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## A review of the genus *Lagynochthonius* Beier, 1951 (Pseudoscorpiones, Chthoniidae) from China

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### Abstract

The genus of *Lagynochthonius* from China was reviewed. Nine new hypogean species were described: *Lagynochthonius apexus* sp. nov. (♂♀), *L. infirmus* sp. nov. (♂♀), *L. longquanensis* sp. nov. (♀) and *L. zhakouensis* sp. nov. (♂♀) from Sichuan, *L. baiguensis* sp. nov. (♂♀), *L. guangyangensis* sp. nov. (♂♀), *L. jingshengensis* sp. nov. (♂♀) and *L. zhaoae* sp. nov. (♀) from Guangxi, *L. galeatus* sp. nov. (♀) from Guizhou. The male *L. guanniensis* Hou, Feng & Zhang, 2023, *L. maanensis* Hou, Feng & Zhang, 2023 and *L. xiaoensis* Hou, Feng & Zhang, 2023 from Guizhou are reported for the first time. The species key and a geographical distribution map of *Lagynochthonius* species from China are provided.

**Keywords:** taxonomy, diversity, morphology

### Introduction

The family Chthoniidae Daday, 1889, composed of 54 genera and 933 species, is the largest family of the arachnid order Pseudoscorpiones (Hou *et al.* 2023a; WPC 2024). At present, the Chthoniidae is composed of three subfamilies (Benavides *et al.* 2019), Chthoniinae Daday, 1889, Tridenchthoniinae Balzan, 1892 and Lechytiinae Chamberlin, 1929. In China, the Chthoniidae includes only four genera: *Ditha* Chamberlin, 1929 (Tridenchthoniinae), *Lagynochthonius* Beier, 1951 (Chthoniinae), *Lechytiia* Balzan, 1892 (Lechytiinae) and *Tyrannochthonius* Chamberlin, 1929 (Chthoniinae).

The genus *Lagynochthonius* was initially created by Beier (1951) as a subgenus of *Tyrannochthonius*, and was elevated to generic status by Chamberlin (1962). It can be recognized by the following combination of characters: the chelal hand distally constricted (or flask-shaped), base of movable finger with strongly sclerotized apodeme and the modified tooth (*td*) of the fixed chelal finger displaced onto the prolateral-retrolateral face; the trichobothria *ib* and *isb* situated close together in a median or sub-basal

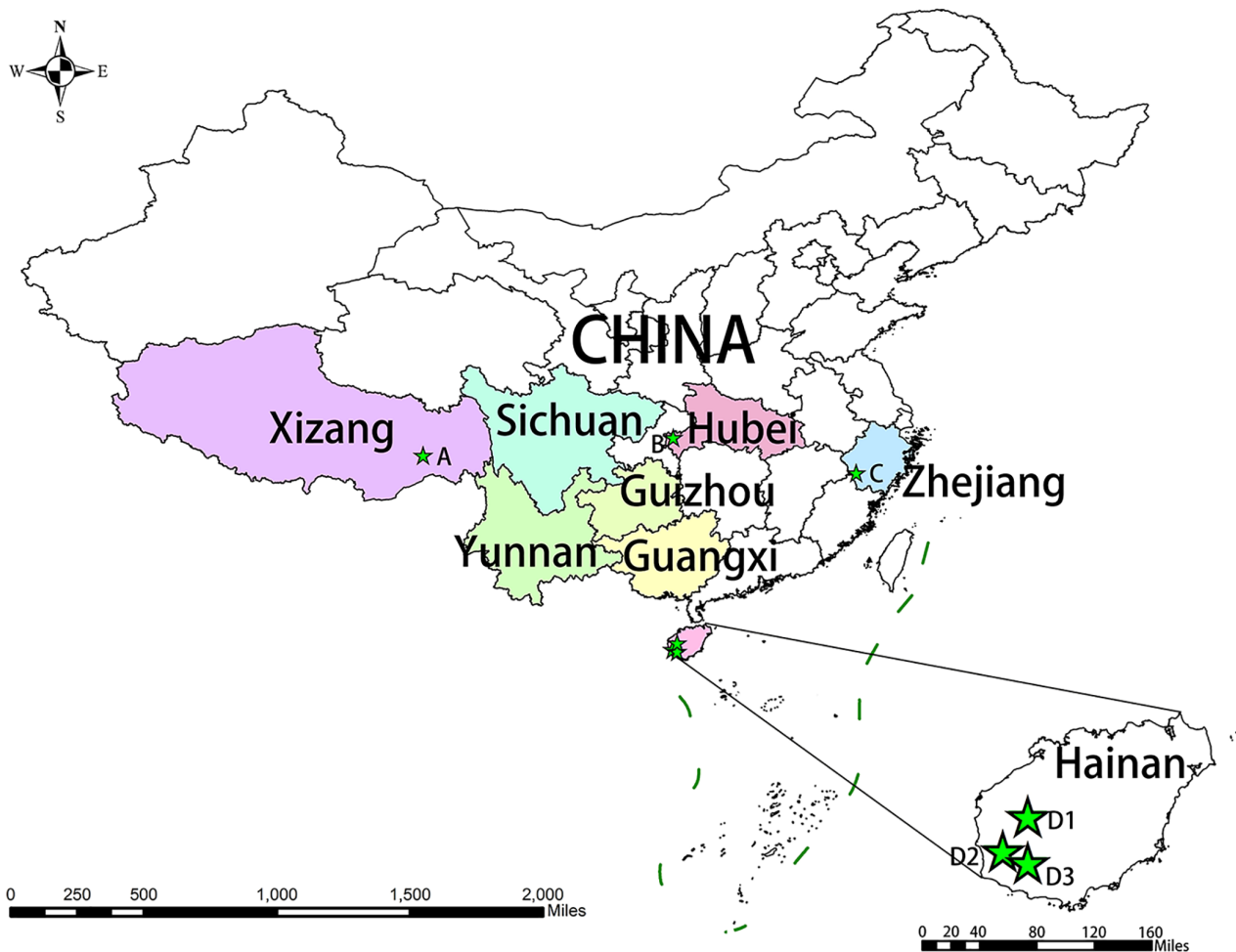
position on the dorsum of the chelal hand; trichobothrium *sb* situated midway between *st* and *b*; and the coxal spines usually long and present only on coxae II (Chamberlin 1962; Edward & Harvey 2008; Harvey 1989; Judson 2007; Muchmore 1991).

The genus *Lagynochthonius* is typically distributed in the tropical and subtropical regions. In addition, based on their habitats, they can be broadly categorized into two types, surface-dwelling (epigean) and troglitic (hypogean) species. Epigean *Lagynochthonius* species commonly live in moist leaf litter, upper layers of soil, and gaps beneath stones. Hypogean *Lagynochthonius* species inhabit caves, where they frequently reside on rock faces, under stones, and in soft earth. Up to now, a total of 84 *Lagynochthonius* species have been documented worldwide, except for Antarctica. Among them, 37 species have been reported from China, including 12 epigean species and 25 hypogean species (Hou *et al.* 2023a; WPC 2024).

In this study, we reviewed all *Lagynochthonius* species from China, providing description of nine new hypogean *Lagynochthonius* species and the first descriptions of males of three species (*L. guanniensis* Hou, Feng & Zhang 2023, *L. maanensis* Hou, Feng & Zhang 2023, and *L. xiaoensis* Hou, Feng & Zhang 2023). All *Lagynochthonius* species within China are meticulously recorded and illustrated through both a graphical format, which can be found in Table 1, and a graphical depiction, detailed in Figures 1–2.

### Materials and methods

**Specimen preparation and examination.** 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 (MHBU) (Baoding, China). Photographs and measurements were taken using a Leica M205A stereomicroscope equipped with a Leica DFC550 camera. Drawings were made using the Inkscape software (Ver. 1.0.2.0). Detailed examination was carried out with



**FIGURE 1. Study area**, aside from Sichuan Province, the Guangxi Zhuang Autonomous Region, Yunnan Province, and Guizhou Province, the distribution areas of the *Lagynochthonius* species. Green represents known species. Star represents species with four eyes. A. Medog County (*L. medog* Zhang & Zhang 2014); B. Jiulong Mountains (*L. brachydigitatus* Zhang & Zhang 2014); C. Lichuan County (*L. sinensis* (Beier, 1967)); D1, D3. Bawangling (*L. niger* Hu & Zhang 2012); D2. Jian-fengling Mountain (*L. leptopalpus* Hu & Zhang 2012).

an Olympus BX53 general optical microscope. All images were edited and formatted using Adobe Photoshop 2017. Names of species, distribution (s), collection date (s), condition of eyes are provided in Table 1.

**Terminology.** 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. All measurements are given in mm unless noted otherwise. Proportions and measurements of chelicerae, carapace and pedipalps correspond to length/breadth, and those of legs to length/depth.

The following abbreviations are used in the text: for the chelal trichobothria: *b* = basal; *sb* = sub-basal; *st* = subterminal; *t* = terminal; *ib* = interior basal; *isb* = interior sub-basal; *ist* = interior sub-terminal; *it* = interior terminal; *eb* = exterior basal; *esb* = exterior sub-basal; *est* = exterior sub-terminal; *et* = exterior terminal. For other abbreviations: *dx*, duplex trichobothria; *sc*, microsetae (chemosensory setae); *td*, modified tooth.

## Taxonomy

### Family Chthoniidae Daday, 1889

#### Subfamily Chthoniinae Daday, 1889

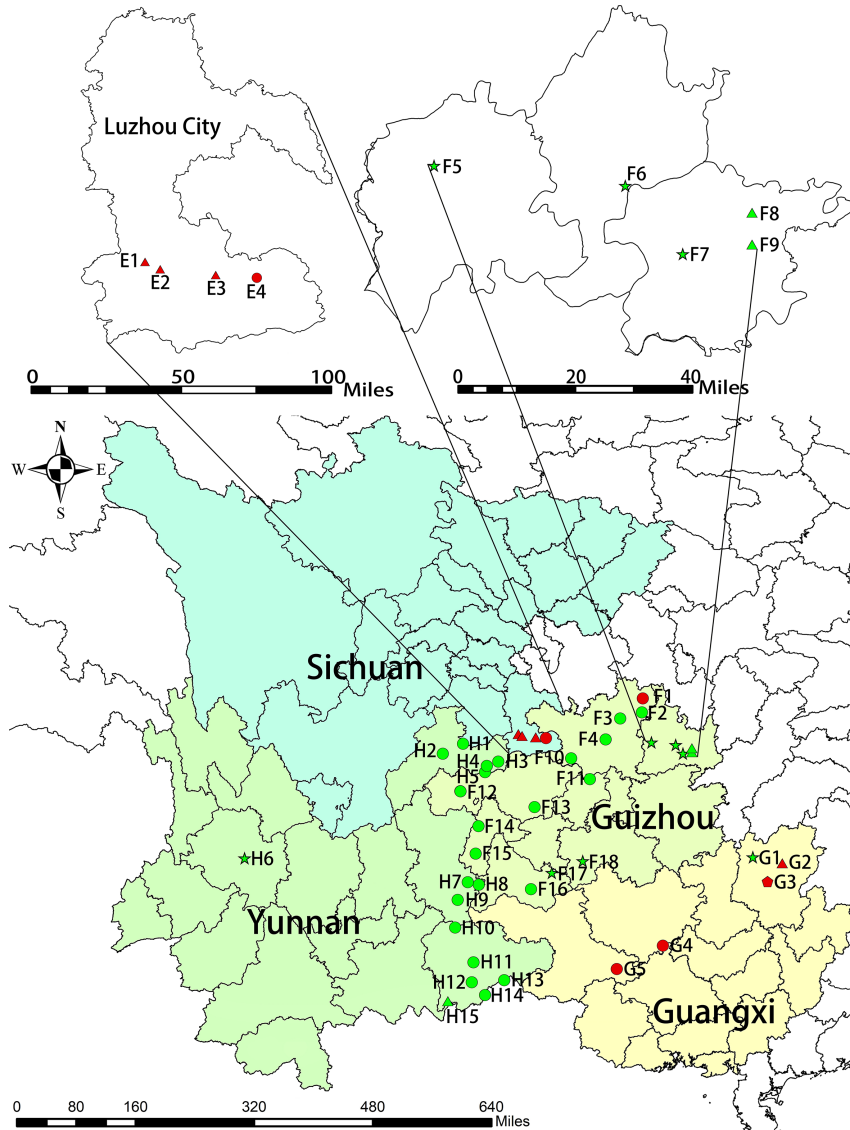
#### Tribe Tyrannochthoniini Chamberlin, 1962

### Genus *Lagynochthonius* Beier, 1951

Type species: *Chthonius johni* Redikorzev, 1922, by original designation.

