90 \times$  as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin slightly serrate; epistome small, triangular; four eyes, anterior pair of eyes reduced, posterior pair of eyespots; with 18 setae arranged s4s: 4: 4: 2: 2, most setae acuminate, sturdy, long and gently curved, anterolateral setae much shorter than others; with three pairs of lyrifissures, first and second pair situated middle and flank to setae of ocular row, third pair situated lateral to sole pair of setae of posterior row. Manducatory process with two acuminate distal setae, anterior seta less than  $\frac{1}{2}$  as long as medial seta; apex of coxa I with rounded anteromedial process; coxae II with 9–10 terminally indented coxal spines on each side, set as oblique and arched row, central spines slightly longer than others (Fig. 42D); intercoxal tubercle absent; chaetotaxy of coxae: P 3, I 3, II 4, III 5, IV 5.

**CHELICERA** (Figs 41C, 42B). Almost as long as carapace,  $1.75\text{--}1.83 \times$  as long as broad; five setae and two lyrifissures (exterior condylar lyrifissure and exterior lyrifissure) present on hand, all setae acuminate, ventrobasal setae shorter than others; movable finger with one medial seta. Cheliceral hand with moderate wrinkle on both ventral and dorsal sides. Both fingers well provided with teeth, fixed finger with 12–13 teeth, distal one largest; movable finger with 12 contiguous small teeth; galea completely vestigial (Fig. 41C). Serrula exterior with 18–19 and serrula interior with 12–14 blades. Rallum with eight blades, distal one longest, with fine barbules and slightly set apart from other blades, latter tightly grouped and with long pinnae, some of which subdivided (Fig. 42C).

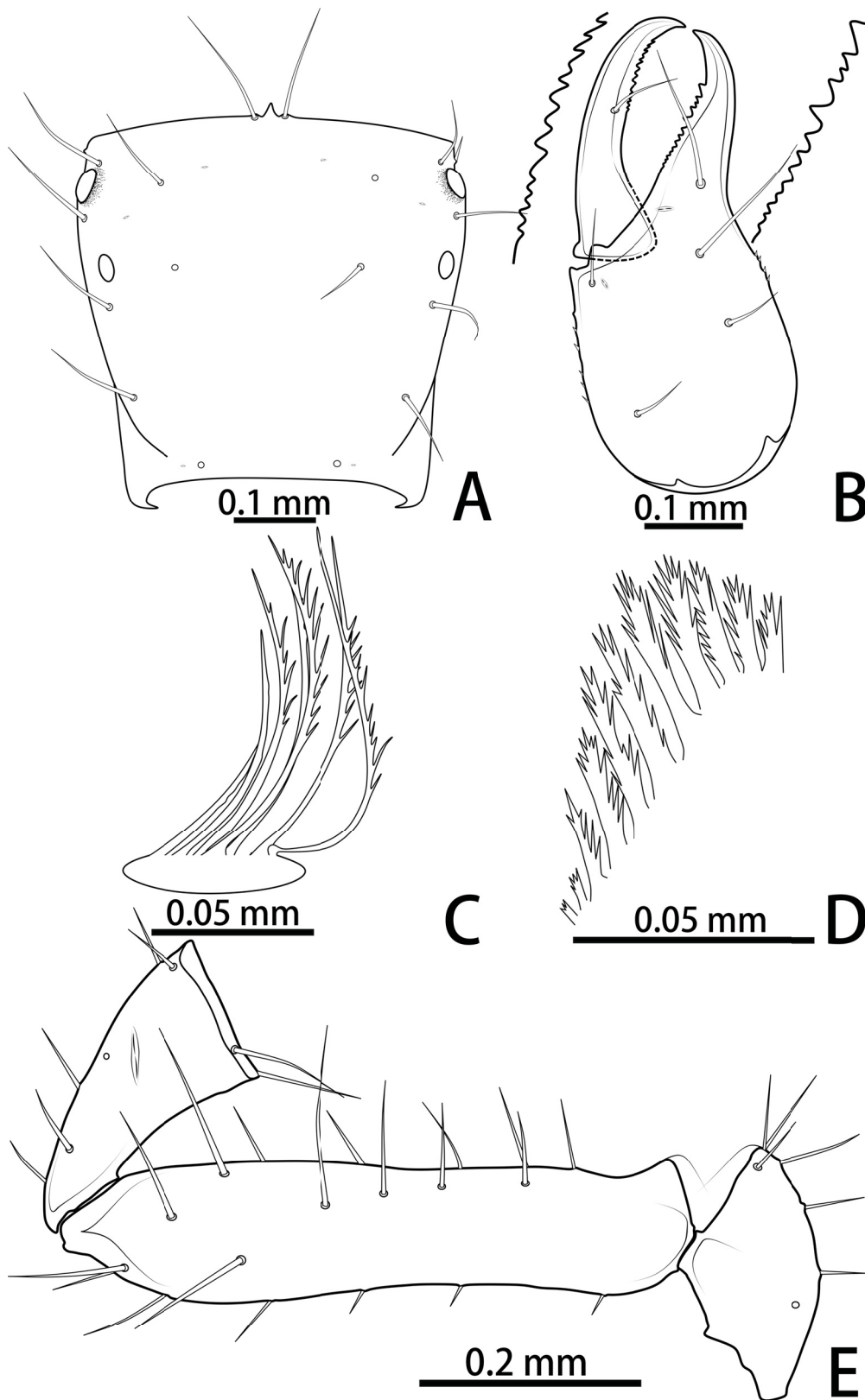
**PEDIPALP** (Figs 41A–B, G, 42E, 43A–B). Trochanter  $1.67\text{--}1.93$ , femur  $4.54\text{--}4.75$ , patella  $2.00\text{--}2.23$ , chela  $5.23\text{--}5.67$ , hand  $1.65\text{--}1.73 \times$  as long as broad; femur  $1.93\text{--}2.11 \times$  as long as patella; movable chelal finger  $2.21\text{--}2.31 \times$  as long as hand and  $0.70\text{--}0.71 \times$  as long as chela. Setae generally long and acuminate. Chelal hand not constricted towards fingers, apodeme complex of movable chelal finger slightly sclerotized. Fixed chelal finger and hand with eight trichobothria, movable chelal finger with four trichobothria, ib and isb situated close together, submedially on dorsum of chelal hand; eb, esb and ist at base of fixed chelal finger; esb slightly distal eb and ist slightly distal to esb; it slightly distal to est, situated subdistally; et slightly near to tip of fixed chelal finger, slightly close to chelal teeth; dx situated distal to et; sb closer to st than b; b and t situated subdistally, it slightly distal to t; est situated at same level as t, and distal to b (Figs 41A, 43A). Microsetae (chemosensory setae) present on dorsum of chelal hand (Figs 41B, 43B). Both chelal fingers with a row of teeth, spaced regularly along margin, teeth smaller distally and proximally: fixed finger with 24 well-spaced, slightly retrorse and pointed teeth and 17–22 intercalary microdenticles; movable finger with 10–13 almost contiguous, slightly retrorse and pointed teeth, plus 9–11 intercalary microdenticles and 9–13 vestigial, rounded and contiguous basal teeth.

**OPISTHOSOMA**. Generally typical, pleural membrane finely granulated. All tergites and sternites undivided; setae uniseriate and acuminate. Tergal chaetotaxy I–XII: 4: 4: 4: 4–5: 4–5: 4–6: 6: 6: 6: 5: T2T: 0. Sternal chaetotaxy IV–XII: 12–15: 9–10: 9–10: 9–14: 9–12: 9–13: 9: -: 2. Genital region: sternite II with 7–10 setae scattered on median area, genital opening slit-like, sternite III with row of 16–18 setae (Fig. 41H).

**LEGS** (Fig. 43C–D). Fine granulation present on anterodorsal faces of femur IV and patella IV. Leg I: femur  $1.56\text{--}2.00 \times$  as long as patella; tarsus  $1.83\text{--}2.00 \times$  as long as tibia. Leg IV: femoropatella  $2.35\text{--}3.13 \times$  as long as deep; tibia  $2.85\text{--}4.00 \times$  as long as deep; with basal tactile setae on both tarsal segments: basitarsus  $2.14\text{--}2.67 \times$  as long as deep (TS =  $0.33\text{--}0.38$ ), telotarsus  $8.03\text{--}8.75 \times$  as long as deep and  $2.06\text{--}2.27 \times$  as long as basitarsus (TS =  $0.23\text{--}0.27$ ). Setae of leg I (trochanter to tibia) 3–4: 9–10: 7–10: 9–12, setae of leg IV (trochanter to basitarsus) 1–3: 3: 5–6: 8: 8–9. Arolium not divided, slightly shorter than simple claws.



**Fig. 41.** *Tyrannochthonius xiaoi* sp. nov. **A–E, G–H.** Holotype, ♂ (Ps.-MHBU-GX2023113002). **F, I–J.** Paratype, ♀ (Ps.-MHBU-GX2023113004). **A.** Left chela, lateral view. **B.** Left chela, dorsal view. **C.** Left chelicera, dorsal view. **D.** Carapace, dorsal view. **E.** Carapace, dorsolateral view, indicate eyespot (red arrow). **F.** Carapace (dorsolateral view), indicate eyespot (red arrow). **G.** Left pedipalp (minus chela), dorsal view. **H.** Male genital area, ventral view. **I.** Female genital area, ventral view.



**Fig. 42.** *Tyrannochthonius xiaoi* sp. nov., holotype, ♂ (Ps.-MHBG-GX2023113002). **A.** Carapace, dorsal view. **B.** Left chelicera, dorsal view, with details of teeth. **C.** Rallum. **D.** Coxal spines on coxae II, ventral view. **E.** Left pedipalp (minus chela), dorsal view.

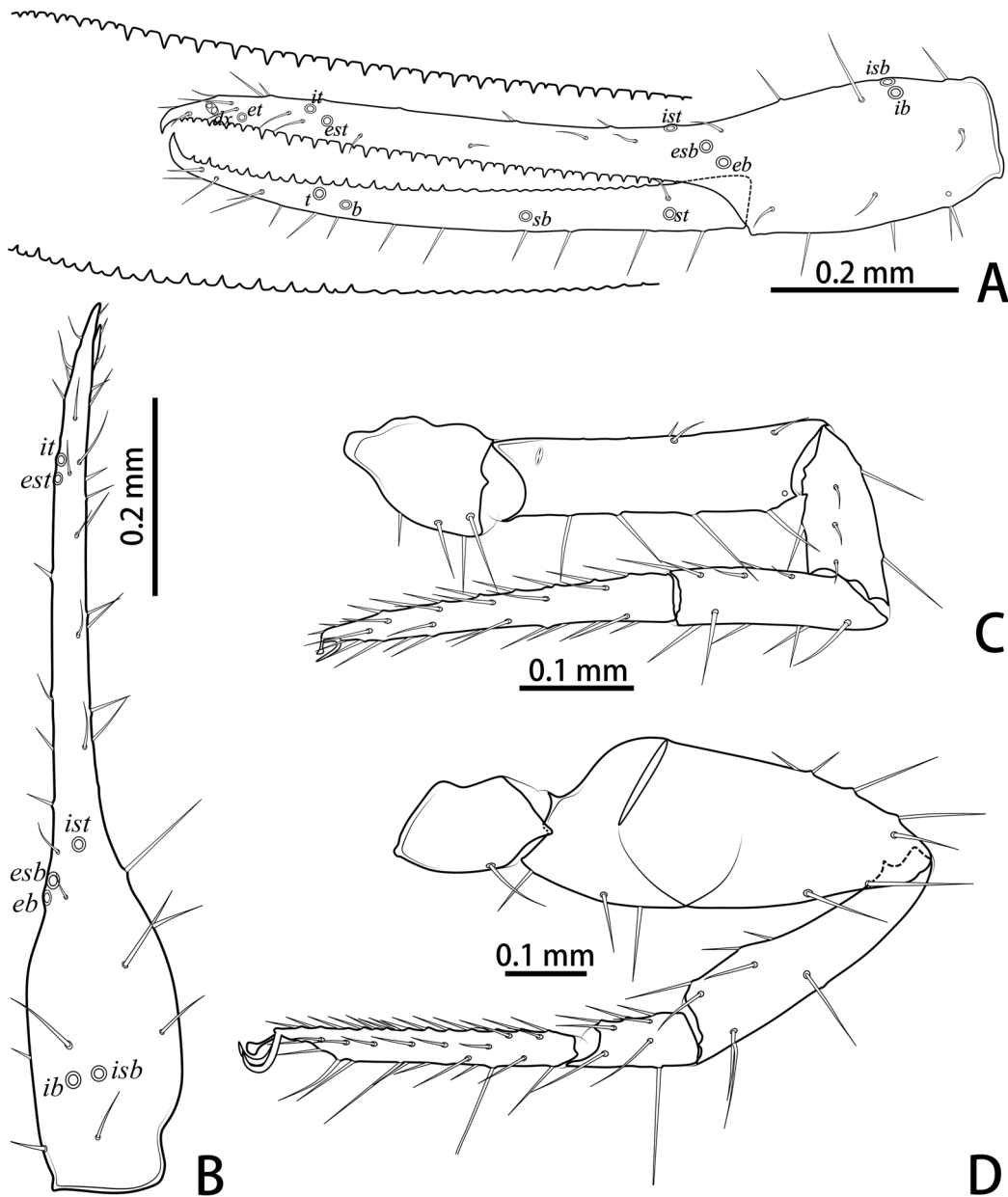
**Adult females** (paratypes; Figs 40B, 41F, I)