*Tyrannochthonius* (*Lagynochthonius*) Beier, 1951: 61.

*Lagynochthonius* Beier: Chamberlin, 1962: 314; Murthy & Ananthakrishnan, 1977: 16–17; Harvey, 1989: 21; Harvey, 1991: 182; Muchmore, 1991: 113; Harvey, 1999: 247; Edward & Harvey, 2008: 280.



**FIGURE 2. Study area**, Sichuan Province, the Guangxi Zhuang Autonomous Region, Yunnan Province, and Guizhou Province, the distribution areas of the *Lagynochthonius* species. Red represents new species, green represents known species. Circle represents species without eyes or eyespots, triangle represents species with two eyespots, pentagon represents species with four strongly reduced eyes, and star represents species with four eyes. E1. Longquan Cave (*L. longquanensis* sp. nov.). E2. Zhakou Cave (*L. zhakouensis* sp. nov.). E3. Guanniu Cave 2 (*L. infirmus* sp. nov.). E4. Huaer Cave (*L. apexus* sp. nov.). F1. Yanshan Cave (*L. galeatus* sp. nov.). F2. Mawang Cave (*L. mawangensis* Hou, Feng & Zhang 2023). F3. Pianxiao Cave (*L. maanensis* Hou, Feng & Zhang, 2023). F4. Xiao Cave 2 (*L. xiaoensis* Hou, Feng & Zhang, 2023). F5, F7. Jiangkou County (*L. gibbus* Sun, Guo & Zhang 2024). F6. 500 m near Sanhua Mountain (*L. sanhuaensis* Sun, Guo & Zhang 2024). F8–F9. Xianren Cave & Shenxian Cave (*L. latipectus* Hou, Gao & Zhang 2023). F10. Longyan Cave (*L. longyanensis* Hou, Feng & Zhang 2023). F11. Guanniu Cave 1 (*L. guanniuensis* Hou, Feng & Zhang, 2023). F12. Yuqiyuan Cave, Unnamed Cave 4 & Unnamed Cave 5 (*L. nigriculus* Hou, Feng & Zhang 2023). F13. Long Cave (*L. zhijinensis* Hou, Feng & Zhang 2023). F14. Tuoluodadong Cave (*L. tuoluoenensis* Hou, Feng & Zhang 2023). F15. Biyun Cave (*L. biyunensis* Hou, Feng & Zhang 2023). F16. Hongbaituo Cave (*L. longedentatus* Hou, Feng & Zhang 2023). F17. Heping Village (*L. hepingensis* Sun, Guo & Zhang 2024). F18. Xindian Village (*L. houi* Sun, Guo & Zhang 2024). G1. Anjiangping Area (*L. duo* Sun, Guo & Zhang 2024). G2. Unnamed Cave 8 (*L. zhaoae* sp. nov.). G3. Baigu Cave (*L. baiguensis* sp. nov.). G4. Unnamed Cave 3 (*L. jingshengensis* sp. nov.). G5. Guangyang Cave (*L. guangyangensis* sp. nov.). H1. Unnamed Cave 2 (*L. fengi* Hou, Gao & Zhang 2022). H2. Qinglong Cave (*L. retrorsus* Hou, Gao & Zhang 2022). H3. Dayan Cave (*L. xiaolinensis* Hou, Gao & Zhang 2022). H4. Hama Cave (*L. xibaiensis* Hou, Gao & Zhang 2022). H5. Yingshan Cave (*L. spinulentus* Hou, Gao & Zhang 2022). H6. Cangshan National Geolociocal Park (*L. harveyi* Hu & Zhang, in Zhang & Zhang 2014). H7. Yueliang Cave (*L. xinjiaoensis* Hou, Gao & Zhang 2022). H8. Xiao Cave 1 (*L. magnidentatus* Hou, Gao & Zhang 2022). H9. Bailongtang Cave (*L. bailongtanensis* Li, Liu & Shi 2019). H10. Daidai Cave (*L. daidaiensis* Hou, Feng & Zhang 2023). H11. Laoxueyan Cave (*L. laoxueyanensis* Hou, Gao & Zhang 2022). H12. Yanfen Cave (*L. minimus* Hou, Gao & Zhang 2022). H13. Unnamed Cave 6 (*L. serratus* Hou, Gao & Zhang 2022). H14. Unnamed Cave 7 (*L. yaowangguensis* Hou, Gao & Zhang 2022). H15. Unnamed Cave 1 (*L. crassus* Hou, Gao & Zhang 2022).

**TABLE 1.** The geographic distribution of the genus *Lagynochthonius* species from China.

| Species  | Distribution                                      | Collection Date              | Codition of eyes  |
|--|---|------------------------------|---|
| <i>Lagynochthonius apexus</i> <b>sp. nov.</b>                    | Huaer Cave (Sichuan)                              | 31 Jul. 2022                 | Without eyes or eyespots  |
| <i>Lagynochthonius baiguensis</i> <b>sp. nov.</b>                | Baigu Cave (Guangxi)                              | 1 Aug. 2023<br>3 Dec.2023    | Four strongly reduced eyes  |
| <i>Lagynochthonius bailongtanensis</i> Li, Liu & Shi 2019        | Bailongtang Cave (Yunnan)                         | 19 Jul. 2021<br>28 Feb. 2016 | Without eyes or eyespots  |
| <i>Lagynochthonius biyunensis</i> Hou, Feng & Zhang 2023         | Biyun Cave (Guizhou)                              | 5 Aug. 2019<br>2 Aug. 2022   | Without eyes or eyespots  |
| <i>Lagynochthonius brachydigitatus</i> Zhang & Zhang 2014        | Jiulong Mountains (Zhejiang)                      | 4 Jul. 2013                  | Anterior pair of eyes well developed, posterior pair of eyes slightly reduced |
| <i>Lagynochthonius crassus</i> Hou, Gao & Zhang 2022             | Unnamed Cave 1 (Yunnan)                           | 21 Apr. 2021                 | Two eyespots  |
| <i>Lagynochthonius daidaiensis</i> Hou, Feng & Zhang 2023        | Daidai Cave (Yunnan)                              | 20 Jul. 2021                 | Without eyes or eyespots  |
| <i>Lagynochthonius duo</i> Sun, Guo & Zhang 2024                 | Anjiangping Area (Guangxi)                        | 2 Aug. 2023                  | Four eyes   |
| <i>Lagynochthonius fengi</i> Hou, Gao & Zhang 2022               | Unnamed Cave 2 (Yunnan)                           | 30 Sept. 2021                | Without eyes or eyespots  |
| <i>Lagynochthonius galeatus</i> <b>sp. nov.</b>                  | Yanshan Cave (Guizhou)                            | 28 Jan. 2024                 | Without eyes or eyespots  |
| <i>Lagynochthonius gibbus</i> Sun, Guo & Zhang 2024              | Jiangkou County (Guizhou)                         | 3 Jul. 2022<br>28 Jun. 2022  | Four eyes   |
| <i>Lagynochthonius guangyangensis</i> <b>sp. nov.</b>            | Guangyang Cave (Guangxi)                          | 6 Oct. 2019                  | Without eyes or eyespots  |
| <i>Lagynochthonius guanniuensis</i> Hou, Feng & Zhang, 2023      | Guanniu Cave 1 (Guizhou)                          | 25 Jan. 2024                 | Without eyes or eyespots  |
| <i>Lagynochthonius harveyi</i> Hu & Zhang, in Zhang & Zhang 2014 | Cangshan National Geologiocal Park (Yunnan)       | 6 Aug. 2010                  | Four eyes   |
| <i>Lagynochthonius hepingensis</i> Sun, Guo & Zhang 2024         | Heping Village (Guizhou)                          | 7 Aug. 2022                  | Four eyes   |
| <i>Lagynochthonius houi</i> Sun, Guo & Zhang 2024                | Xindian Village (Guizhou)                         | 9 Aug. 2022                  | Four eyes   |
| <i>Lagynochthonius infirmus</i> <b>sp. nov.</b>                  | Guanniu Cave 2 (Sichuan)                          | 30 Aug. 2020                 | Two eyespots  |
| <i>Lagynochthonius jingshengensis</i> <b>sp. nov.</b>            | Unnamed Cave 3 (Guangxi)                          | 29 Jul. 2021                 | Without eyes or eyespots  |
| <i>Lagynochthonius laoxueyanensis</i> Hou, Gao & Zhang 2022      | Laoxueyan Cave (Yunnan)                           | 17 Oct. 2021                 | Without eyes or eyespots  |
| <i>Lagynochthonius latipectus</i> Hou, Gao & Zhang 2023          | Xianren Cave (Guizhou)<br>Shenxian Cave (Guizhou) | 15 Aug. 2022<br>4 Jul. 2022  | Two eyespots  |
| <i>Lagynochthonius leptopalpus</i> Hu & Zhang 2012               | Jian-fengling Mountain (Hainan)                   | 31 May 2009                  | Four eyes   |
| <i>Lagynochthonius longedentatus</i> Hou, Feng & Zhang 2023      | Hongbaituo Cave (Guizhou)                         | 10 Oct. 2021                 | Without eyes or eyespots  |
| <i>Lagynochthonius longquanensis</i> <b>sp. nov.</b>             | Longquan Cave (Sichuan)                           | 6 Oct. 2019                  | Two eyespots  |
| <i>Lagynochthonius longyanensis</i> Hou, Feng & Zhang 2023       | Longyan Cave (Guizhou)                            | 6 Jul. 2021                  | Without eyes or eyespots  |
| <i>Lagynochthonius maanensis</i> Hou, Feng & Zhang, 2023         | Pianxiao Cave (Guizhou)                           | 25 Aug. 2020<br>27 Jan. 2024 | Without eyes or eyespots  |