Mostly same as males; tergal chaetotaxy I–XII: 4:4:4:5–6:6:6:6:6:6:5:T2T:0; sternal chaetotaxy IV–XII: 14:11:11:13:14:13:9:-:2. Genital region: sternite II with 10 setae scattered on median area, sternite III with row of 12 setae.

**Dimensions** (length/breadth or, in the case of the legs, length/depth in mm; ratios in parentheses)

**Males**

Body length 1.30–1.66. Pedipalps: trochanter 0.20–0.22/0.11–0.12 (1.67–1.93), femur 0.56–0.59/0.12–0.13 (4.54–4.75), patella 0.28–0.29/0.13–0.14 (2.00–2.23), chela 0.84–0.89/0.15–0.17 (5.23–5.67), hand



**Fig. 43.** *Tyrannochthonius xiaoi* sp. nov., holotype, ♂ (Ps.-MHBU-GX2023113002). **A.** Left chela, lateral view, with details of teeth and trichobothrial pattern. **B.** Left chela, dorsal view. **C.** Leg I, lateral view. **D.** Leg IV, lateral view. Abbreviations: see Material and methods.

0.26–0.28/0.15–0.17 (1.65–1.73), movable chelal finger length 0.59–0.62. Chelicera 0.41–0.44/0.23–0.24 (1.75–1.83), movable finger length 0.24–0.26. Carapace 0.41–0.50/0.46–0.48 (0.89–0.90). Leg I: trochanter 0.13–0.15/0.08–0.09 (1.42–1.87), femur 0.28–0.31/0.05–0.07 (4.29–5.43), patella 0.12–0.18/0.05–0.06 (2.50–3.60), tibia 0.13–0.18/0.04–0.06 (2.82–4.25), tarsus 0.33–0.35/0.04 (8.25–9.03). Leg IV: trochanter 0.15–0.19/0.11–0.12 (1.30–1.64), femoropatella 0.45–0.55/0.15–0.20 (2.35–3.13), tibia 0.25–0.36/0.09 (2.85–4.00), basitarsus 0.12–0.16/0.05–0.07 (2.14–2.67), telotarsus 0.31–0.35/0.04 (8.03–8.75).

### Females

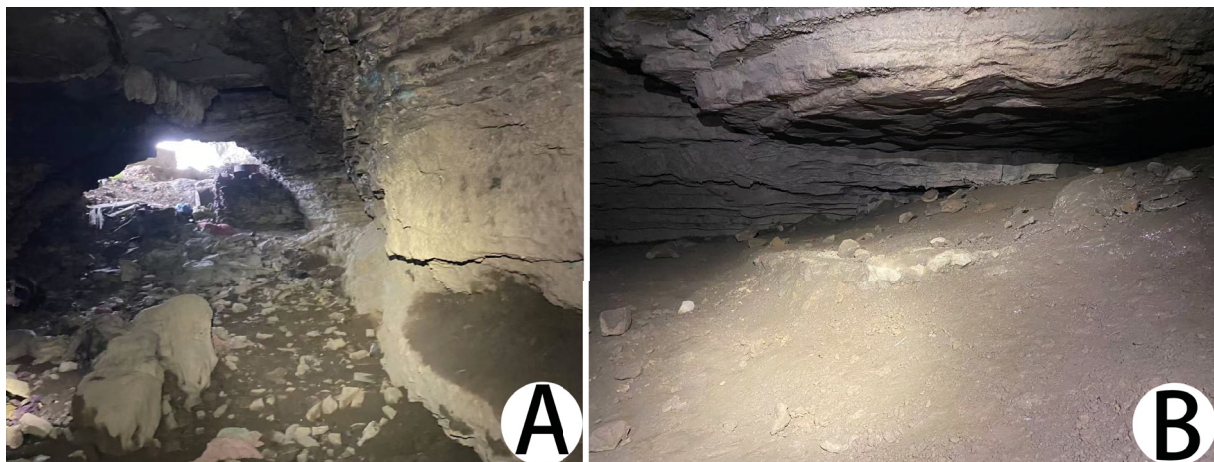
Body length 1.53–1.80. Pedipalps: trochanter 0.23–0.24/0.13 (1.77–1.91), femur 0.64/0.13–0.14 (4.57–4.92), patella 0.25–0.32/0.12–0.15 (2.07–2.13), chela 0.95/0.18–0.19 (5.00–5.28), hand 0.31/0.18–0.19 (1.63–1.72), movable chelal finger length 0.65–0.66. Chelicera 0.48–0.49/0.27 (1.78–1.81), movable finger length 0.29. Carapace 0.47/0.54–0.56 (0.84–0.87). Leg I: trochanter 0.14–0.15/0.10–0.12 (1.25–1.41), femur 0.33–0.35/0.06–0.07 (5.00–5.39), patella 0.15–0.18/0.06 (2.36–3.00), tibia 0.20/0.05 (3.76–4.00), tarsus 0.36–0.37/0.04–0.05 (7.40–9.53). Leg IV: trochanter 0.18–0.20/0.13–0.15 (1.33–1.38), femoropatella 0.53–0.55/0.12–0.19 (2.89–4.41), tibia 0.32–0.36/0.08–0.09 (4.00–4.15), basitarsus 0.15–0.17/0.06–0.06 (2.50–2.86), telotarsus 0.33–0.38/0.04 (8.25–9.67).

### Remarks

*Tyrannochthonius xiaoi* sp. nov. differs from all other hypogean species of the genus from China except *T. duo*, *T. fenghuangensis* sp. nov. and *T. xiannvyanensis* sp. nov. by the four eyes, anterior pair of eyes reduced, posterior pair of eyespots. It differs from *T. duo*, *T. fenghuangensis* and *T. xiannvyanensis* by its shorter and thicker pedipalpal chela (length 0.84–0.89 mm (♂), 0.56–0.59 mm (♀), 5.23–5.67 (♂), 4.54–4.75 (♀) × as long as broad compared to length 1.11 mm (♂), 1.17–1.18 mm (♀), 6.94 (♂), 5.85–6.56 (♀) × as long as broad in *T. duo*, and 1.32–1.37 mm (♂), 1.45–1.49 mm (♀), 7.21–7.33 (♂), 6.77–6.91 (♀) × as long as broad in *T. xiannvyanensis*), the shape of epistome (epistome small, triangular compared to epistome small, rounded and obtuse in *T. fenghuangensis* and *T. xiannvyanensis*) and the position of trichobothrium (sb closer to st than b compared to sb midway between st and b in *T. fenghuangensis* and *T. xiannvyanensis* and sb closer to b than to st in *T. duo*) (Hou *et al.* 2023b).

### Ecology

These specimens were collected under mud inside the cave (Fig. 44).



**Fig. 44.** Unnamed Cave 1, type locality of *Tyrannochthonius xiaoi* sp. nov. **A.** Inside the cave entrance. **B.** Areas where specimens of *T. xiaoi* were collected.

### Distribution

Known only from the type locality, Unnamed Cave 1 (Guangxi, China).

*Tyrannochthonius yanwuensis* Sun, Guo & Zhang, 2025

Fig. 1E

*Tyrannochthonius yanwuensis* Sun, Guo & Zhang, 2025: 127–131, figs 9–11.

### Diagnosis and description

For details see Sun *et al.* (2025).

### Vernacular name

岩屋暴伪蝎.

### Material examined

#### Holotype

CHINA • ♂; Guangxi, Baise City, Leye County, Yanwu Cave; 24.823900° N, 106.431500° E; 695 m a.s.l.; 28 Apr. 2024; Sunbin Huang, Mingzhi Zhao, Yan Li and Rong Chen leg.; MHBUS, Ps.-MHBUS-GX2024042801.

### Distribution

Yanwu Cave (Guangxi, China).

#### *Tyrannochthonius yilingyanensis* sp. nov.

urn:lsid:zoobank.org:act:D3D473B6-ED3C-4AA5-8FFE-5F3D0773CDFB

Figs 45–49

### Diagnosis

(♂♀) Moderately sized troglomorphic species with elongated appendages; four eyes, anterior pair of eyes reduced, posterior pair of eyespots; anterior margin of carapace thin, finely denticulated, epistome small, triangular; posterior margin of carapace with 2 setae; tergites I–IV each with four setae. Pedipalps slender, femur 4.54–4.75 (♂), 4.57–4.92 (♀) × as long as broad, length 0.56–0.59 (♂), 0.64 (♀); chela 5.23–5.67 (♂), 5.00–5.28 (♀) × as long as broad, length 0.84–0.89 (♂), 0.95 (♀); both chelal fingers with intercalary teeth; sb closer to st than b.

### Etymology

Named after the type locality, Yilingyan Cave.

### Vernacular name

伊岭岩暴伪蝎.

### Type material

#### Holotype

CHINA • ♂; Guangxi, Nanning City, Wuming District, Yilingyan Cave; 23.041315° N, 108.294759° E; 96 m a.s.l.; 8 Oct. 2019; Zegang Feng and Lingchen Zhao leg.; MHBUS, Ps.-MHBUS-GX2019100801.

### Paratypes

CHINA • 1 ♂, 2 ♀♀; same data as for holotype; MHBUS, Ps.-MHBUS-GX2019100802–04.

### Description

#### Adult males (Figs 45–49)

**COLOR.** Generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.

**CEPHALOTHORAX** (Figs 46D, 47A). Carapace nearly subquadrate,  $0.89\text{--}0.90 \times$  as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin slightly serrate; epistome small, triangular; four eyes, anterior pair of eyes reduced, posterior pair of eyespots; with 18 setae arranged s4s: 4:4:2:2, most setae acuminate, sturdy, long and gently curved, anterolateral setae much shorter than others; with three pairs of lyrifissures, first and second pair situated middle and flank to setae of ocular row, third pair situated lateral to sole pair of setae of posterior row. Manducatory process with two acuminate distal setae, anterior seta more than  $\frac{1}{2}$  as long as medial seta; apex of coxa I with rounded anteromedial process; coxae II with 7–8 terminally indented coxal spines on each side, set as oblique and arched row, central spines slightly longer than others (Fig. 47D); intercoxal tubercle absent; chaetotaxy of coxae: P 3, I 3, II 4, III 5, IV 5.

**CHELICERA** (Figs 46C, 47B). Almost as long as carapace,  $2.04\text{--}2.14 \times$  as long as broad; five setae and two lyrifissures (exterior condylar lyrifissure and exterior lyrifissure) present on hand, all setae acuminate, ventrobasal setae shorter than others; movable finger with one medial seta. Cheliceral hand with moderate wrinkle on both ventral and dorsal sides. Both fingers well provided with teeth, fixed finger with 13–14 teeth, distal one largest; movable finger with 13–15 contiguous small teeth; galea completely vestigial (Fig. 46C). Serrula exterior with 16–21 and serrula interior with 10–12 blades. Rallum with eight blades, distal one longest, with fine barbules and slightly set apart from other blades, latter tightly grouped and with long pinnae, some of which subdivided (Fig. 47C).

**PEDIPALP** (Figs 46A–B, F, 47E, 48A–B). Trochanter 1.83–1.92, femur 5.15–5.67, patella 1.93–2.21, chela 6.47–6.80, hand  $2.20\text{--}2.33 \times$  as long as broad; femur  $2.19\text{--}2.31 \times$  as long as patella; movable chelal finger  $1.94\text{--}1.97 \times$  as long as hand and  $0.67 \times$  as long as chela. Setae generally long and acuminate. Chelal hand not constricted towards fingers, apodeme complex of movable chelal finger slightly sclerotized. Fixed chelal finger and hand with eight trichobothria, movable chelal finger with four trichobothria, ib and isb situated close together, submedially on dorsum of chelal hand; eb, esb and ist at base of fixed chelal finger; esb slightly distal eb and ist slightly distal to esb; it slightly distal to est, situated subdistally; et slightly near to tip of fixed chelal finger, slightly close to chelal teeth; dx situated distal to et; sb closer to st than b; b and t situated subdistally, it situated at same level as t; est slightly distal to b (Figs 46A, 48A). Microsetae (chemosensory setae) present on dorsum of chelal hand (Figs 46B, 48B). Both chelal fingers with row of teeth, spaced regularly along margin, teeth smaller distally and proximally: fixed finger with 28–33 well-spaced, slightly retrorse and pointed teeth and 26–27 intercalary microdenticles; movable finger with 15–20 almost contiguous, slightly retrorse and pointed teeth, plus 15–16 intercalary microdenticles and 14–20 vestigial, rounded and contiguous basal teeth.

**OPISTHOSOMA.** Generally typical, pleural membrane finely granulated. All tergites and sternites undivided; setae uniseriate and acuminate. Tergal chaetotaxy I–XII: 4:4:4:4:4:4:4:5:5:4:T2T:0. Sternal chaetotaxy IV–XII: 12:10:9:9:9:9:9:–:2. Genital region: sternite II with nine setae scattered on median area, genital opening slit-like, sternite III with row of 14 setae (Fig. 46G).

**LEGS** (Fig. 48C–D). Fine granulation present on anterodorsal faces of femur IV and patella IV. Leg I: femur  $2.05\text{--}2.17 \times$  as long as patella; tarsus  $2.00\text{--}2.21 \times$  as long as tibia. Leg IV: femoropatella 2.60–

2.86 × as long as deep; tibia 4.67–5.00 × as long as deep; with basal tactile setae on both tarsal segments: basitarsus 3.00–3.33 × as long as deep (TS = 0.24), telotarsus 10.83–13.00 × as long as deep and 2.28–2.35 × as long as basitarsus (TS = 0.32–0.33). Setae of leg I (trochanter to tibia) 3–4 : 11–12 : 8 : 9–12, setae of leg IV (trochanter to basitarsus) 2–3 : 3 : 5–8 : 9–10 : 8–9. Arolium not divided, slightly shorter than simple claws.

**Adult females** (paratypes; Figs 45B, 46H)

Mostly same as males; tergal chaetotaxy I–XII: 4 : 4 : 4 : 5–6 : 6 : 6 : 6 : 6 : 6 : 5 : T2T : 0; sternal chaetotaxy IV–XII: 14 : 11 : 11 : 13 : 14 : 13 : 9 : - : 2. Genital region: sternite II with 10 setae scattered on median area, sternite III with row of 12 setae.

**Dimensions** (length/breadth or, in the case of the legs, length/depth in mm; ratios in parentheses)

**Males**

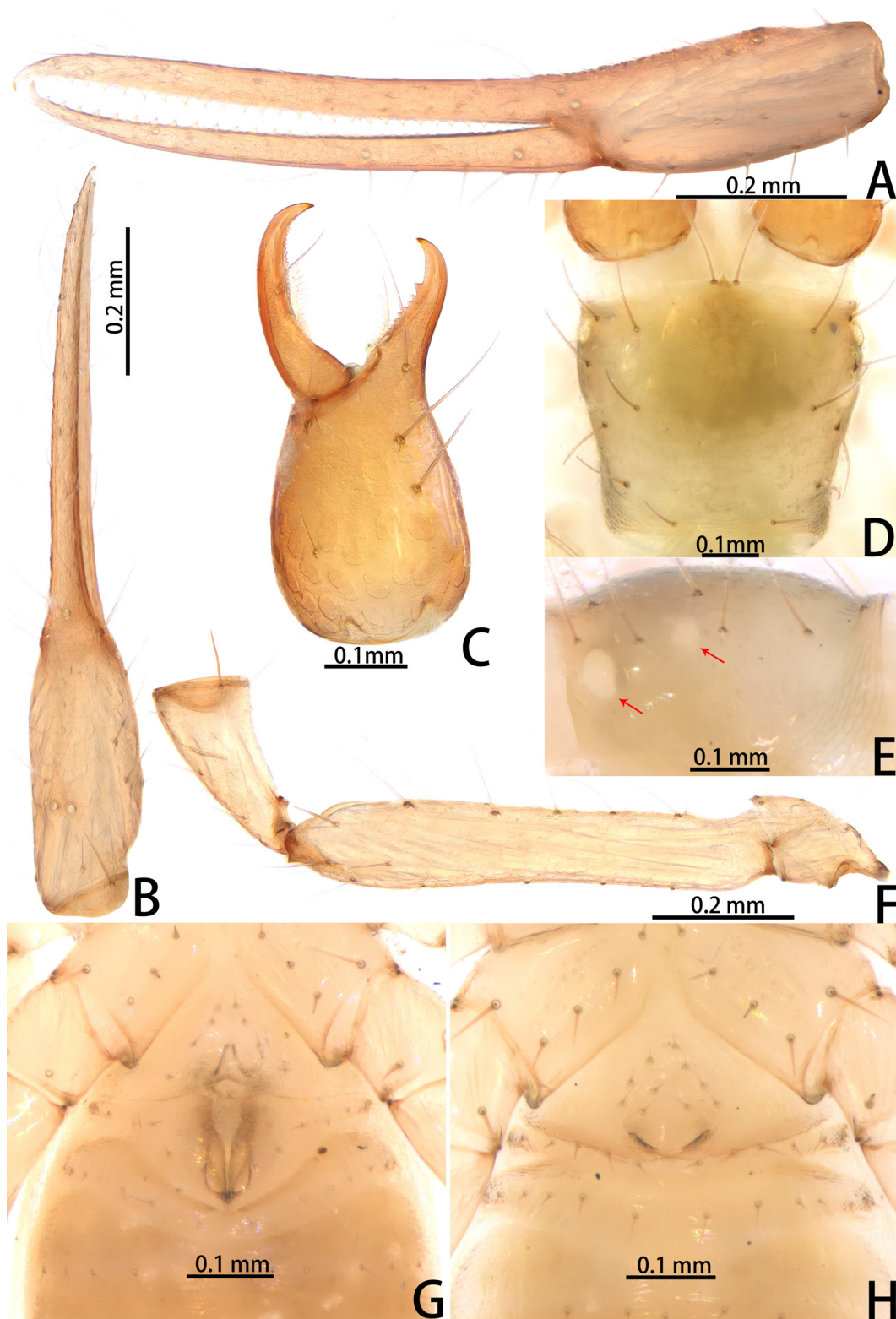
Body length 1.39–1.45. Pedipalps: trochanter 0.22–0.23/0.12 (1.83–1.92), femur 0.67–0.68/0.12–0.13 (5.15–5.67), patella 0.29–0.31/0.14–0.15 (1.93–2.21), chela 0.97–1.02/0.15 (6.47–6.80), hand 0.33–0.35/0.15 (2.20–2.33), movable chelal finger length 0.65–0.68. Chelicera 0.47–0.49/0.22–0.24 (2.04–2.14), movable finger length 0.24–0.25. Carapace 0.44–0.45/0.50–0.51 (0.88). Leg I: trochanter 0.14–0.15/0.09 (1.56–1.67), femur 0.39–0.41/0.07 (5.57–5.86), patella 0.18–0.20/0.06–0.07 (2.57–3.33), tibia 0.19–0.21/0.04–0.05 (3.80–5.25), tarsus 0.42/0.04 (10.50). Leg IV: trochanter 0.18–0.20/0.11 (1.64–1.82), femoropatella 0.63–0.65/0.22–0.25 (2.60–2.86), tibia 0.42–0.45/0.09 (4.67–5.00), basitarsus 0.20–0.21/0.06–0.07 (3.00–3.33), telotarsus 0.47–0.48/0.04 (11.75–12.00).

**Females**

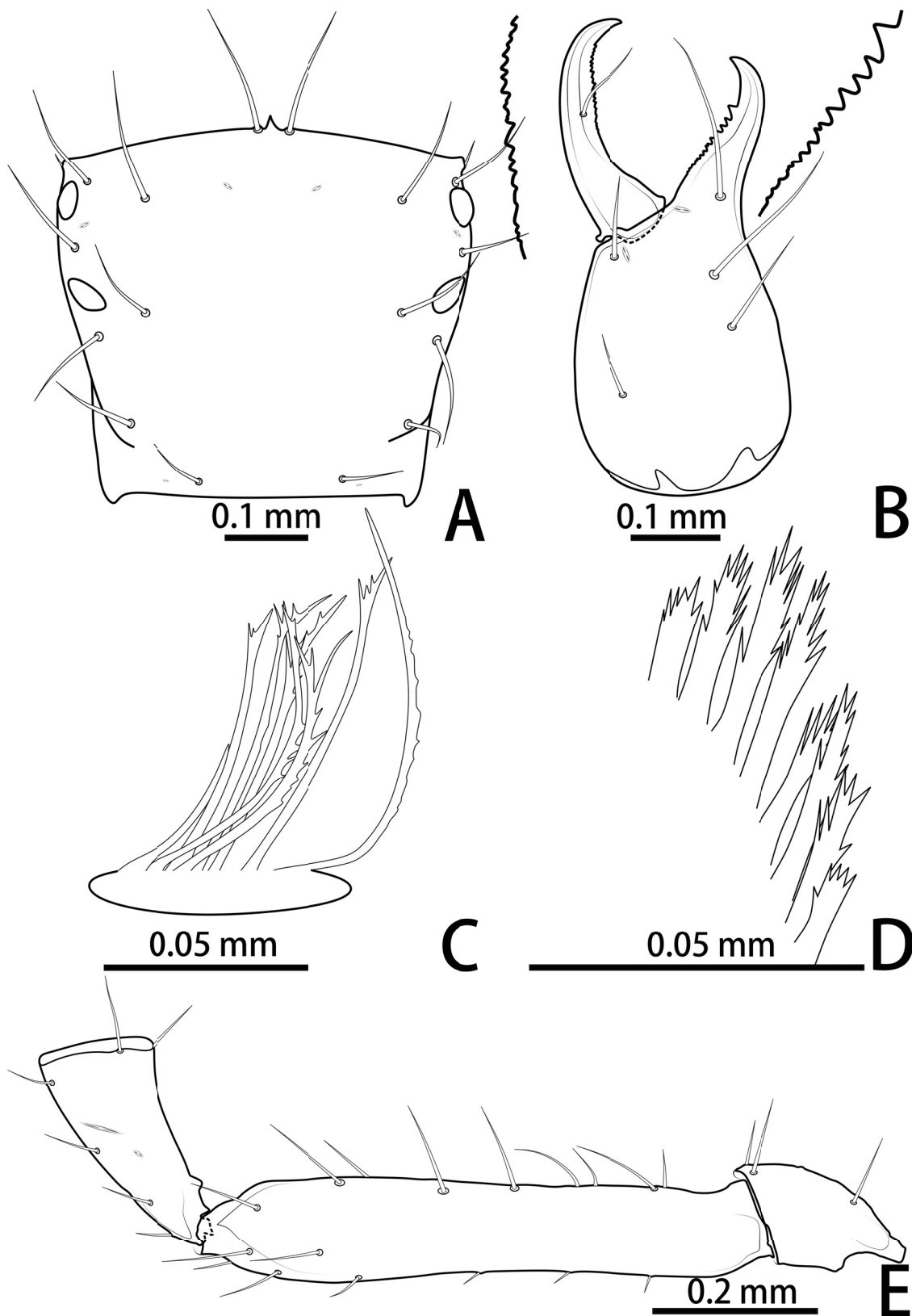
Body length 1.39–1.53. Pedipalps: trochanter 0.25/0.13–0.14 (1.78–1.92), femur 0.72–0.76/0.14–0.15 (5.07–5.14), patella 0.32–0.33/0.16–0.17 (1.94–2.00), chela 1.06–1.09/0.18–0.19 (5.58–6.05), hand



**Fig. 45.** *Tyrannochthonius yilingyanensis* sp. nov. **A.** Holotype, ♂ (Ps.-MHBU-GX2019100801), dorsal view. **B.** Paratype, ♀ (Ps.-MHBU-GX2019100803), dorsal view.