.....continued on the next page

TABLE 1. (Continued)

| Species  | Distribution  | Collection Date   | Codition of eyes         |
|--|---|---|--------------------------|
| <i>Lagynochthonius magnidentatus</i> Hou, Gao & Zhang 2022 | Xiao Cave 1 (Yunnan)  | 9 Oct. 2021   | Without eyes or eyespots |
| <i>Lagynochthonius mawangensis</i> Hou, Feng & Zhang 2023  | Mawang Cave (Guizhou)   | 24 Aug. 2020  | Without eyes or eyespots |
| <i>Lagynochthonius medog</i> Zhang & Zhang 2014            | Medog County (Xizang)   | 20 Sept. 2013   | Four eyes                |
| <i>Lagynochthonius minimus</i> Hou, Gao & Zhang 2022       | Yanfen Cave (Yunnan)  | 15 Oct. 2021  | Without eyes or eyespots |
| <i>Lagynochthonius niger</i> Hu & Zhang 2012               | Bawangling (Hainan)   | 18 May 2009<br>9 Jun. 2009  | Four eyes                |
| <i>Lagynochthonius nigriculus</i> Hou, Feng & Zhang 2023   | Yuqiyan Cave (Guizhou)<br>Unnamed Cave 4 (Guizhou)<br>Unnamed Cave 5 (Guizhou)  | 4 Oct. 2021<br><br>31 Jul. 2022   | Without eyes or eyespots |
| <i>Lagynochthonius retrorsus</i> Hou, Gao & Zhang 2022     | Qinglong Cave (Yunnan)  | 3 Oct. 2021   | Without eyes or eyespots |
| <i>Lagynochthonius sanhuaensis</i> Sun, Guo & Zhang 2024   | 500 m near Sanhua Mountain (Guizhou)  | 7 Jul. 2022   | Four eyes                |
| <i>Lagynochthonius serratus</i> Hou, Gao & Zhang 2022      | Unnamed Cave 6 (Yunnan)   | 23 Jul. 2021  | Without eyes or eyespots |
| <i>Lagynochthonius sinensis</i> (Beier, 1967)              | Lichuan County (Hubei Province)   | Aug. 1948   | Four eyes                |
| <i>Lagynochthonius spinulentus</i> Hou, Gao & Zhang 2022   | Yingshan Cave (Yunnan)  | 28 Sept. 2021   | Without eyes or eyespots |
| <i>Lagynochthonius tonkinensis</i> (Beier 1951)            | Tianmu Mountain (Zhejiang)<br>Xishuanbanna (Yunnan)<br>Mengleng Tropical Garden (Yunnan)<br>Mengleng (Yunnan)<br>Mengyang Nature Reserve (Yunnan) | 5 Sept. 1989<br>Apr.–Jul. 1993<br>9 Apr. 1992<br>10 Apr. 1992<br>10–14 Sept. 1994 | Four eyes                |
| <i>Lagynochthonius tuoluensis</i> Hou, Feng & Zhang 2023   | Tuoluodadong Cave (Guizhou)   | 6 Aug. 2019   | Without eyes or eyespots |
| <i>Lagynochthonius xiaoensis</i> Hou, Feng & Zhang, 2023   | Xiao Cave 2 (Guizhou)   | 27 Jul. 2019<br>26 Jan. 2024  | Without eyes or eyespots |
| <i>Lagynochthonius xiaolinensis</i> Hou, Gao & Zhang 2022  | Dayan Cave (Yunnan)   | 29 Sept. 2021   | Without eyes or eyespots |
| <i>Lagynochthonius xibaiensis</i> Hou, Gao & Zhang 2022    | Hama Cave (Yunnan)  | 10 Aug. 2019  | Without eyes or eyespots |
| <i>Lagynochthonius xinjiaoensis</i> Hou, Gao & Zhang 2022  | Yueliang Cave (Yunnan)  | 8 Oct. 2021   | Without eyes or eyespots |
| <i>Lagynochthonius yaowanguensis</i> Hou, Gao & Zhang 2022 | Unnamed Cave 7 (Yunnan)   | 19 Apr. 2021<br>22 Jul. 2021  | Without eyes or eyespots |
| <i>Lagynochthonius zhakouensis</i> <b>sp. nov.</b>         | Zhakou Cave (Sichuan)   | 30 Jul. 2022  | Two eyespots             |
| <i>Lagynochthonius zhaoae</i> <b>sp. nov.</b>              | Unnamed Cave 8 (Guangxi)  | 30 Nov. 2023  | Two eyespots             |
| <i>Lagynochthonius zhijinensis</i> Hou, Feng & Zhang 2023  | Long Cave (Guizhou)   | 2 Oct. 2019   | Without eyes or eyespots |

## Key to the species of genus *Lagynochthonius* from China

1. Carapace with eyes or eyespots ..... 2
- Carapace without eyes or eyespots ..... 20
2. Eyes well-developed ..... 3
- Eyes strongly reduced ..... 14
3. Tergites I and II each with two setae ..... 4
- Tergites I and II each with four setae ..... 6
4. Epistome present ..... 5
- Epistome absent ..... *L. medog* Zhang & Zhang, 2014
5. Fixed chelal finger with intercalary teeth .....  
..... *L. duo* Sun, Guo & Zhang, 2024
- Fixed chelal finger without intercalary teeth .....  
..... *L. houi* Sun, Guo & Zhang, 2024
6. At least one finger of chela with intercalary teeth ..... 7
- Both chelal fingers without intercalary teeth ..... 10
7. Both chelal fingers with intercalary teeth ..... 8
- Only fixed chelal finger with intercalary teeth ..... 9
8. Carapace with a hump-shaped epistome; four eyes well-developed ..... *L. hepingensis* Sun, Guo & Zhang, 2024
- Carapace with a flat, rounded epistome; posterior pair of eyes spot-like ..... *L. tonkinensis* (Beier, 1951)
9. Carapace without epistome .....  
..... *L. harveyi* Zhang & Zhang, 2014
- Carapace with a hump-shaped epistome .....  
..... *L. gibbus* Sun, Guo & Zhang, 2024
10. Epistome present ..... 11
- Epistome absent ..... 12
11. Epistome triangular; pedipalpal chela length 0.75–0.93 mm, 5.17–6.25 times as long as broad .....  
..... *L. niger* Hu & Zhang, 2012
- Epistome hump-shaped; pedipalpal chela length 0.68–0.73 mm, 6.80–7.30 times as long as broad .....  
..... *L. sanhuaensis* Sun, Guo & Zhang, 2024
12. Four eyes well-developed ..... 13
- Anterior pair of eyes well-developed, posterior pair of eyes reduced to eyespots .....  
..... *L. brachydigitatus* Zhang & Zhang, 2014
13. Pedipalpal chela length 0.72 mm, 4.80 times as long as broad ..... *L. sinensis* (Beier, 1967)
- Pedipalpal chela length 0.95–1.00 mm, 5.56–6.33 times as long as broad ..... *L. leptopalpus* Hu & Zhang, 2012
14. Carapace with four strongly reduced eyes .....  
..... *L. baiguensis* **sp. nov.**
- Carapace only with two eyespots ..... 15
15. Tergites I and II each with two setae ..... 16
- Tergites I and II each with four setae ..... 18
16. Epistome present ..... *L. zhaoae* **sp. nov.**
- Epistome absent ..... 17
17. The length of chela femur (0.78 mm) and pedipalpal chela (1.08 mm); chela femur 7.80 (♀) times longer than broad..  
..... *L. zhakouensis* **sp. nov.**
- The length of chela femur (0.61 mm) and pedipalpal chela (0.88 mm); chela femur 5.54 (♀) times longer than broad..  
..... *L. longquanensis* **sp. nov.**
18. Epistome triangular; pedipalpal chela length 1.61 mm (♂), 1.69–1.77 mm (♀) ..... *L. infirmus* **sp. nov.**
- Epistome obtuse and small, round; pedipalpal chela length not more than 1.60 mm (♂♀) ..... 19
19. Pedipalpal chela 7.00–7.14 (♂), 6.40–6.46 (♀) times as long as broad (length 1.54–1.57 (♂), 1.55–1.60 (♀) mm); palpal femur 8.21–8.50 (♂), 7.50–7.87 (♀) times as long as broad (length 1.15–1.19 (♂), 1.18–1.20 (♀) mm) .....  
..... *L. crassus* Hou, Gao & Zhang, 2022
- Pedipalpal chela 7.33–7.67 (♂), 6.71–6.82 (♀) times as long as broad (length 1.32–1.38 (♂), 1.41–1.50 (♀) mm); palpal femur 6.92–7.23 (♂), 6.80–7.29 (♀) times as long as broad (length 0.90–0.94 (♂), 1.02 (♀) mm) .....  
..... *L. latipectus* Hou, Feng & Zhang, 2023
20. Carapace without antero-median setae; trichobothrium *sb* closer to *b* than to *st* ..... 21
- Carapace with antero-median setae; trichobothrium *sb* closer to *st* than to *b* or midway between *st* and *b* ..... 22
21. Epistome pointed and small, triangular; pedipalpal chela 7.03 (♂) times as long as broad (length 2.04 mm) .....  
..... *L. xinjiaoensis* Hou, Gao & Zhang, 2022
- Epistome small and obtuse, rounded; pedipalpal chela 6.44–6.46 (♂), 5.87–6.04 (♀) times as long as broad (1.55–1.61 (♂), 1.69–1.76 (♀) mm) .....  
..... *L. magnidentatus* Hou, Gao & Zhang, 2022
22. At least one chela finger with intercalary teeth ..... 23
- Both chelal fingers without intercalary teeth ..... 32
23. Only fixed chelal finger with intercalary teeth ..... 24
- Both chelal fingers with intercalary teeth ..... 26
24. Movable chelal finger teeth markedly retrorse and contiguous ..... *L. retrorsus* Hou, Gao & Zhang, 2022
- Movable chelal finger teeth upright and contiguous ..... 25
25. Tergite X with two setae; pedipalpal chela length 1.79–1.85 mm (♀), chela femur length 1.27–1.28 mm (♀), 8.47–8.53 (♀) times as long as broad; trichobothrium *sb* situated midway between *st* and *b* .....  
..... *L. zhijinensis* Hou, Feng & Zhang, 2023
- Tergite X with four setae; pedipalpal chela length 2.06–2.19 mm (♀), chela femur length 1.47–1.48 mm (♀), 7.40–7.74 (♀) times as long as broad; trichobothrium *sb* slightly closer to *st* than to *b* ..... *L. spinulentus* Hou, Gao & Zhang, 2022
26. Tergites II and III each with four setae ..... 27
- Tergites II and III each with two setae ..... 28
27. Tergites I with four setae; pedipalpal chela length 1.84 mm (♂), 1.83–1.91 mm (♀), 8.76 (♂), 8.30–8.32 (♀) times as long as broad; chela femur length 1.36 mm (♂), 1.35–1.41 mm (♀), 10.46 (♂), 10.07–10.38 (♀) times as long as broad; trichobothrium *sb* situated midway between *st* and *b* .....  
..... *L. yaowangguensis* Hou, Gao & Zhang, 2022
- Tergites I with two setae; pedipalpal chela length 1.33 mm (♂), 1.26 mm (♀), 6.65 (♂), 6.63 (♀) times as long as broad; chela femur length 0.93 mm (♂), 0.89 mm (♀), 7.15 (♂), 7.42 (♀) times as long as broad; trichobothrium *sb* slightly closer to *st* than to *b* .....  
..... *L. longedentatus* Hou, Feng & Zhang, 2023
28. Tergites IV and X each with four setae .....  
..... *L. guangyangensis* **sp. nov.**
- Tergites IV and X each with two setae ..... 29
29. Trichobothrium *sb* slightly closer to *st* than to *b* ..... 30
- Trichobothrium *sb* situated midway between *st* and *b* ... 31
30. Carapace markedly narrowed posteriorly; chela 8.38–8.84 (♂) times as long as broad, hand 3.38–3.58 (♂) times longer than broad; proximal half of movable chelal finger without vestigial teeth ..... *L. serratus* Hou, Gao & Zhang, 2022