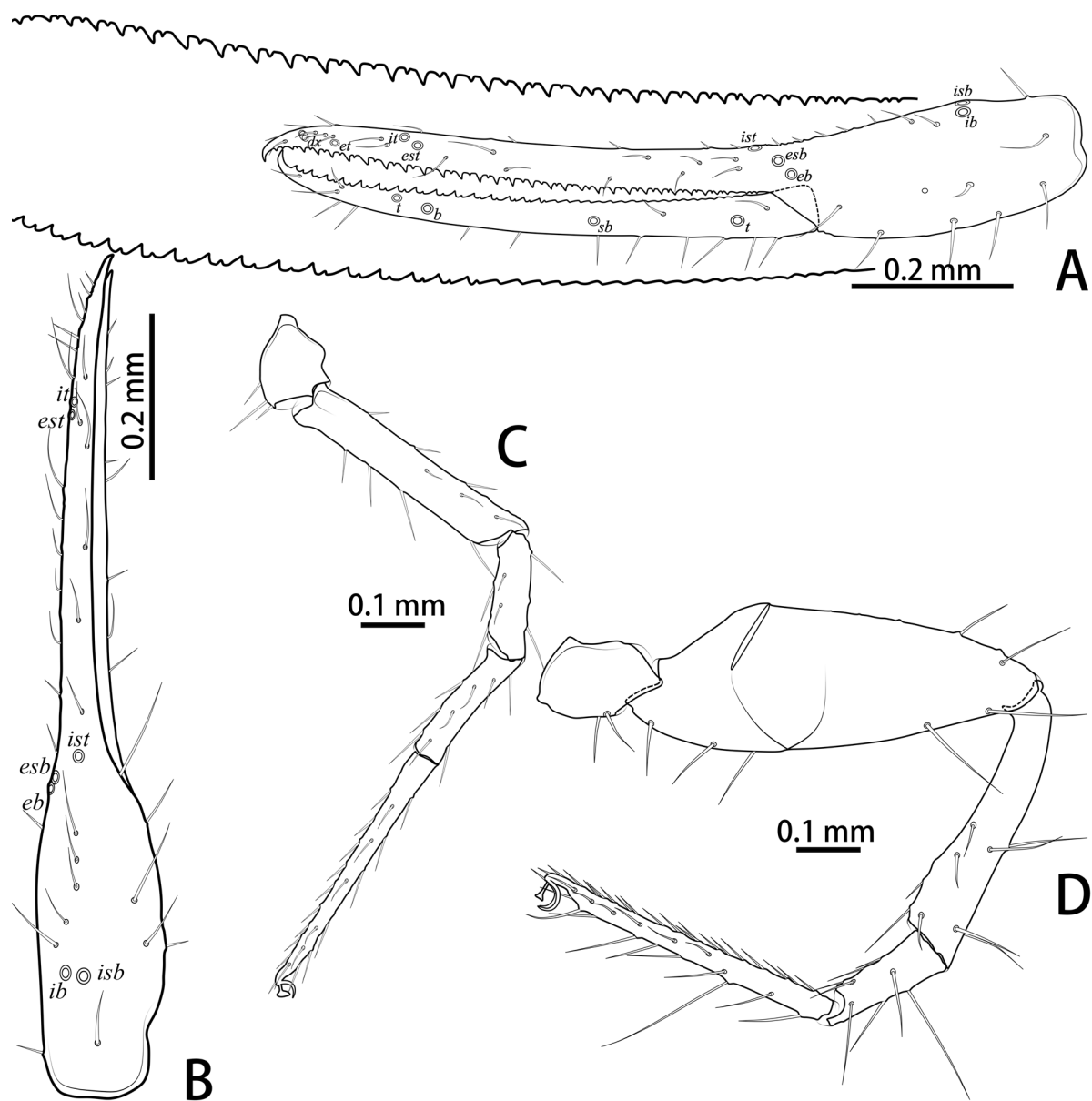


**Fig. 46.** *Tyrannochthonius yilingyanensis* sp. nov. A–G. Holotype, ♂ (Ps.-MHBU-GX2019100801). H. Paratype, ♀ (Ps.-MHBU-GX2019100803). A. Left chela, lateral view. B. Left chela, dorsal view. C. Left chelicera, dorsal view. D. Carapace, dorsal view. E. Carapace, dorsolateral view, indicate strongly weakly eyes (red arrow). F. Left pedipalp (minus chela), dorsal view. G. Male genital area, ventral view. H. Female genital area, ventral view.



**Fig. 47.** *Tyrannochthonius yilingyanensis* sp. nov., holotype, ♂ (Ps.-MHBUSGX2019100801). **A.** Carapace, dorsal view. **B.** Left chelicera, dorsal view, with details of teeth. **C.** Rallum. **D.** Coxal spines on coxae II, ventral view. **E.** Left pedipalp (minus chela), dorsal view.

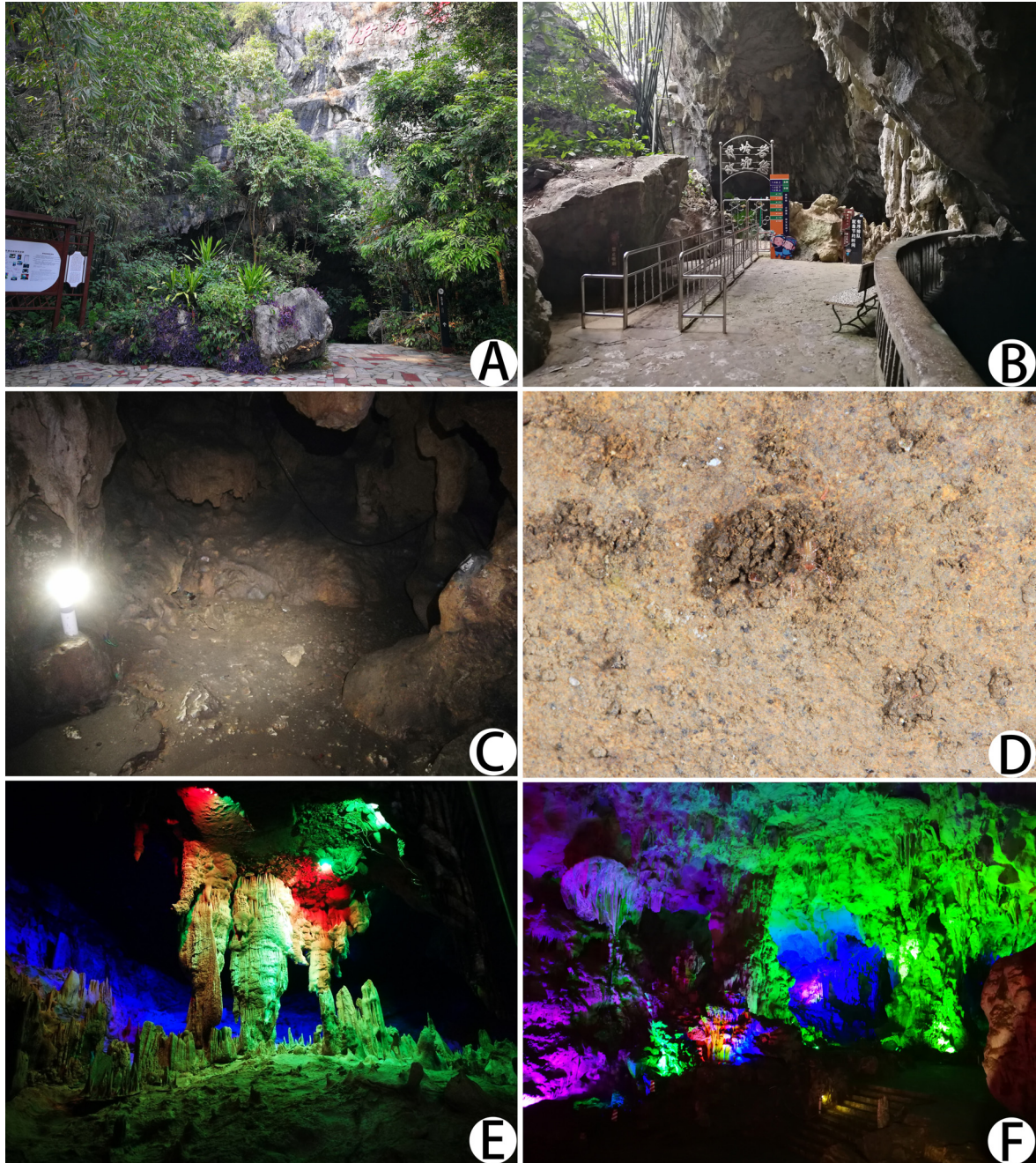
0.36–0.38/0.18–0.19 (1.89–2.11), movable chelal finger length 0.71–0.73. Chelicera 0.52–0.55/0.25–0.27 (2.04–2.08), movable finger length 0.27–0.29. Carapace 0.47–0.54/0.54–0.56 (0.84–1.00). Leg I: trochanter 0.14–0.17/0.10–0.12 (1.40–1.42), femur 0.40–0.43/0.07–0.08 (5.38–5.71), patella 0.21–0.22/0.07 (3.00–3.14), tibia 0.22/0.05–0.06 (3.67–4.40), tarsus 0.44–0.45/0.04–0.05 (9.00–11.00). Leg IV: trochanter 0.20–0.21/0.13–0.14 (1.50–1.54), femoropatella 0.66–0.68/0.23–0.24 (2.83–2.87), tibia 0.46/0.08–0.10 (4.60–5.75), basitarsus 0.21/0.07–0.08 (2.63–3.00), telotarsus 0.49/0.04–0.05 (9.80–12.25).



**Fig. 48.** *Tyrannochthonius yilingyanensis* sp. nov., holotype, ♂ (Ps.-MHBG-GX2019100801). **A.** Left chela, lateral view, with details of teeth and trichobothrial pattern. **B.** Left chela, dorsal view. **C.** Leg I, lateral view. **D.** Leg IV, lateral view. Abbreviations: see Material and methods.

### Remarks

*Tyrannochthonius yilingyanensis* sp. nov. most closely resembles *T. xiaoi* sp. nov. in the both chelal fingers with intercalary teeth, trichobothrium sb closer to st than b, epistome small, triangular, tergites I–IV each with four setae and four eyes, anterior pair of eyes reduced, posterior pair of eyespots, but differs in several characters as follows: longer and thinner pedipalpal chela (length 0.97–1.02 mm (♂), 1.06–1.09 mm (♀), 6.47–6.80 (♂), 5.58–6.05 (♀) × as long as broad compared to length 0.84–0.89 mm (♂), 0.95 mm (♀), 5.23–5.67 (♂), 5.00–5.28 (♀) × as long as broad in *T. xiaoi*) and longer and thinner



**Fig. 49.** Yilingyan Cave, type locality of *Tyrannochthonius yilingyanensis* sp. nov. **A.** Inside the cave entrance. **B.** Entrance. **C.** Area where specimens of *T. yilingyanensis* were collected. **D.** *T. yilingyanensis* in its natural environment. **E–F.** Cave environment.

pedipalpal femur (length 0.67–0.68 mm (♂), 0.72–0.76 (♀), 5.15–5.67 (♂), 5.07–5.14 (♀) × as long as broad compared to length 0.56–0.59 mm (♂), 0.64 mm (♀), 4.54–4.75 (♂), 4.57–4.92 (♀) × as long as broad in *T. xiaoi*).

### Distribution

Known only from the type locality, Yilingyan Cave (Guangxi, China).

### *Tyrannochthonius yui* sp. nov.

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Figs 1M, 50–54

### Diagnosis

(♂) Moderately sized troglomorphic species with elongated appendages; carapace without eyes or eyespots; anterior margin of carapace thin, finely denticulated, epistome pointed, triangular; posterior margin of carapace with 2 setae; tergites I–II each with two setae, tergite III–IV each with four setae. Pedipalps slender, femur 5.00 (♂) × as long as broad, length 0.40 (♂); chela 6.44 (♂) × as long as broad, length 0.58 (♂); both chelal fingers without intercalary teeth; sb closer to st than b.

### Etymology

This species is named after Kun Yu, who collected this specimen.

### Vernacular name

余氏暴伪蝎.

### Type material

#### Holotype

CHINA • ♂; Guangxi, Liuzhou City, Yufeng District, Liyong Town, Unnamed Cave 2; 24.20260909° N, 109.49899591° E; 94 m a.s.l.; 9 Aug. 2023; Kun Yu leg.; MHB, Ps.-MHB-GX2023080901.

### Description

#### Adult male (Figs 50–54)

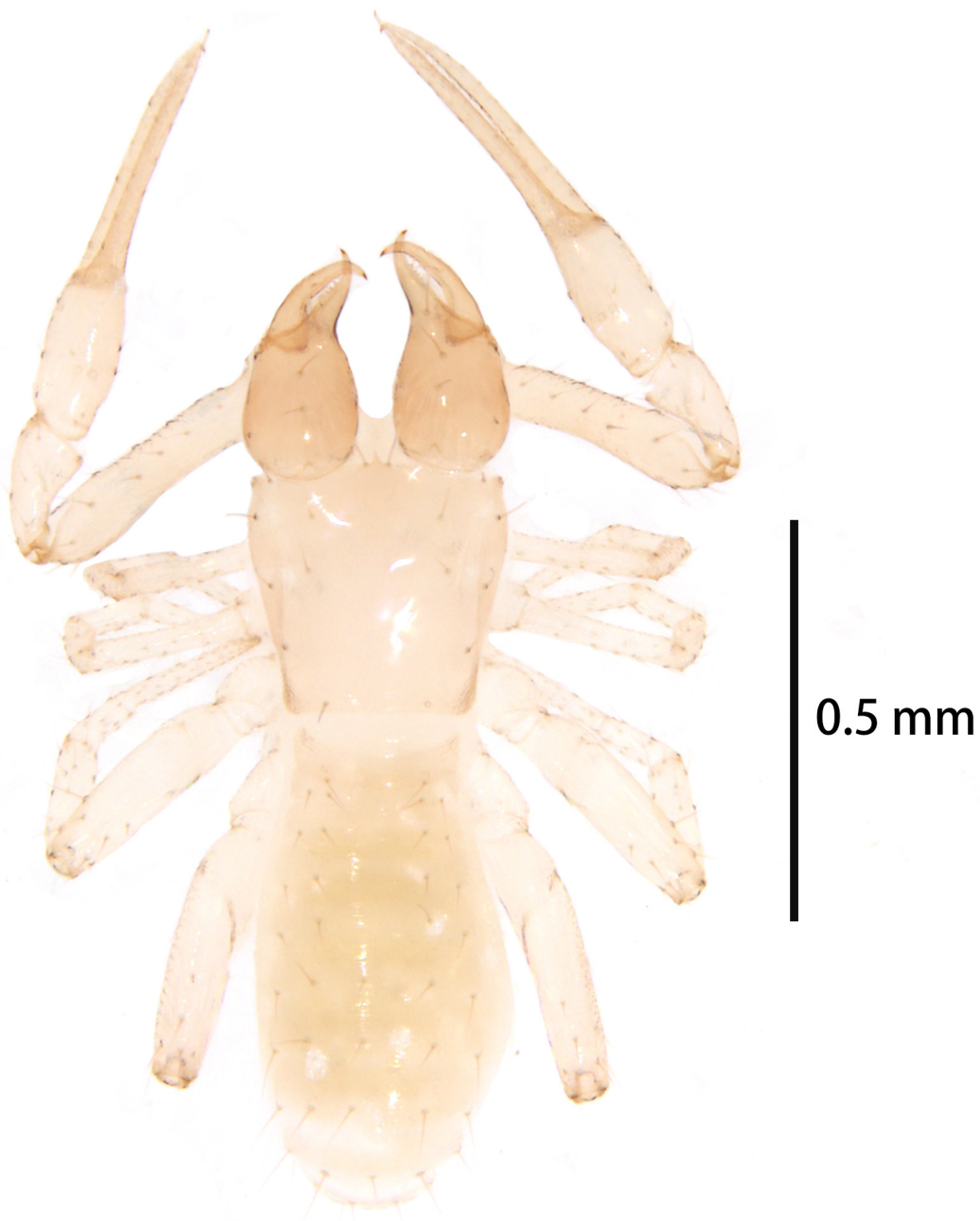
COLOR. Generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.

CEPHALOTHORAX (Figs 51E, 52A). Carapace nearly subquadrate, 0.94 × as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin slightly serrate; epistome small, triangular; without eyes or eyespots; with 18 setae arranged s4s: 4:4:2:2, most setae acuminate, sturdy, long and gently curved, anterolateral setae much shorter than others; with three pairs of lyrifissures, first and second pair situated middle and flank to setae of ocular row, third pair situated lateral to sole pair of setae of posterior row. Manducatory process with two acuminate distal setae, anterior seta more than ½ as long as medial seta; apex of coxa I rounded anteromedial process; coxae II with seven or eight terminally indented coxal spines, set as oblique and arched row, central spines slightly longer than others (Fig. 52D); intercoxal tubercle absent; chaetotaxy of coxae: P 3, I 3, II 4, III 5, IV 5.

CHELICERA (Figs 51D, 52B). Almost as long as carapace, 1.93 × as long as broad; five setae and two lyrifissures (exterior condylar lyrifissure and exterior lyrifissure) present on hand, all setae acuminate, ventrobasal setae shorter than others; movable finger with one medial seta. Cheliceral hand with moderate

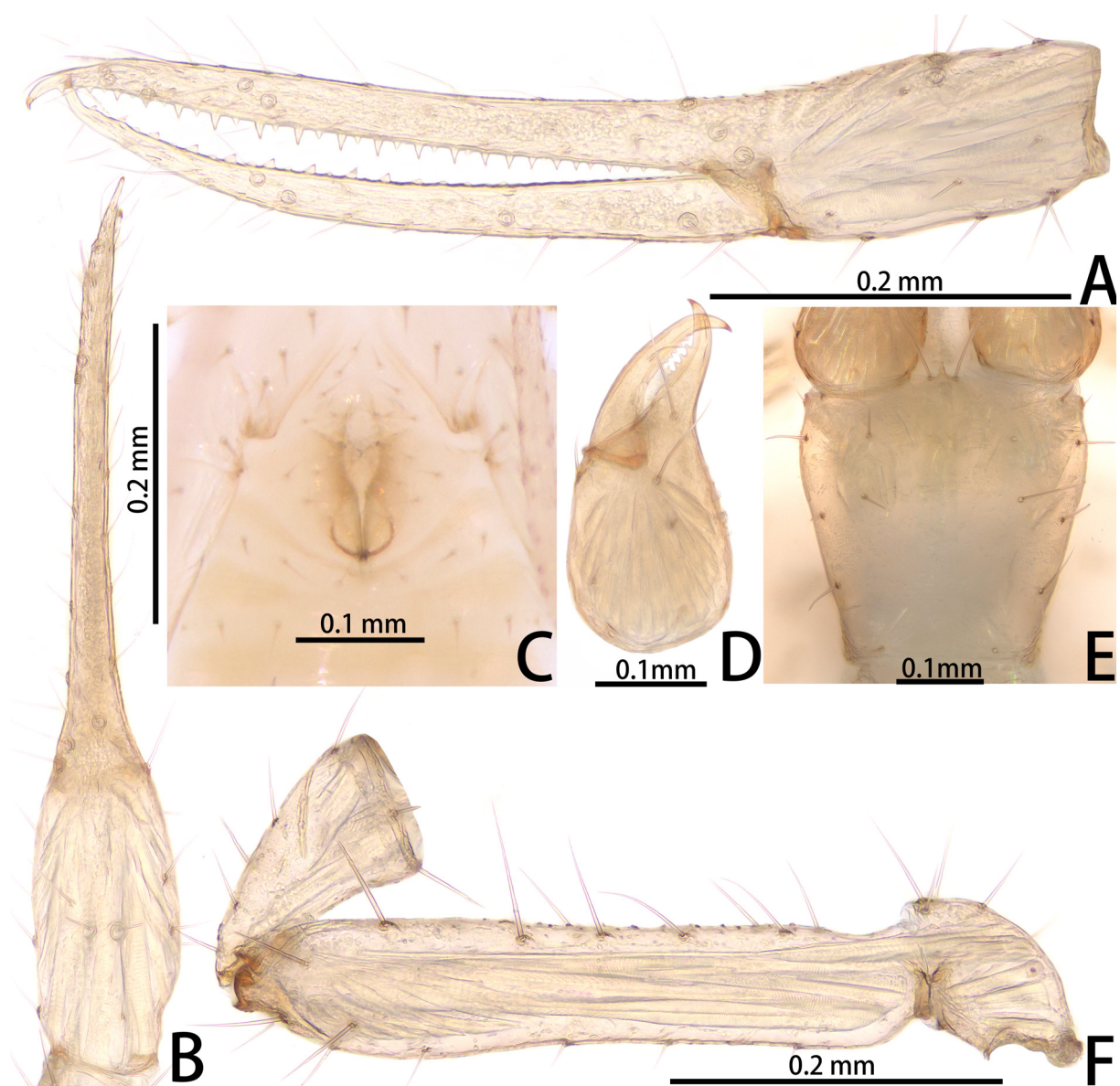
wrinkle on both ventral and dorsal sides. Both fingers well provided with teeth, fixed finger with nine teeth, distal one largest; movable finger with 10 contiguous small teeth; galea completely vestigial (Fig. 51D). Serrula exterior with 17 and serrula interior with 11 blades. Rallum with eight blades, distal one longest, with fine barbules and slightly set apart from other blades, latter tightly grouped and with long pinnae, some of which subdivided (Fig. 52C).