- Carapace gently narrowed posteriorly; chela 7.00 (♂) times as long as broad, hand 2.92 (♂) times longer than broad; proximal half of movable chelal finger with 6 vestigial teeth ..... *L. xiaolinensis* Hou, Gao & Zhang, 2022
31. Pedipalpal chela length 1.53–1.54 mm (♂), 1.53–1.55 mm (♀); chela femur length 1.06–1.07 mm (♂), 1.08–1.15 mm (♀); fixed chelal finger with 23–25 macrodenticles, slightly retrorse and pointed, plus 14–15 intercalary microdenticles ..... *L. fengi* Hou, Gao & Zhang, 2022
- Pedipalpal chela length 1.88–1.99 mm (♂), 1.89–2.01 mm (♀); chela femur length 1.35–1.39 mm (♂), 1.36–1.41 mm (♀); fixed chelal finger with 31–36 macrodenticles, slightly retrorse and pointed, plus 27–31 intercalary microdenticles ..... *L. guanniensis* Hou, Feng & Zhang, 2023
32. Tergites I and II each with two setae ..... 33
- Tergites I and II each with four setae ..... 38
33. Tergites X with two setae .....  
..... *L. nigriculus* Hou, Feng & Zhang, 2023
- Tergites X with four setae ..... 34
34. Tergites III and IV each with two setae .....  
..... *L. daidaiensis* Hou, Feng & Zhang, 2023
- Tergites III and IV each with four setae ..... 35
35. Epistome triangular .....  
..... *L. laoxueyanensis* Hou, Gao & Zhang, 2022
- Epistome hump-shaped ..... 36
36. Pedipalpal chelal length 0.78–0.83 mm (♂), 0.85 mm (♀) mm; fixed chelal finger teeth for numbers 17–19 .....  
..... *L. jingshengensis* sp. nov.
- Pedipalpal chelal length at least 0.87 mm; fixed chelal finger teeth for numbers at least 23 ..... 37
37. Chelal finger 1.64 (♂), 1.55–1.61 (♀) times longer than hand, hand 1.89–2.25 (♂), 2.28–2.32 (♀) times as long as broad ..... *L. maanensis* Hou, Feng & Zhang, 2023
- Chelal finger 1.56–1.59 (♂), 1.48–1.50 (♀) times longer than hand, hand 2.27–2.43 (♂), 2.35–2.38 (♀) times as long as broad ..... *L. tuoluensis* Hou, Feng & Zhang, 2023
38. Galea present ..... 39
- Galea completely vestigial ..... 43
39. Galea helmet-shaped ..... *L. galeatus* sp. nov.
- Galea bump-shaped ..... 40
40. Epistome triangular *L. xibaiensis* Hou, Gao & Zhang, 2022
- Epistome hump-shaped ..... 41
41. Trichobothrium *sb* situated midway between *st* and *b* ... 42
- Trichobothrium *sb* slightly closer to *st* than to *b* .....  
..... *L. mawangensis* Hou, Feng & Zhang, 2023
42. Pedipalpal chela length 1.26–1.32 mm (♂), 1.38 mm (♀), 6.63–6.95 (♂), 5.75 (♀) times as long as broad; chela femur length 0.90–0.95 mm (♂), 0.99 mm (♀), 6.79–7.50 (♂), 7.07 (♀) times as long as broad .....  
..... *L. longyanensis* Hou, Feng & Zhang, 2023
- Pedipalpal chela length 0.93 mm (♂), 0.89–0.96 mm (♀), 6.20 (♂), 6.00–6.85 (♀) times as long as broad; chela femur length 0.66 mm (♂), 0.63–0.66 mm (♀), 6.00 (♂), 5.73–6.00 (♀) times as long as broad .....  
..... *L. xiaoensis* Hou, Feng & Zhang, 2023
43. Trichobothrium *sb* situated midway between *st* and *b* .....  
..... *L. biyunensis* Hou, Feng & Zhang, 2023
- Trichobothrium *sb* slightly closer to *st* than to *b* ..... 44
44. Epistome small, obtuse .....  
..... *L. bailongtanensis* Li, Liu & Shi 2019
- Epistome obvious ..... 45
45. Epistome peak-shaped; pedipalpal chela length 1.51–1.52 mm (♂), 1.39–1.62 mm (♀), 8.44–8.88 (♂), 7.48–8.10 (♀) times as long as broad; chela femur length 1.09 mm (♂), 1.00–1.21 (♀), 9.08 (♂), 8.07–10.08 (♀) times as long as broad ..... *L. apexus* sp. nov.
- Epistome hump-shaped; pedipalpal chela length 0.76–0.85 mm (♂), 0.85–0.86 mm (♀), 6.07–6.33 (♂), 6.14–6.54 (♀) times as long as broad; chela femur length 0.56–0.60 mm (♂), 0.59–0.61 mm (♀), 6.67–7.00 (♂), 5.90–6.10 (♀) times as long as broad .....  
..... *L. minimus* Hou, Gao & Zhang, 2022

***Lagynochthonius apexus* sp. nov.**

Chinese name. 顶突拉伪蝎

Figs 3–6

**Type material.** Holotype ♂ (Ps.-MHBUSC2022073101): China, Sichuan Province, Luzhou City, Gulin County, Shiping Town, Xiangding Village, Huaer Cave [28.02556943°N, 106.01076007°E], 618 m a.s.l., 31 July 2022, Zegang Feng, Liu Fu, Long Hao & Jiaqi Zhao leg. Paratypes: 1 ♂ (Ps.-MHBUSC2022073102) and 5 ♀ (Ps.-MHBUSC2022073103–07), all with the same data as the holotype.

**Etymology.** The specific name is derived from the Latin word “*apex*”, meaning peak, which refers to the shape of the epistome.

**Diagnosis.** (♂♀). Moderately sized hypogean species; carapace without eyes or eyespots, anterior margin smooth and epistome peak-shaped; tergites I–IV each with four setae. Rallum with eight blades. Pedipalps slender, chela 8.44–8.88 (♂), 7.48–8.10 (♀) times as long as broad; femur 9.08 (♂), 8.07–10.08 (♀) times as long as broad; both chelal fingers without intercalary teeth and a modified accessory tooth (*td*) on prolateral-retrolateral face; chemosensory setae (*sc*) present on dorsum of chelal hand.

**Description.** Adult males (holotype and paratype) (Figs 3A, 4A–F, 5, 6).

**Color** generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.

**Cephalothorax** (Figs 4D, 5A): carapace nearly subquadrate, 1.02–1.06 times as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin smooth, without serrations; epistome peak-shaped, without eyes or eyespots; with 18 setae arranged s4s: 4: 4: 2: 2, most setae heavy, long and gently curved, anterolateral setae much shorter than others; with three pairs of lyrifissures, anterior two pairs situated middle and flank to the setae of ocular row, the third pair situated lateral to the sole pair of setae of posterior row. Manducatory process with two acuminate distal setae, anterior seta more than 1/2 length of medial seta; apex of coxa I with a rounded anteromedial process; coxae II with 8–11 terminally indented coxal spines on each side, set as an oblique and arc row, central spines slightly longer

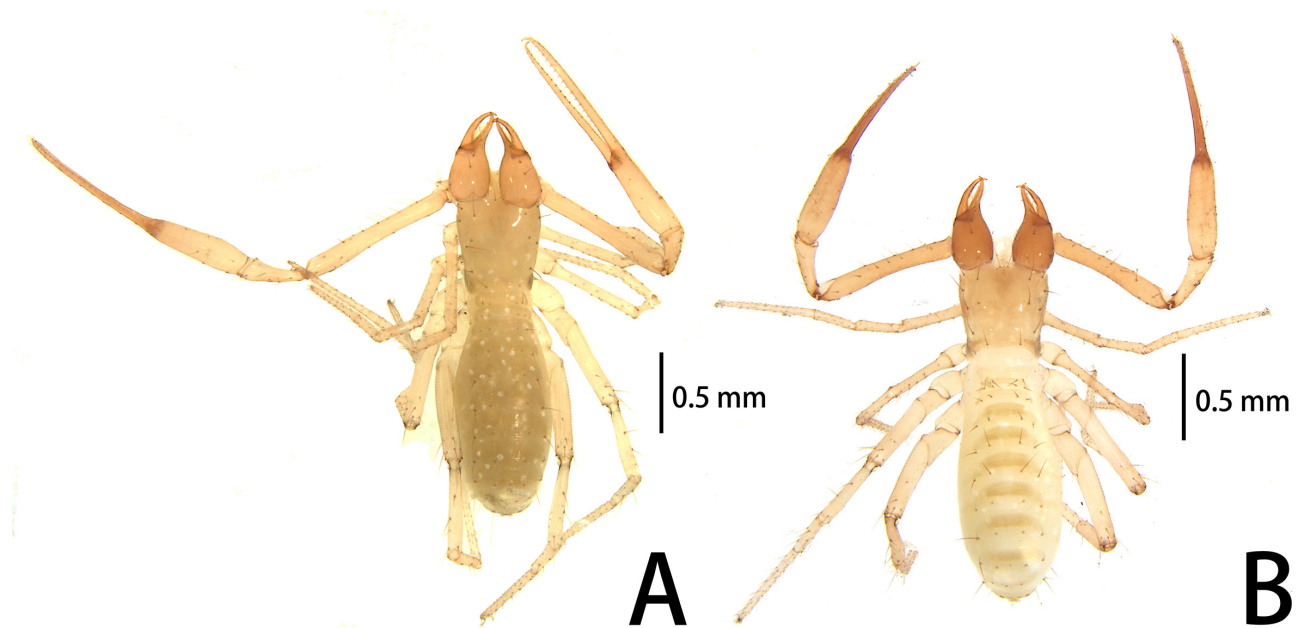


FIGURE 3. *Lagynochthonius apexus* sp. nov., A. Holotype male (dorsal view); B. Paratype female (dorsal view).

than the others (Fig. 5D); intercoxal tubercle absent; chaetotaxy of coxae: P 3, I 3, II 4, III 5, IV 5.

**Chelicera** (Figs 4C, 5B): almost as long as carapace, 1.80–1.83 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 16–18 teeth, distal one largest; movable finger with 12–13 retrorse contiguous small teeth; galea completely vestigial (Fig. 5B). Serrula exterior with 22 and serrula interior with 13 blades. Rallum with 7–8 blades, the distal one longest and recumbent basally, with fine barbules and slightly set apart from the other blades, latter tightly grouped and with long pinnae, some of which are subdivided (Fig. 5C).

**Pedipalp** (Figs 4A–B, 4E, 5E, 6A–B): trochanter 1.75–2.00, femur 9.08, patella 2.80–3.00, chela 8.44–8.88, hand 3.39–3.52 times as long as broad; femur 2.59 times as long as patella; movable chelal finger 0.90–0.91 times as long as hand and 1.49–1.50 times as long as chela. Setae generally long and acuminate. Chelal hand gradually constricted towards fingers, apodeme complex of movable chelal finger strongly 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, close to chelal teeth; *dx* situated distal to *et*; *sb* slightly closer to *st* than to *b*; *b* and *t* situated subdistally, *t* situated at the same level as *it* and distal to *b*; *est* situated distal to *b* and close to *it* (Figs. 4A, 6A). Microsetae (chemosensory setae) present on dorsum of chelal hand (Figs. 4B, 6B).

Both chelal fingers with a row of teeth, spaced regularly along the margin, teeth smaller distally and proximally: fixed finger with 22–24 well-spaced, pointed teeth, and a modified accessory tooth on prolateral-retrolateral face (*td*, slightly distal to *dx*); movable finger with 13–15 well-spaced, pointed teeth, plus 8–12 vestigial, rounded and contiguous basal teeth.

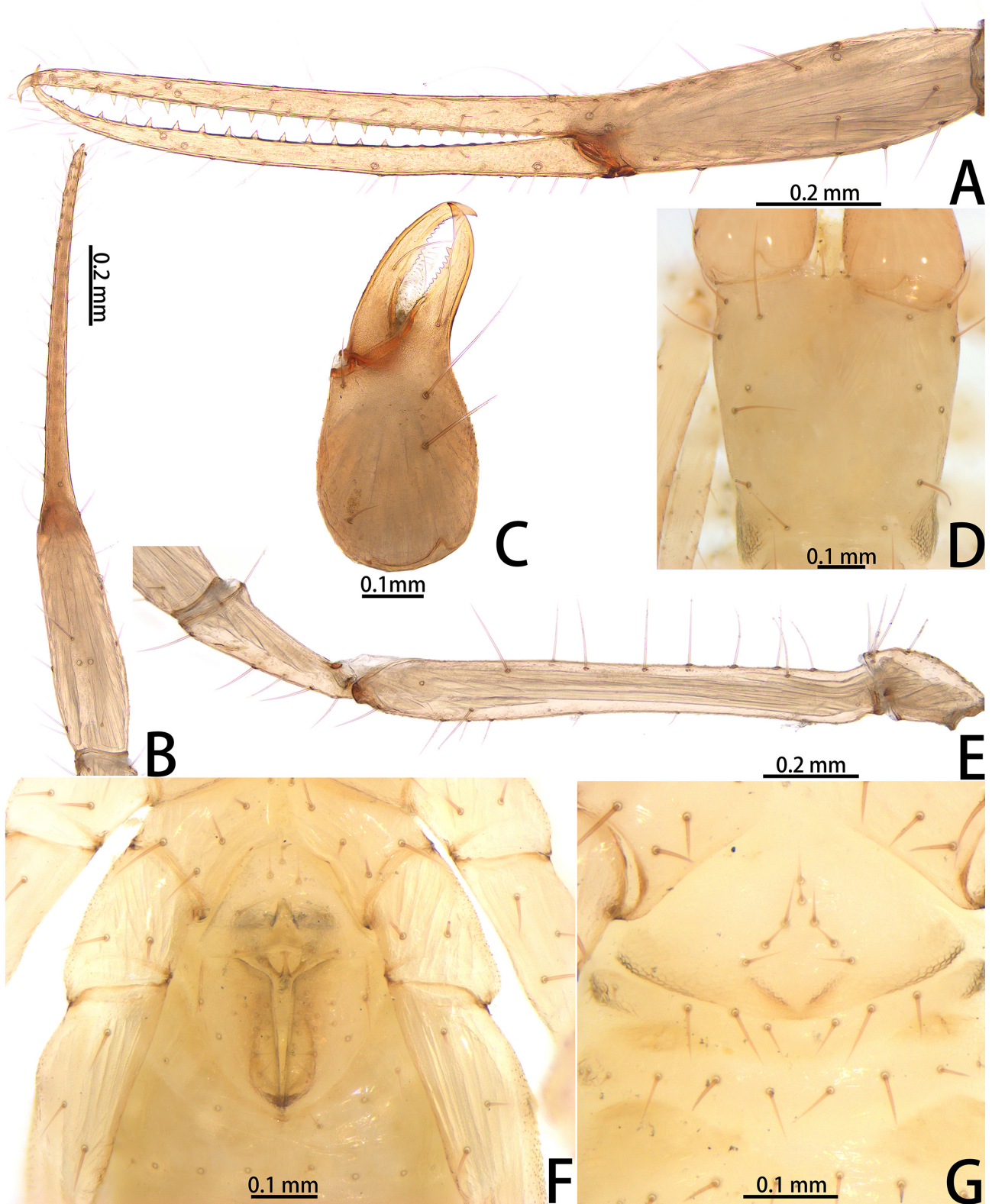
**Opisthosoma**: generally typical, pleural membrane finely granulated. All tergites and sternites undivided; setae uniseriate and acuminate. Tergal chaetotaxy I–XII: 4: 4: 4: 4: 4: 4: 4: 4: 5: 4: T2T: 0. Sternal chaetotaxy IV–XII: 8: 8–9: 8–10: 8–9: 9: 8–10: 8–11: -: 2. Genital region: sternite II with 6 setae scattered on median area, genital opening slit-like, sternite III with 24–28 setae (Fig. 4F).

**Legs** (Fig. 6C–D): fine granulation present on anterodorsal faces of femur IV and patella IV. Leg I: femur 1.82–1.84 times as long as patella; tarsus 2.23–2.39 times as long as tibia. Leg IV: femoropatella 3.71–3.88 times as long as deep; tibia 6.00–6.89 times as long as deep; with basal tactile setae on both tarsal segments: basitarsus 3.63–3.86 times as long as deep (TS = 0.35–0.37), telotarsus 11.83–14.60 times as long as deep and 2.45–2.70 times as long as basitarsus (TS = 0.27–0.28). Setae of leg I (trochanter to tibia) 2–4: 10–11: 5–8: 8–13, setae of leg IV (trochanter to basitarsus) 2–3: 3: 4–5: 8–10: 6–7. Arolium not divided, slightly shorter than the simple claws.

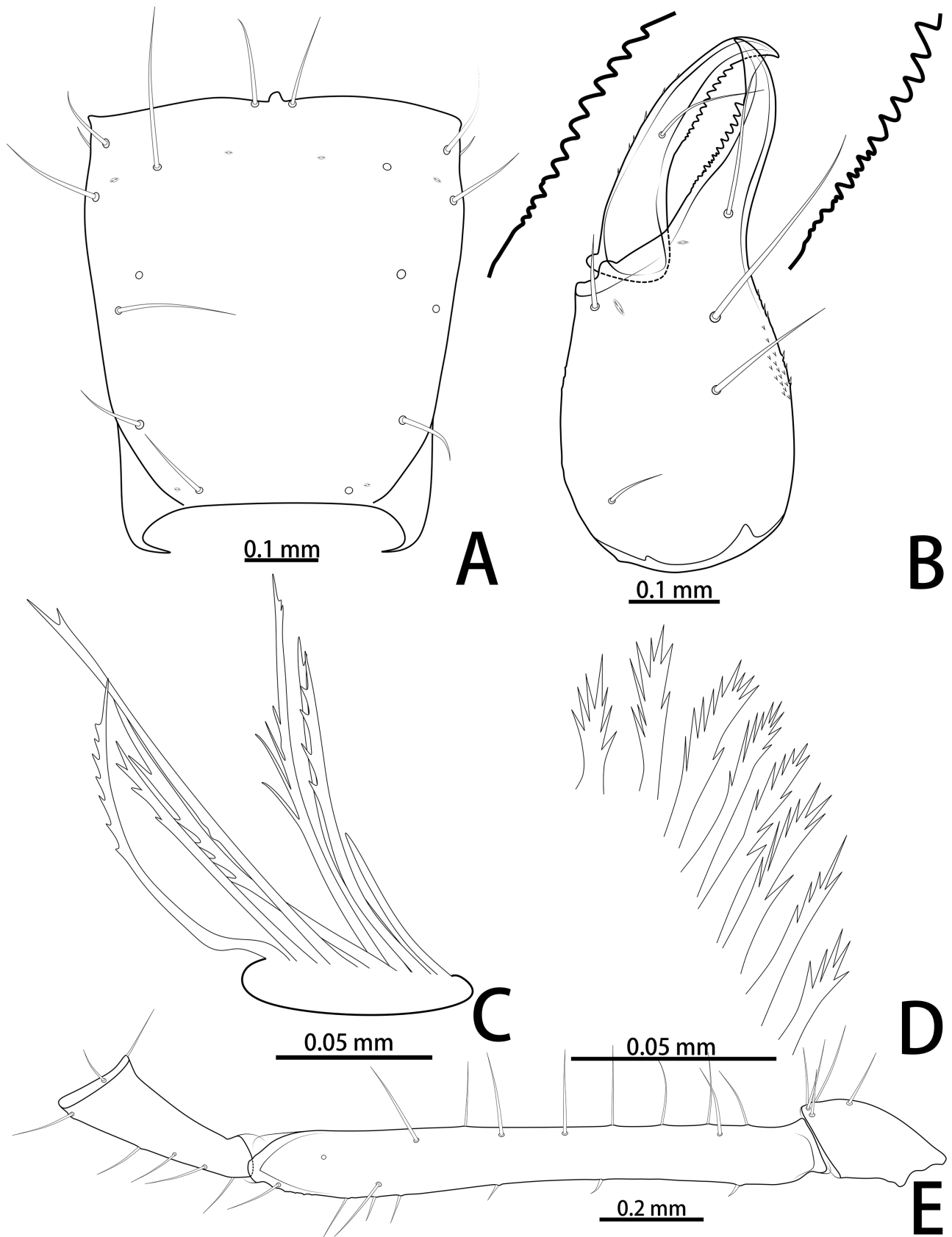
**Adult female** (paratypes) (Figs 3B, 4G). Mostly same as male; tergal chaetotaxy I–XII: 4: 4: 4: 4: 4: 4: 4: 4–5: 5–6: 3–4: T2T: 0; sternal chaetotaxy IV–XII: 8: 8–12: 8: 9: 10: 9–11: 7–13: -: 2. Genital region: sternite II with 8–10 setae scattered on median area, sternite III with a row of 12 setae.