PEDIPALP (Figs 51A–B, F, 52E, 53A–B). Trochanter 1.75, femur 5.00, patella 2.00, chela 6.44, hand  $2.11 \times$  as long as broad; femur  $2.22 \times$  as long as patella; movable chelal finger  $2.05 \times$  as long as hand and  $0.67 \times$  as long as chela. Setae generally long and acuminate. Chelal hand not constricted towards fingers, apodeme complex of movable chelal finger slightly sclerotized. Fixed chelal finger and hand

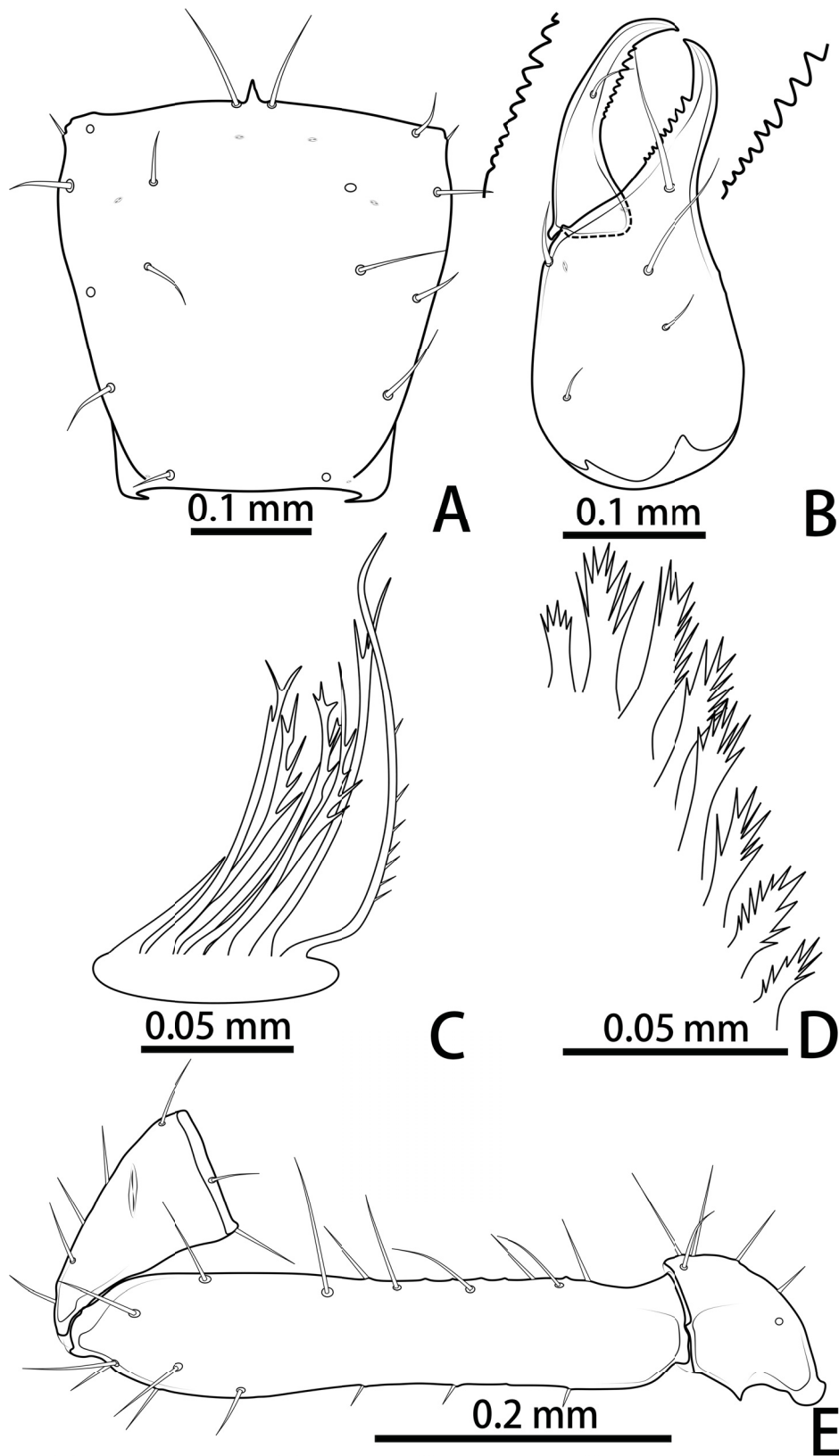


**Fig. 50.** *Tyrannochthonius yui* sp. nov., holotype, ♂ (Ps.-MHBU-GX2023080901), dorsal view.

with eight trichobothria, movable chelal finger with four trichobothria, *ib* and *isb* situated close together, submedially on dorsum of chelal hand; *eb*, *esb* and *ist* at base of fixed chelal finger; *esb* slightly distal to *eb* and *ist* slightly distal to *esb*; *it* slightly distal to *est*, situated subdistally; *et* slightly near to tip of fixed chelal finger, slightly close to chelal teeth; *dx* situated distal to *et*; *sb* closer to *st* than *b*; *b* and *t* situated subdistally, *t* slightly distal to *t*; *est* situated at same level as *t* and distal to *b* (Figs 51A, 53A). Microsetae (chemosensory setae) present on dorsum of chelal hand (Figs 51B, 53B). Both chelal fingers with row of teeth, spaced regularly along margin, teeth smaller distally and proximally: fixed finger with 25 well-spaced, slightly retrorse and pointed teeth and 12 intercalary microdenticles; movable finger with 10 almost contiguous, slightly retrorse and pointed teeth, plus nine intercalary microdenticles and nine vestigial, rounded and contiguous basal teeth.



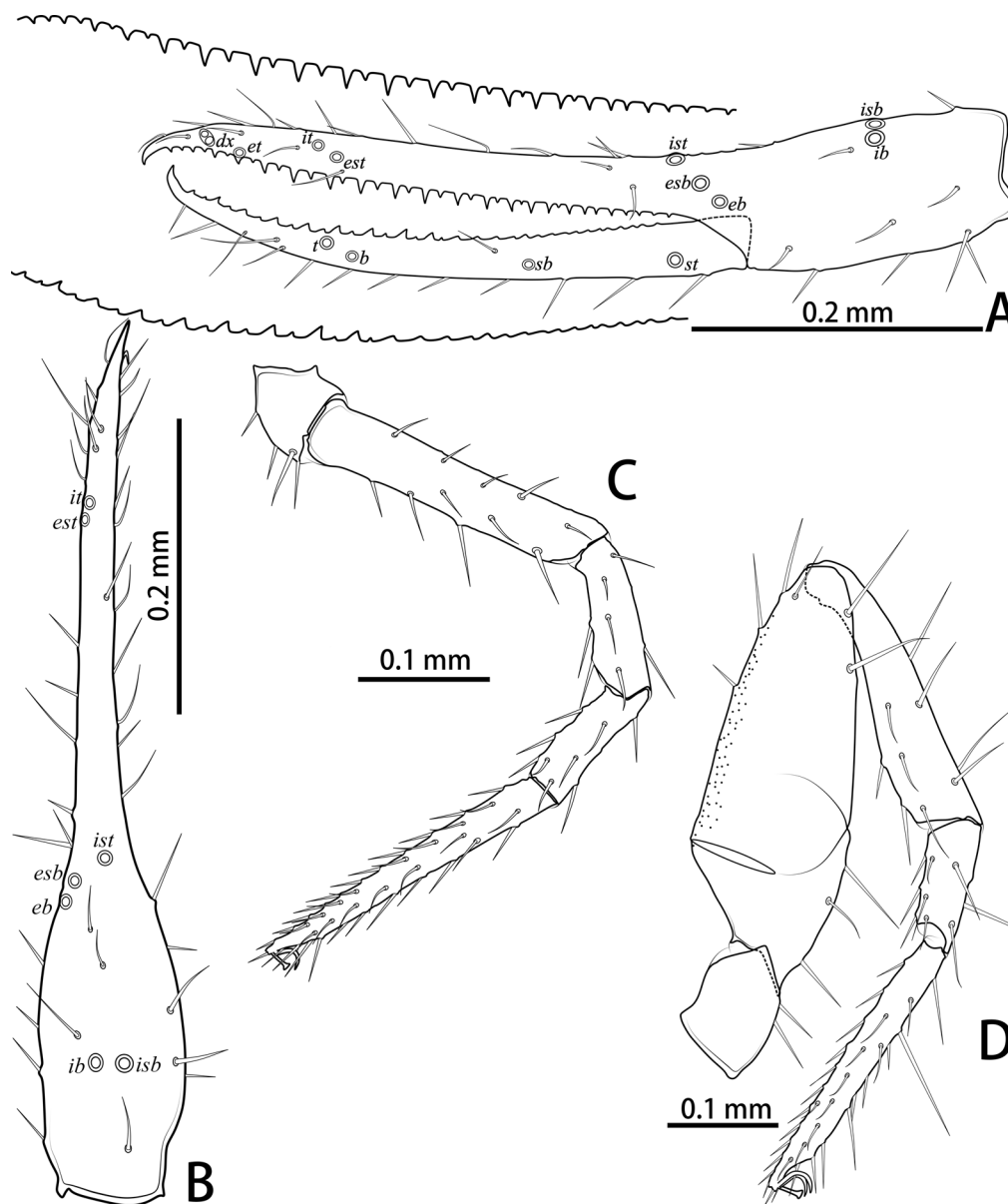
**Fig. 51.** *Tyrannochthonius yui* sp. nov., holotype, ♂ (Ps.-MHBU-GX2023080901). **A.** Left chela, lateral view. **B.** Left chela, dorsal view. **C.** Male genital area, ventral view. **D.** Left chelicera, dorsal view. **E.** Carapace, dorsal view. **F.** Left pedipalp (minus chela), dorsal view.



**Fig. 52.** *Tyrannochthonius yui* sp. nov., holotype, ♂ (Ps.-MHBG-GX2023080901). **A.** Carapace, dorsal view. **B.** Left chelicera, dorsal view, with details of teeth. **C.** Rallum. **D.** Coxal spines on coxae II, ventral view. **E.** Left pedipalp (minus chela), dorsal view.

OPISTHOSOMA. Generally typical, pleural membrane finely granulated. All tergites and sternites undivided; setae uniseriate and acuminate. Tergal chaetotaxy I–XII: 2:4:4:4:4:5:5:5:5:4:T2T:0. Sternal chaetotaxy IV–XII: 12:8:7:7:6:7:7:-:2. Genital region: sternite II with 10 setae scattered on median area, genital opening slit-like, sternite III with row of 14 setae (Fig. 51C).

LEGS (Fig. 53C–D). Fine granulation present on anterodorsal faces of femur IV and patella IV. Leg I: femur 2.09 × as long as patella; tarsus 2.00 × as long as tibia. Leg IV: femoropatella 2.57 × as long as deep; tibia 5.00 × as long as deep; with basal tactile setae on both tarsal segments: basitarsus 3.00 × as long as deep (TS = 0.29), telotarsus 8.33 × as long as deep and 2.08 × as long as basitarsus (TS = 0.32). Setae of leg I (trochanter to tibia) 4:10:8:9, setae of leg IV (trochanter to basitarsus) 2:3:6:9:10. Arolium not divided, slightly shorter than simple claws.