**Dimensions** (length/breadth or, in the case of the legs, length/depth in mm; ratios in parentheses). Males: body length 1.54–1.94. Pedipalps: trochanter 0.28/0.14–

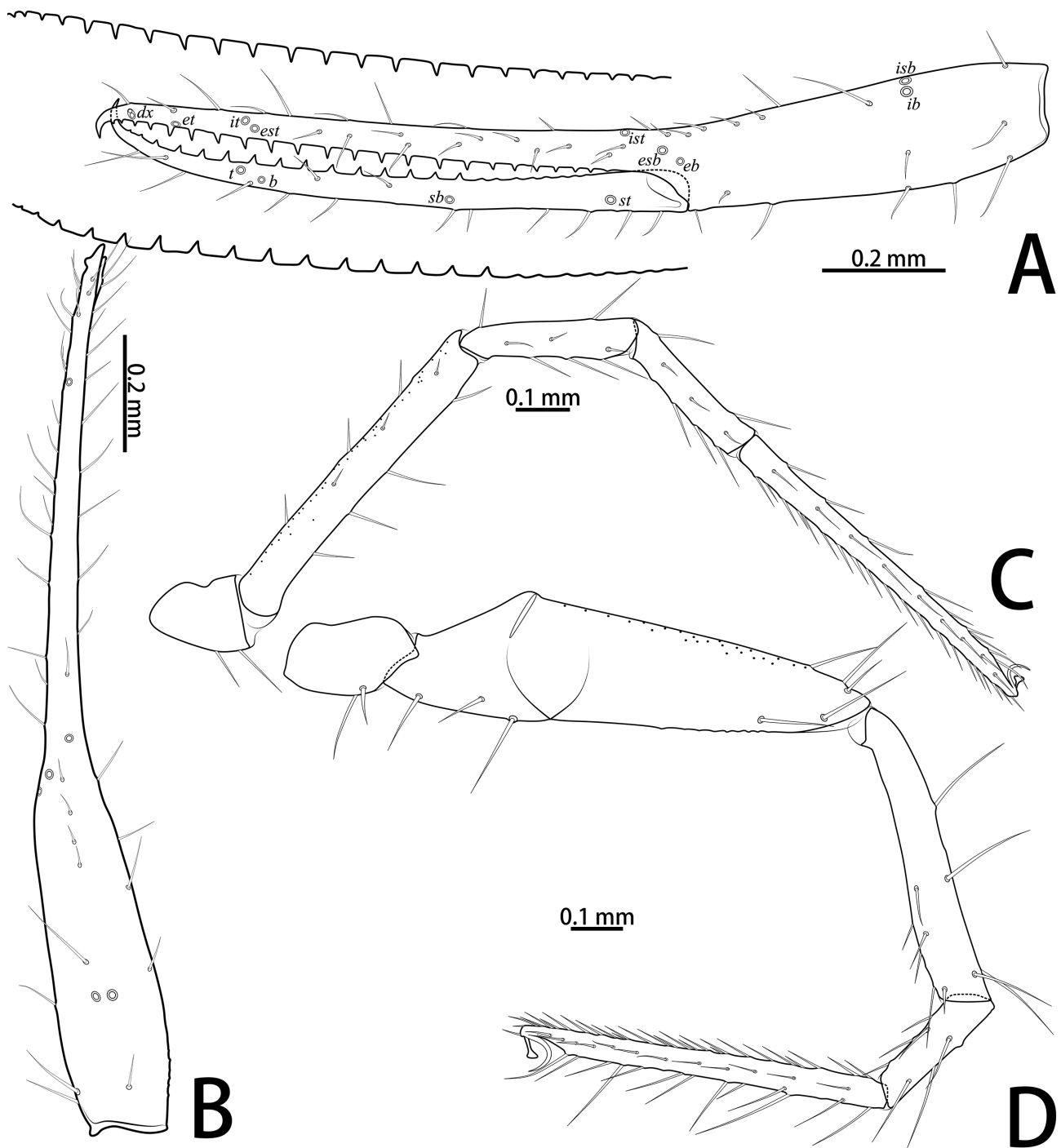




**FIGURE 4.** *Lagynochthonius apexus* sp. nov., holotype male (A–F), paratype female (G): A. Left chela (lateral view); B. Left chela (dorsal view); C. Left chelicera (dorsal view); D. Carapace (dorsal view); E. Left pedipalp (minus chela, dorsal view); F. Male genital area (ventral view); G. Female genital area (ventral view).



**FIGURE 5.** *Lagynochthonius apexus* sp. nov., holotype male: 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).



**FIGURE 6.** *Lagynochthonius apexus* sp. nov., holotype male: 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).

0.16 (1.75–2.00), femur 1.09/0.12 (9.08), patella 0.42/0.14–0.15 (2.80–3.00), chela 1.51–1.52/0.17–0.18 (8.44–8.88), hand 0.60–0.61/0.17–0.18 (3.39–3.52), movable chelal finger length 0.90–0.91. Chelicera 0.54–0.55/0.30 (1.76–1.94), movable finger length 0.30. Carapace 0.54–0.56/0.53 (1.02–1.06). Leg I: trochanter 0.19/0.11–0.13 (1.46–1.73), femur 0.59–0.60/0.09 (6.56–6.67), patella 0.32–0.33/0.07 (4.57–4.71), tibia 0.28–0.30/0.06 (4.67–5.00), tarsus 0.67/0.05 (13.4). Leg IV: trochanter 0.25/0.14–0.16 (1.56–1.79), femoropatella

0.89–0.93/0.24 (3.71–3.88), tibia 0.60–0.62/0.09–0.10 (6.00–6.89), basitarsus 0.27–0.29/0.07–0.08 (3.63–3.86), telotarsus 0.71–0.73/0.05–0.06 (11.83–14.60).

Females: body length 1.49–1.95. Pedipalps: trochanter 0.27–0.34/0.14–0.16 (1.93–2.13), femur 1.00–1.21/0.12–0.14 (8.07–10.08), patella 0.36–0.48/0.14–0.17 (2.57–2.88), chela 1.39–1.62/0.18–0.21 (7.48–8.10), hand 0.55–0.66/0.18–0.21 (3.00–3.30), movable chelal finger length 0.83–0.98. Chelicera 0.53–0.59/0.28–0.33 (1.77–1.89), movable finger length 0.30–0.34. Carapace

0.48–0.58/0.52–0.60 (0.92–1.00). Leg I: trochanter 0.18–0.20/0.10–0.14 (1.43–1.80), femur 0.55–0.65/0.07–0.09 (6.11–8.57), patella 0.26–0.34/0.06–0.08 (4.25–4.86), tibia 0.23–0.32/0.06–0.07 (3.83–5.33), tarsus 0.58–0.72/0.05–0.07 (10.14–12.00). Leg IV: trochanter 0.22–0.27/0.14–0.17 (1.47–1.64), femoropatella 0.82–0.95/0.21–0.23 (3.73–4.38), tibia 0.49–0.66/0.09–0.10 (5.44–7.33), basitarsus 0.25–0.30/0.07–0.08 (3.13–4.71), telotarsus 0.61–0.76/0.05–0.06 (10.17–15.00).

**Remarks.** *Lagynochthonius apexus* sp. nov. most closely resembles *L. bailongtanensis* in the absence of intercalary teeth, the presence of four setae on tergites I–IV and carapace without eyes or eyespots, but differs in following several characters: shorter pedipalpal chela (1.51–1.52 mm (♂), 1.39–1.62 mm (♀) compared to 1.85–2.22 mm (♂), 1.94–2.03 mm (♀) in *L. bailongtanensis*) and shorter pedipalpal femur (1.09 mm (♂), 1.00–1.21 mm (♀) compared to 1.30–1.58 mm (♂), 1.35–1.56 mm (♀) in *L. bailongtanensis*) and carapace (0.54–0.56 mm (♂), 0.48–0.58 mm (♀) compared to 0.66–0.72 mm (♂), 0.59–0.68 mm (♀) in *L. bailongtanensis*) (Li *et al.* 2019).

**Distribution.** Known only from the type locality. (China, Sichuan Province).

***Lagynochthonius baiguensis* sp. nov.**

Chinese name. 白骨拉伪蝎

Figs 7–11

**Typematerial.** Holotype ♂ (Ps.-MHBG-GX2023080101): China, Guangxi Zhuang Autonomous Region, Guilin City, Qixing County, Baigu Cave [25.22612311°N, 110.33612284°E], 216 m a.s.l., 1 August 2023, Kun Yu & Jianzhou Sun leg. Paratypes: 1 ♂ (Ps.-MHBG-

GX2023080102) and 1 ♀ (Ps.-MHBG-GX2023080103), all with the same data as the holotype; 2 ♂ (Ps.-MHBG-GX2023120204–05), 160 m a.s.l., 3 December 2023, Jiaqi Zhao, Tao Zheng, Songtao Shi & Jianzhou Sun legit, Except for the time, others with the same data as the holotype.

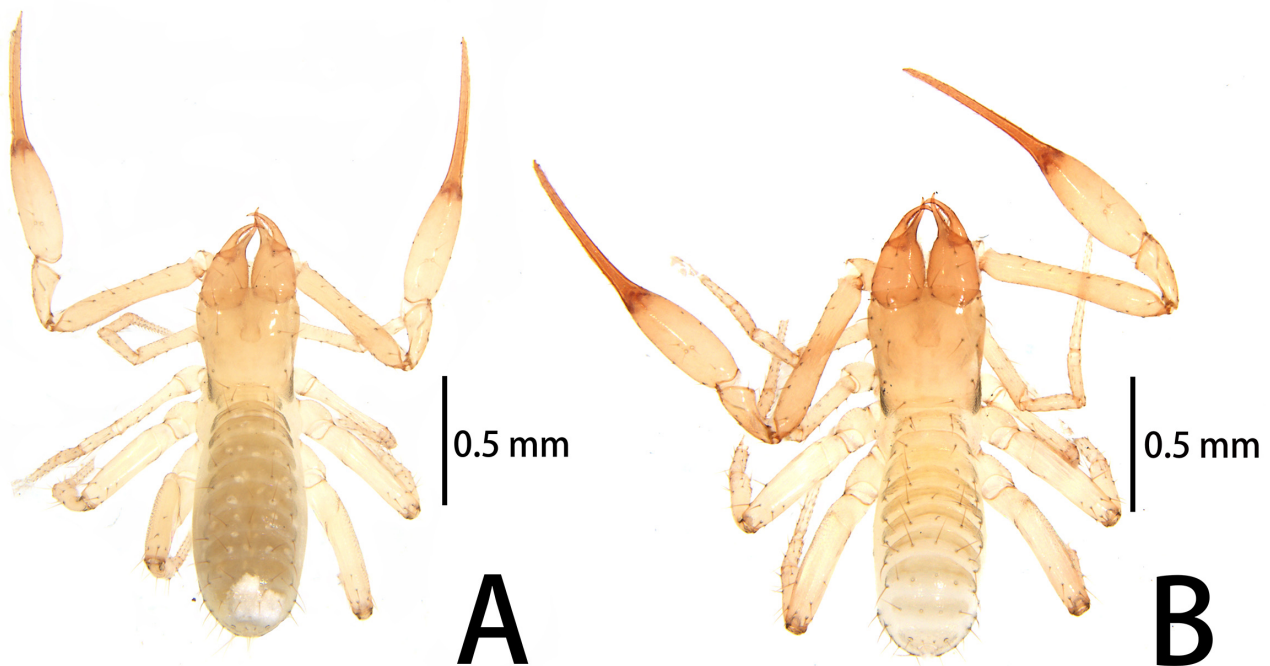
**Etymology.** Named after the type locality, Baigu Cave.

**Diagnosis.** (♂♀). Small sized hypogean species; carapace with four strongly reduced eyes, anterior margin smooth and epistome small and triangular; tergites I with two setae. Pedipalps slender, chela 6.00–6.44 (♂), 6.00 (♀) times as long as broad; femur 6.53–8.11 (♂), 6.42 (♀) times as long as broad; both chelal fingers without intercalary teeth and a modified accessory tooth (*td*) on prolateral-retrolateral face; chemosensory setae (*sc*) present on dorsum of chelal hand.

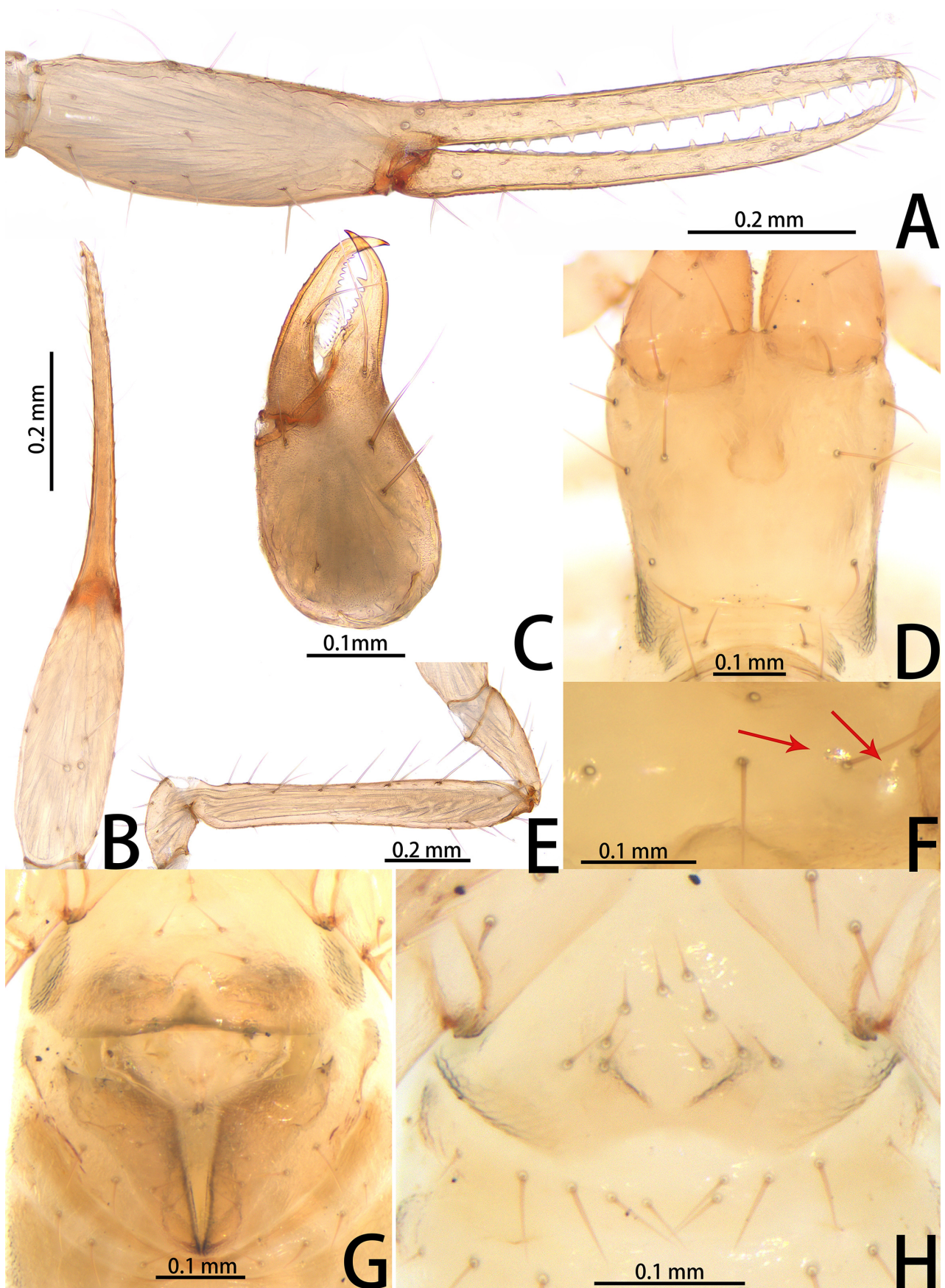
**Description.** Adult males (holotype and paratypes) (Figs 7A, 8A–G, 9, 10).

**Color** generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.

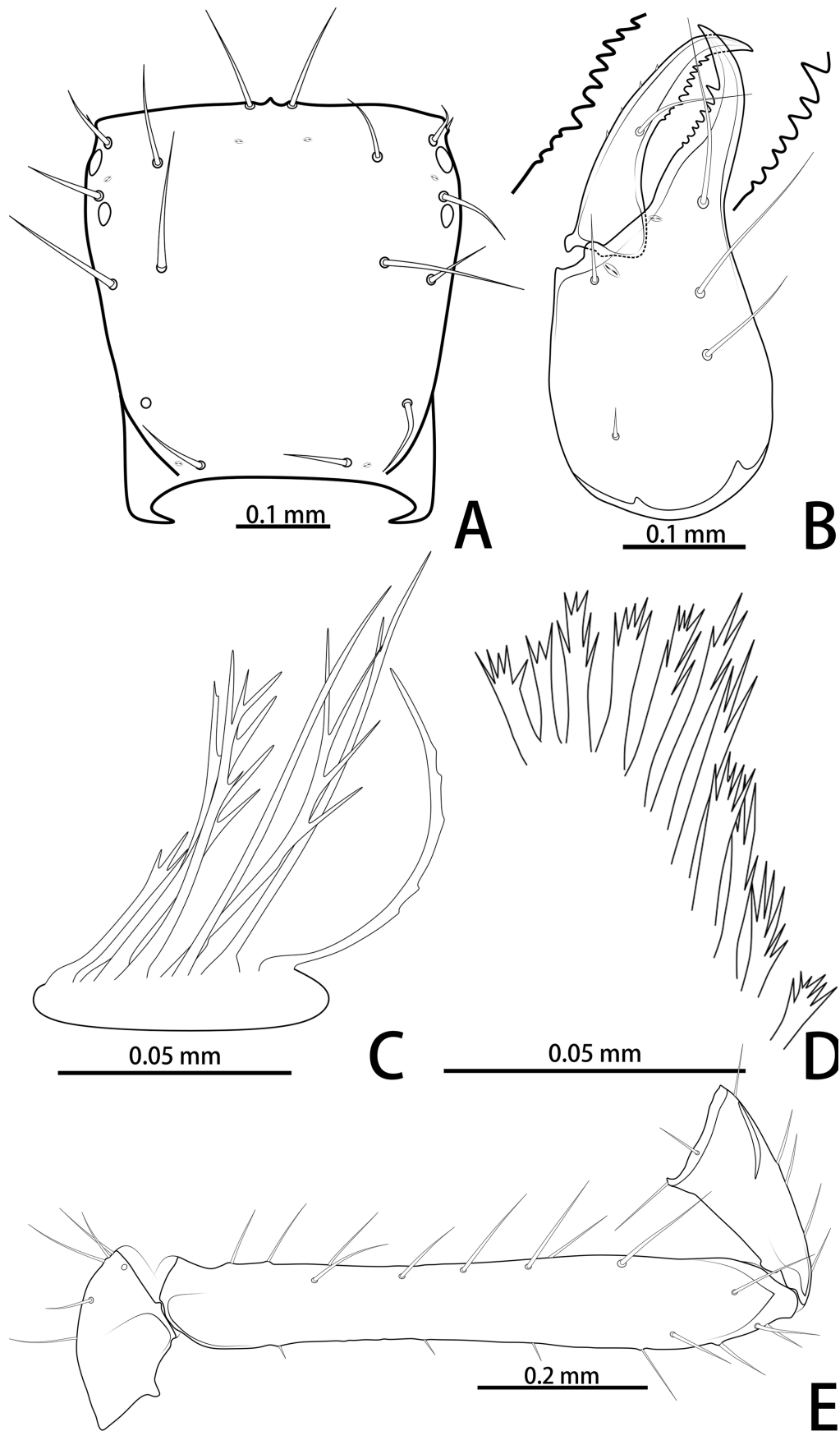
**Cephalothorax** (Figs 8D, 9A): carapace nearly subquadrate, 0.93–1.00 times as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin smooth, without serrations; epistome small and triangular, with four strongly reduced eyes; with 18 setae arranged s4s: 4: 4: 2: 2, most setae heavy, 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 the sole pair of setae of posterior row. Manducatory process with two acuminate distal setae, anterior seta more than 1/2 length of medial



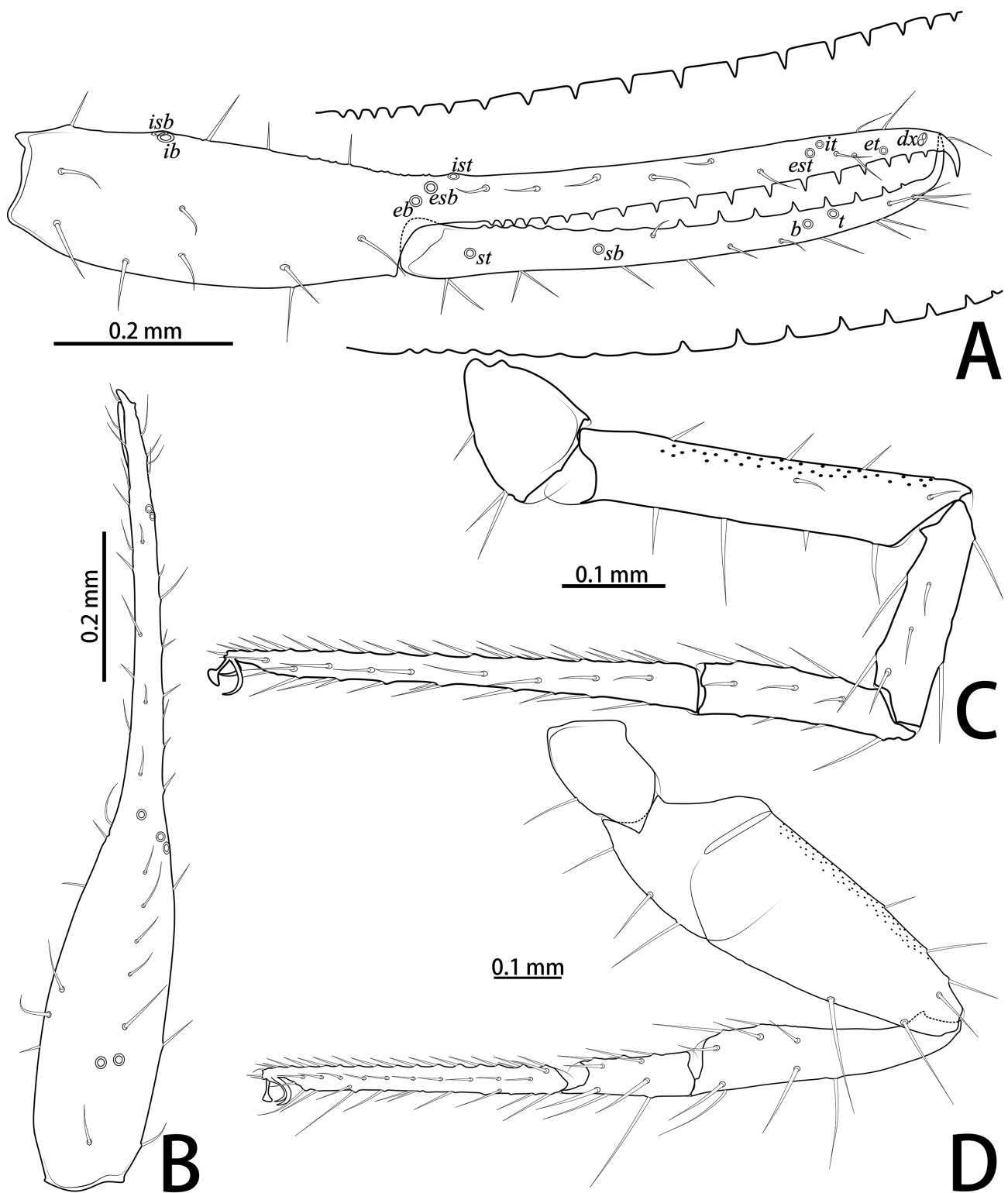
**FIGURE 7.** *Lagynochthonius baiguensis* sp. nov., A. Holotype male (dorsal view); B. Paratype female (dorsal view).