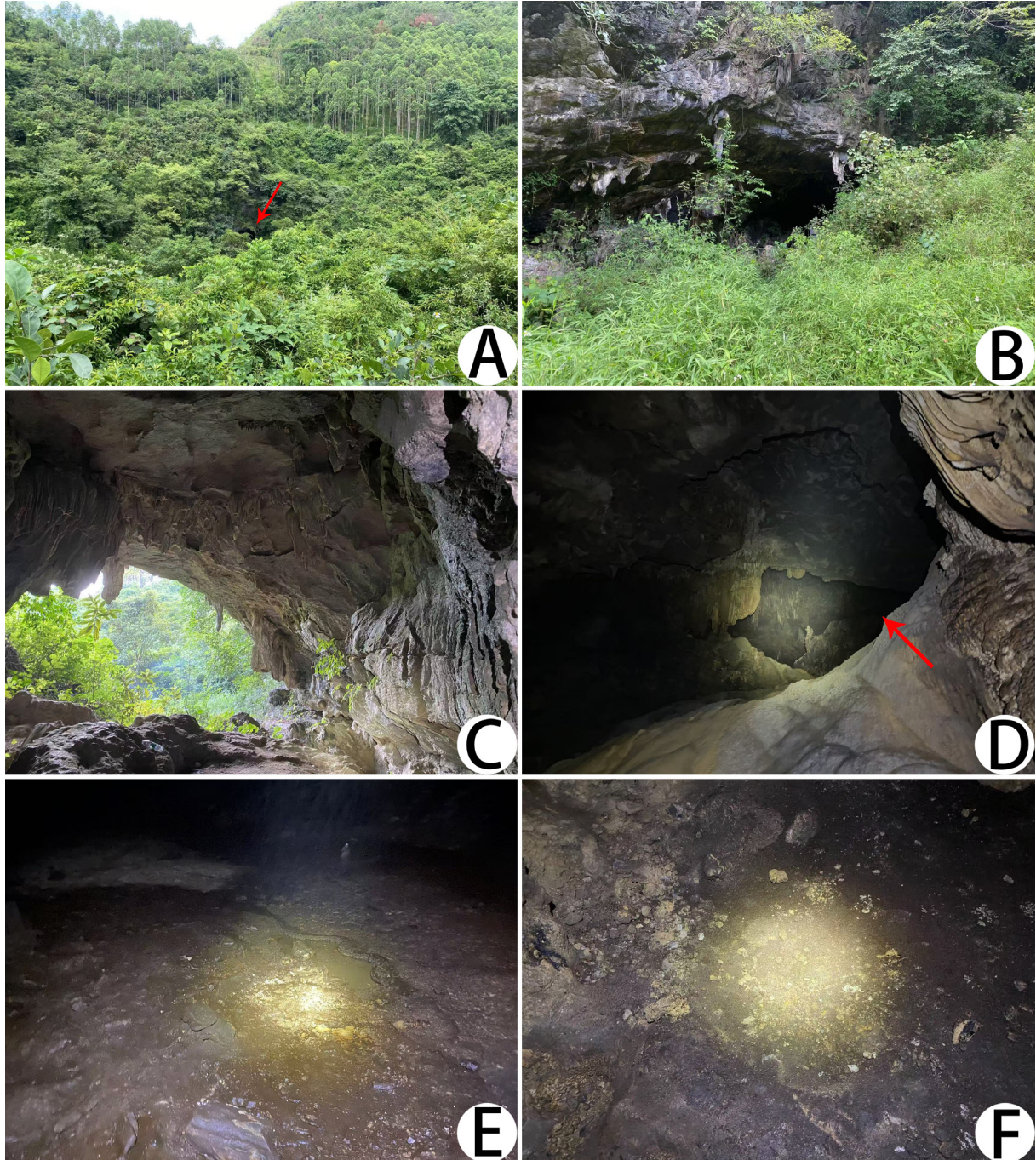


**Fig. 53.** *Tyrannochthonius yui* sp. nov., holotype, ♂ (Ps.-MHBU-GX2023080901). **A.** Left chela, lateral view, with details of teeth and trichobothrial pattern. **B.** Left chela, dorsal view. **C.** Leg I, lateral view. **D.** Leg IV, lateral view. Abbreviations: see Material and methods.

**Dimensions** (length/breadth or, in the case of the legs, length/depth in mm; ratios in parentheses)

**Male**

Body length 0.98. Pedipalps: trochanter 0.14/0.08 (1.75), femur 0.40/0.08 (5.00), patella 0.40/0.08 (5.00), chela 0.58/0.09 (6.44), hand 0.19/0.09 (2.11), movable chelal finger length 0.39. Chelicera 0.29/0.15



**Fig. 54.** Unnamed Cave 2, type locality of *Tyrannochthonius yui* sp. nov. **A.** The environment outside the cave (red arrow pointing to the cave entrance). **B.** Entrance. **C.** Inside the cave entrance. **D.** Cave tunnel junction with red arrow indicating the path to the specimen collection site. **E–F.** Area where the holotype (Ps.-MHBU-GX2023080901) of *T. yui* was collected.

(1.93), movable finger length 0.17. Carapace 0.31/0.33 (0.94). Leg I: trochanter 0.08/0.04 (2.00), femur 0.23/0.04 (5.75), patella 0.11/0.04 (2.75), tibia 0.12/0.03 (4.00), tarsus 0.24/0.03 (8.00). Leg IV: trochanter 0.11/0.08 (1.38), femoropatella 0.36/0.14 (2.57), tibia 0.25/0.05 (5.00), basitarsus 0.12/0.04 (3.00), telotarsus 0.25/0.03 (8.33).

### Remarks

*Tyrannochthonius yui* sp. nov. most closely resembles *T. yanwuensis* by the tergite I with two setae, tergite III–IV and X each with four setae, both chelal fingers with intercalary teeth and carapace without eyes or eyespots, but differs in several characters as follows: tergite II with four setae (vs tergite II with two setae in *T. yanwuensis*), shorter pedipalpal chela (length 0.58 mm (♂) compared to length 1.31 mm (♂) in *T. yanwuensis*) and shorter pedipalpal femur (length 0.40 mm (♂) compared to length 0.94 mm (♂) in *T. yanwuensis*) (Sun *et al.* 2025).

### Ecology

The specimen was collected from bat guano inside the cave (Fig. 54).

### Distribution

Known only from the type locality, Unnamed Cave 2 (Guangxi, China).

### Key to the species of *Tyrannochthonius* Chamberlin, 1929 from China (subspecies not included)

1. Carapace with eyes or eyespots ..... 2
  - Carapace without eyes or eyespots ..... 12
2. Trichobothrium sb closer to b than to st or midway between st and b ..... 3
  - Trichobothrium sb closer to st than to b ..... 6
3. Trichobothrium sb midway between st and b; epistome small, rounded and obtuse ..... 4
  - Trichobothrium sb closer to b than to st; epistome pointed, triangular ..... 5
4. Pedipalpal chela length 0.72 mm (♂), 0.82–0.83 mm (♀), 6.08 (♂), 5.13–5.19 (♀) × as long as broad; palpal femur length 0.54 mm (♂), 0.55–0.58 mm (♀), 5.40 (♂), 4.83–5.50 (♀) × as long as broad ..... *T. fenghuangensis* sp. nov.
  - Pedipalpal chela length 1.32–1.37 mm (♂), 1.45–1.49 mm (♀), 7.21–7.33 (♂), 6.77–6.91 (♀) × as long as broad; palpal femur length 0.98–1.02 mm (♂), 1.08–1.09 mm (♀), 6.53–6.80 (♂), 6.75–7.27 (♀) × as long as broad ..... *T. xiannvyanensis* sp. nov.
5. Pedipalpal chela length 1.11 mm (♂), 1.17–1.18 mm (♀), 6.94 (♂), 5.85–6.56 (♀) × as long as broad; palpal femur length 0.76 mm (♂), 0.79–0.81 mm (♀), 5.85 (♂), 5.79–6.08 (♀) × as long as broad ..... *T. duo* Hou, Feng & Zhang, 2023
  - Pedipalpal chela length 1.60–1.78 mm (♂), 1.57–1.64 mm (♀), 7.27–7.42 (♂), 6.28–6.83 (♀) × as long as broad; palpal femur length 1.10–1.21 mm (♂), 1.10–1.18 mm (♀), 6.72–6.88 (♂), 6.47–6.94 (♀) × as long as broad ..... *T. infirmus* Hou, Feng & Zhang, 2023
6. Carapace with 16 setae ..... *T. japonicus* Ellingsen, 1907
  - Carapace with 18 setae ..... 7
7. Tergites I and II each with six setae; both chelal fingers without intercalary teeth .....
  - ..... *T. pachythorax* Redikorzev, 1938
  - Tergites I and II each with four setae; both chelal fingers with intercalary teeth ..... 8

8. Carapace with two anterior corneate eyes only .....	<i>T. capito</i> Hou, Feng & Zhang, 2023	
– Carapace with four eyes .....		9
9. Carapace with four corneate eyes .....	<i>T. robustus</i> Beier, 1951	
– Carapace with four eyes, anterior pair of eyes well-developed, posterior pair of eyespots .....		10
10. Epistome small, rounded and obtuse .....	<i>T. baiseensis</i> sp. nov.	
– Epistome triangular .....		11
11. Pedipalpal chela length 0.84–0.89 mm (♂), 0.95 mm (♀), 5.23–5.67 (♂), 5.00–5.28 (♀) × as long as broad; palpal femur length 0.56–0.59 mm (♂), 0.64 mm (♀), 4.54–4.75 (♂), 4.57–4.92 (♀) × as long as broad .....	<i>T. xiaoi</i> sp. nov.	
– Pedipalpal chela length 0.97–1.02 mm (♂), 1.06–1.09 mm (♀), 6.47–6.80 (♂), 5.58–6.05 (♀) × as long as broad; palpal femur length 0.67–0.68 mm (♂), 0.72–0.76 mm (♀), 5.15–5.67 (♂), 5.07–5.14 (♀) × as long as broad .....	<i>T. yilingyanensis</i> sp. nov.	
12. At least one finger of chela with intercalary teeth .....		13
– Neither chelal finger with intercalary teeth .....		37
13. Only one finger of chela with intercalary teeth .....		14
– Both chelal fingers with intercalary teeth .....		18
14. Only movable finger of chela with intercalary teeth .....	<i>T. calvatus</i> Hou, Feng & Zhang, 2023	
– Only fixed finger of chela with intercalary teeth .....		15
15. Trichobothrium sb midway between st and b .....	<i>T. parcidentatus</i> Hou, Feng & Zhang, 2023	
– Trichobothrium sb closer to b than to st .....		16
16. Epistome absent .....	<i>T. zhai</i> Gao, Zhang & Chen, 2020	
– Epistome triangular .....		17
17. Tergites I–IV each with four setae .....	<i>T. chixing</i> Gao, Wynne & Zhang, 2018	
– Tergites I–IV each with two setae .....	<i>T. gracilis</i> Hou, Feng & Zhang, 2023	
18. Trichobothrium sb closer to st than to b .....		19
– Trichobothrium sb closer to b than to st or midway between st and b .....		27
19. Epistome small, rounded and obtuse .....		20
– Epistome pointed, triangular .....		21
20. Body size 1.62–1.69 (♀) mm; pedipalpal chela 6.07–6.20 (♀) × as long as broad; tergite V with four setae, tergite X with three setae; fixed finger of pedipalpal chela with 25–26 intercalary teeth; rallum with eight blades .....	<i>T. arificus</i> Hou, Feng & Zhang, 2023	
– Body size 1.29–1.33 (♀) mm; pedipalpal chela 5.69–5.75 (♀) × as long as broad; tergite V with five setae, tergite X with five setae; fixed finger of pedipalpal chela with 14 intercalary teeth; rallum with seven blades .....	<i>T. yanshanensis</i> Hou, Feng & Zhang, 2023	
21. Tergite II with two setae .....		22
– Tergite II with four setae .....		24
22. Tergite IV with two setae .....	<i>T. qilinensis</i> Hou, Feng & Zhang, 2023	
– Tergite IV with four setae .....		23

23. Pedipalpal chela length 1.28 mm (♀), 7.53 (♀) × as long as broad; palpal femur length 0.90 mm (♀), 6.42 (♀) × as long as broad ..... ***T. akaelus*** Mahnert, 2009  
 – Pedipalpal chela length 0.94–1.02 mm (♀), 6.71–6.80 (♀) × as long as broad; palpal femur length 0.66–0.74 mm (♀), 6.00–6.17 (♀) × as long as broad ..... ***T. shenlongensis*** sp. nov.
24. Pedipalpal chela length min. 1.40 mm (♂); palpal femur length min. 0.90 mm (♂) ..... 25  
 – Pedipalpal chela length less than 1.40 mm (♂); palpal femur length less than 0.90 mm (♂) ..... 26
25. Pedipalpal chela length 1.75–1.76 mm (♂), 1.77–1.87 mm (♀), 7.29–7.65 (♂), 7.38–7.79 (♀) × as long as broad; palpal femur length 1.20–1.25 mm (♂), 1.25–1.26 mm (♀), 6.58–6.67 (♂), 6.63–6.94 (♀) × as long as broad ..... ***T. acutus*** Hou, Feng & Zhang, 2023  
 – Pedipalpal chela length 1.45–1.46 mm (♂), 7.63–7.66 (♂) × as long as broad; palpal femur length 0.97–0.99 mm (♂), 6.06–6.07 (♂) × as long as broad ..... ***T. yamuheensis*** Li, 2022
26. Pedipalpal chela length 1.21–1.27 mm (♂), 1.24–1.29 mm (♀), 6.68–6.72 (♂), 6.20–6.79 (♀) × as long as broad; palpal femur length 0.83–0.87 mm (♂), 0.86–0.89 mm (♀), 5.80–5.93 (♂), 5.93–6.14 (♀) × as long as broad ..... ***T. hispidus*** Hou, Feng & Zhang, 2023  
 – Pedipalpal chela length 1.01–1.09 mm (♂), 1.21–1.25 mm (♀), 5.61–5.66 (♂), 6.37–6.40 (♀) × as long as broad; palpal femur length 0.73–0.76 mm (♂), 0.80–0.83 mm (♀), 4.87–4.90 (♂), 5.33–5.37 (♀) × as long as broad ..... ***T. huilongshanensis*** Li, 2022
27. Trichobothrium sb midway between st and b ..... 28  
 – Trichobothrium sb closer to b than to st ..... 32
28. Tergite I with two setae ..... 29  
 – Tergite I with four setae ..... 30
29. Tergites II and X with four setae; pedipalpal chela length 0.58 mm (♂); palpal femur length 0.40 mm (♂) ..... ***T. yui*** sp. nov.  
 – Tergites II and X with two setae; pedipalpal chela length 1.31 mm (♂); palpal femur length 0.94 mm (♂) ..... ***T. yanwuensis*** Sun, Guo & Zhang, 2025
30. Epistome small, rounded and obtuse; pedipalpal chela length 0.74–0.76 mm (♂), 0.78–0.79 mm (♀); palpal femur length 0.48–0.51 mm (♂), 0.53–0.55 mm (♀) ..... ***T. breviculus*** Hou, Feng & Zhang, 2023  
 – Epistome small, pointed; pedipalpal chela length min. 1.40 mm (♂), 1.40 mm (♀); palpal femur length min. 0.95 mm (♂), 1.00 mm (♀) ..... 31
31. Pedipalpal chela length 1.80–1.98 mm (♂), 1.93–2.00 mm (♀), 8.25–8.57 (♂), 7.41–7.42 (♀) × as long as broad; palpal femur length 1.23–1.36 mm (♂), 1.35–1.37 mm (♀), 8.50–8.79 (♂), 8.06–8.44 (♀) × as long as broad ..... ***T. altus*** Hou, Feng & Zhang, 2023  
 – Pedipalpal chela length 1.43–1.49 mm (♂), 1.44 mm (♀), 6.81–7.45 (♂), 6.55 (♀) × as long as broad; palpal femur length 0.97–1.02 mm (♂), 1.00–1.02 mm (♀), 6.47–6.80 (♂), 6.67–6.80 (♀) × as long as broad ..... ***T. maculosus*** Hou, Feng & Zhang, 2023
32. Tergites I and II each with two setae ..... 33  
 – Tergites I and II each with four setae ..... 34

33. Pedipalpal chela length 1.21–1.44 mm (♀), 6.90–7.30 (♀) × as long as broad; palpal femur length 0.95–0.97 mm (♀), 5.90–6.70 (♀) × as long as broad ..... *T. ganshuangensis* Mahnert, 2009  
 – Pedipalpal chela length 1.65 mm (♀), 8.25 (♀) × as long as broad; palpal femur length 1.23 mm (♀), 7.69 (♀) × as long as broad ..... *T. longulimembrum* sp. nov.
34. The movable finger of the pedipalpal chela with almost upright teeth .....  
 ..... *T. rudongyanensis* Sun, Guo & Zhang, 2025  
 – The movable finger of the pedipalpal chela with almost retrorse teeth ..... 35
35. Tergite X with two setae ..... *T. babaowanensis* Hou, Feng & Zhang, 2023  
 – Tergite X with four or five setae ..... 36
36. The movable finger of the pedipalpal chela with slightly retrorse teeth.....  
 ..... *T. antridraconis* Mahnert, 2009  
 – The movable finger of the pedipalpal chela with remarkably retrorse teeth .....  
 ..... *T. multidentatus* Hou, Feng & Zhang, 2023
37. Tergite I with two setae ..... 38  
 – Tergite I with four setae ..... 47
38. Trichobothrium sb closer to b than to st or midway between st and b ..... 39  
 – Trichobothrium sb closer to st than to b ..... 45
39. Trichobothrium sb midway between st and b ..... 40  
 – Trichobothrium sb closer to b than to st ..... 42
40. Tergite III with four setae ..... *T. brevispinus* Hou, Feng & Zhang, 2023  
 – Tergite III with two setae ..... 41
41. Tergite IV with four setae; epistome small, rounded and obtuse *T. harveyi* Gao, Zhang & Chen, 2020  
 – Tergite IV with two setae; epistome absent ..... *T. dongjiensis* Li, 2022
42. Tergite III with three or four setae; tergite X with four setae .....  
 ..... *T. oblongus* Hou, Feng & Zhang, 2023  
 – Tergite III with two setae; tergite X with two setae ..... 43
43. Epistome small, rounded ..... *T. multicaves* Hou, Feng & Zhang, 2023  
 – Epistome absent ..... 44
44. Pedipalpal chela 8.44–9.06 (♂), 7.75–8.33 (♀) × as long as broad; coxae II with 12–13 terminally indented coxal spines ..... *T. umidus* Hou, Feng & Zhang, 2023  
 – Pedipalpal chela 7.45–7.95 (♂), 7.52 (♀) × as long as broad; coxae II with 8–9 terminally indented coxal spines ..... *T. pinguis* Hou, Feng & Zhang, 2023
45. Epistome pointed, triangular; tergite X with two setae ..... *T. pandus* Hou, Feng & Zhang, 2023  
 – Epistome absent; tergite X with four setae ..... 46
46. Chelal fixed finger with 20–21 teeth, movable finger with 25–26 teeth; rallum with seven blades ...  
 ..... *T. planus* Hou, Feng & Zhang, 2023  
 – Chelal fixed finger with 30–32 teeth, movable finger with 25–26 teeth; rallum with eight blades ...  
 ..... *T. pictus* Hou, Feng & Zhang, 2023

47. Trichobothrium sb closer to b than to st or midway between st and b ..... 48  
 – Trichobothrium sb closer to st than to b ..... 50
48. Trichobothrium sb midway between st and b ..... *T. laquiensis* sp. nov.  
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 ..... *T. nanxingensis* Hou, Feng & Zhang, 2023  
 – Chelal movable finger with remarkably heterodont teeth; pedipalpal chela length 1.79 mm (♀), 9.42 (♀) × as long as broad; palpal femur length 1.32 mm (♀), 9.43 (♀) × as long as broad .....  
 ..... *T. tiani* Sun, Guo & Zhang, 2025
50. Epistome small, rounded and obtuse ..... 51  
 – Epistome small, pointed ..... 52
51. Pedipalpal chela length 1.61–1.64 mm (♂), 1.56–1.58 mm (♀), 7.00–7.07 (♂), 8.67–8.69 (♀) × as long as broad; palpal femur length 1.16–1.19 mm (♂), 1.11–1.17 mm (♀), 8.92–8.95 (♂), 8.54–8.59 (♀) × as long as broad ..... *T. huaerensis* Li, 2022  
 – Pedipalpal chela length 2.14–2.34 mm (♂), 2.37–2.46 mm (♀), 6.69–7.13 (♂), 6.15–6.58 (♀) × as long as broad; palpal femur length 1.58–1.68 mm (♂), 1.67–1.75 mm (♀), 9.29–9.33 (♂), 8.75–8.79 (♀) × as long as broad ..... *T. latus* Hou, Feng & Zhang, 2023
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 – The movable finger of the pedipalpal chela with well-spaced, slightly or upright teeth ..... 54
53. Pedipalpal chela length 1.12–1.14 mm (♀), 5.60–6.00 (♀) × as long as broad; palpal femur length 0.76–0.77 mm (♀), 5.50–5.85 (♀) × as long as broad ..... *T. miridentatus* sp. nov.  
 – Pedipalpal chela length 1.74–1.86 mm (♀), 6.89–7.25 (♀) × as long as broad; palpal femur length 1.24–1.32 mm (♀), 7.33–7.75 (♀) × as long as broad ..... *T. quattuor* Hou, Feng & Zhang, 2023
54. Pedipalpal chela length 0.63 mm (♀), 5.25 (♀) × as long as broad; palpal femur length 0.44 mm (♀), 4.89 (♀) × as long as broad ..... *T. xianguensis* sp. nov.  
 – Pedipalpal chela length 1.61–1.64 mm (♀), 6.42–6.44 (♀) × as long as broad; palpal femur length 1.14–1.18 mm (♀), 6.71–6.77 (♀) × as long as broad ..... *T. xinzhaiensis* Li, 2022

## Discussion

This study has revealed more species of the cave-dwelling genus *Tyrannochthonius* with transitional eye conditions between the four well-developed eyes and the completely eyeless ones, the former including four eyes, anterior pair of eyes well-developed, posterior pair with flat lenses in *T. baiseensis* sp. nov., and four eyes, anterior pair of eyes reduced, posterior pair of eyespots in *T. fenghuangensis* sp. nov., *T. xiannvensis* sp. nov., *T. xiaoi* sp. nov. and *T. yilingyanensis* sp. nov.

Currently, the species of *Tyrannochthonius* from China display the following five categories in eyes: carapace without eyes or eyespots; carapace with two anterior corneate eyes only; carapace with a pair of anterior eyespots only; four eyes, anterior pair of eyes reduced, posterior pair of eyespots; four eyes, anterior pair of eyes well-developed, posterior pair with flat lenses (see Table 1). Although their eye conditions are diverse and currently serve as important diagnostic characters, pseudoscorpion eyes are merely light-compensating structures (Weygold 1969). Given the minimal morphological differences

in eye features, especially in the absence of molecular evidence or more significant morphological distinctions, we believe it is necessary to exercise caution in designating these cave-dwelling pseudoscorpion species as different species.

Furthermore, the diverse eye morphologies observed among cave-dwelling lineages should not be overlooked, as they may effectively reflect different degrees of cave adaptation among species (Klaus *et al.* 2013; Meng *et al.* 2013; Rétaux & Casane 2013; Luo *et al.* 2023; Li *et al.* 2025).

### Relationships between species

Supplementing the explanation provided by Hou *et al.* (2023b), it is reasonable to classify species as distinct within the genus *Tyrannochthonius* when caves are in close proximity (though it remains unknown whether there are minor connecting passages within the cave system) and when sufficiently clear evidence (including morphological and molecular data) exists. Additionally, the presence of two species within a single cave (e.g., *T. longulimembrum* sp. nov. and *Lagynochthonius guangyangensis* in Guangyang Cave; *T. xiaoi* sp. nov. and *L. zhaoae* in Unnamed Cave 3; and *T. yanshanensis* and *L. galeatus* in Yanshan Cave) (Hou *et al.* 2023b; Sun *et al.* 2024) belonging to different genera within the Chthoniidae may indicate a close phylogenetic relationship between *Tyrannochthonius* and *Lagynochthonius*, similar to the polyphyletic relationships revealed by Harrison *et al.* (2014) and Johnson *et al.* (2022). Nevertheless, it remains undeniable that they are still recognized as two distinct genera, despite their blurred phylogenetic boundaries and ambiguous generic delimitations (Hou *et al.* 2022b).

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