**FIGURE 8.** *Lagynochthonius baiguensis* sp. nov., holotype male (A–F), paratype female (G): A. Right chela (lateral view); B. Right chela (dorsal view); C. Left chelicera (dorsal view); D. Carapace (dorsal view); E. Right pedipalp (minus chela, dorsal view); F. Carapace (dorsal-lateral view), indicate strongly reduced eyes (red arrow); G. Male genital area (ventral view); H. Female genital area (ventral view).



**FIGURE 9.** *Lagynochthonius baiguensis* sp. nov., holotype male: A. Carapace (dorsal view); B. Left chelicera (dorsal view), with details of teeth; C. Rallum; D. Coxal spines on coxae II (ventral view); E. Right pedipalp (minus chela, dorsal view).



**FIGURE 10.** *Lagynochthonius baiguensis* sp. nov., holotype male: A. Right chela (lateral view), with details of teeth and trichobothrial pattern; B. Right chela (dorsal view); C. Leg I (lateral view); D. Leg IV (lateral view).

seta; apex of coxa I with a rounded anteromedial process; coxae II with 10–13 terminally indented coxal spines on each side, set as an oblique and arc row, central spines slightly longer than the 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, 1.84–1.95 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 9–13 teeth, distal one largest; movable finger with 9–10 retrorse contiguous small teeth;

galea completely vestigial (Fig. 9B). Serrula exterior with 18–20 and serrula interior with 10–13 blades. Rallum with eight blades, the distal one longest and recumbent basally, with fine barbules and slightly set apart from the other blades, latter tightly grouped and with long pinnae, some of which are subdivided (Fig. 9C).

**Pedipalp** (Figs 8A–B, 8E, 9E, 10A–B): trochanter 1.72–1.91, femur 6.54–8.11 patella 2.17–2.45, chela 6.00–6.44, hand 2.53–2.69 times as long as broad; femur 2.55–2.81 times as long as patella; movable chelal finger 1.42–1.45 times as long as hand and 0.59–0.61 times as long as chela. Setae generally long and acuminate. Chelal hand gradually constricted towards fingers, apodeme complex of movable chelal finger strongly 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, *t* situated at the same level as *it* and distal to *b*; *est* situated distal to *b* and close to *it* (Figs. 8A, 10A). Microsetae (chemosensory setae) present on dorsum of chelal hand (Figs. 8B, 10B). Both chelal fingers with a row of teeth, spaced regularly along the margin, teeth smaller distally and proximally: fixed finger with 18–19 well-spaced, pointed teeth, and a modified accessory tooth on prolateral-retrolateral face (*td*, slightly distal to *dx*); movable finger with 8–10 well-spaced, pointed teeth, plus 7–9 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: 2–3: 4: 4: 4: 4: 5: 5–7: 5–7: 4: T2T: 0. Sternal chaetotaxy IV–XII: 8–10: 10: 9–10: 8–10: 9: 9: 9: -: 2. Genital region: sternite II with 6–10 setae scattered on median area, genital opening slit-like, sternite III with 10–12 setae (Fig. 8G).

**Legs** (Fig. 10C–D): fine granulation present on anterodorsal faces of femur IV and patella IV. Leg I: femur 1.73–1.89 times as long as patella; tarsus 2.14–2.44 times as long as tibia. Leg IV: femoropatella 2.70–2.85 times as long as deep; tibia 4.33–5.13 times as long as deep; with basal tactile setae on both tarsal segments: basitarsus 2.57–3.33 times as long as deep (TS = 0.25–0.33), telotarsus 10.25–11.25 times as long as deep and 2.20–2.56 times as long as basitarsus (TS = 0.25–0.29). Setae of leg I (trochanter to tibia) 3: 6–9: 6–7: 5–9, setae of leg IV (trochanter to basitarsus) 1–3: 3: 6: 8–10: 6–9. Arolium not divided, slightly shorter than the simple claws.

**Adult female** (paratype) (Figs 7B, 8G). Mostly same as males; tergal chaetotaxy I–XII: 2: 4: 4: 4: 4: 5: 5: 7: 6: 4: T2T: 0; sternal chaetotaxy IV–XII: 10: 10: 9: 9: 9: 11: 9: -: 2. Genital region: sternite II with 10 setae scattered on median area, sternite III with a row of 10 setae.

**Dimensions** (length/breadth or, in the case of the legs, length/depth in mm; ratios in parentheses). Males: body length 1.40–1.47. Pedipalps: trochanter 0.19–0.21/0.11 (1.72–1.91), femur 0.72–0.74/0.09–0.11 (6.54–8.11), patella 0.26–0.29/0.11–0.12 (2.17–2.45), chela 0.99–1.03/0.16–0.17 (6.00–6.44), hand 0.42–0.43/0.16–0.17 (2.53–2.69), movable chelal finger length 0.60–0.61. Chelicera 0.35–0.37/0.19–0.20 (1.84–1.95), movable finger length 0.21. Carapace 0.37–0.41/0.39–0.41 (0.93–1.00). Leg I: trochanter 0.13–0.14/0.09–0.11 (1.27–1.63), femur 0.36–0.38/0.06–0.07 (5.14–6.33), patella 0.19–0.22/0.05–0.06 (3.33–3.80), tibia 0.18–0.21/0.04–0.06 (3.00–4.75), tarsus 0.42–0.44/0.04 (10.50–11.25). Leg IV: trochanter 0.15–0.21/0.11–0.13 (1.23–1.91), femoropatella 0.54–0.59/0.20–0.21 (2.70–2.85), tibia 0.39–0.41/0.08–0.09 (4.33–5.13), basitarsus 0.16–0.20/0.05–0.07 (2.57–3.33), telotarsus 0.41–0.45/0.04 (10.25–11.25).

Female: body length 1.43. Pedipalps: trochanter 0.20/0.12 (1.67), femur 0.77/0.12 (6.42), patella 0.30/0.13 (2.31), chela 1.08/0.18 (6.00), hand 0.46/0.18 (2.56), movable chelal finger length 0.64. Chelicera 0.40/0.21 (1.90), movable finger length 0.24. Carapace 0.45/0.44 (1.02). Leg I: trochanter 0.15/0.09 (1.67), femur 0.40/0.07 (5.71), patella 0.22/0.06 (3.67), tibia 0.22/0.05 (4.40), tarsus 0.45/0.04 (11.25). Leg IV: trochanter 0.23/0.13 (1.76), femoropatella 0.60/0.22 (2.73), tibia 0.40/0.09 (4.44), basitarsus 0.18/0.06 (3.00), telotarsus 0.40/0.05 (8.00).

**Remarks.** *Lagynochthonius baiguensis* sp. nov. differs from all other hypogean *Lagynochthonius* species from China by the presence of four strongly reduced eyes (Fig. 8F).

**Ecology.** All of the specimens were collected under mud and rocks inside the cave, which are relatively wet compared to the rest of the Baigu Cave (Fig. 11D).

**Distribution.** Known only from the Baigu Cave (China, Guangxi Zhuang Autonomous Region).

### *Lagynochthonius bailongtanensis* Li, Liu & Shi, 2019

Chinese name. 白龙潭拉伪蝎

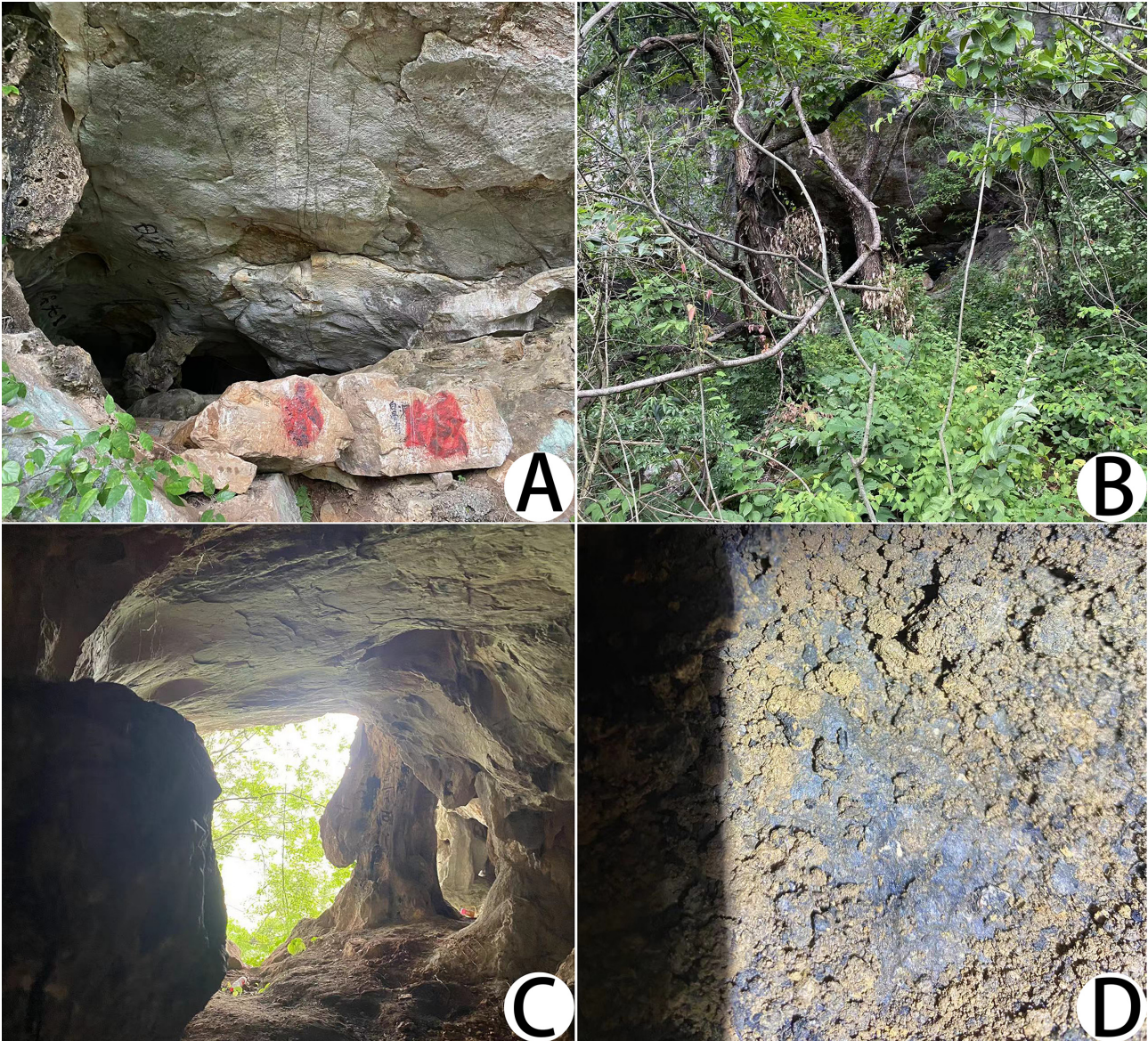
*Lagynochthonius bailongtanensis* Li, Liu & Shi, 2019: 29–33, figs 1–18.

**Material examined.** 3 ♂ (Ps.-MHB-YN2021071901–03), 4 ♀ (Ps.-MHB-YN2021071904–07): China, Yunnan Province, Luoping County, Bailongtang Cave [24.868912°N, 104.288068°E], 1724.2 m a.s.l., 19 July 2021, Zegang Feng, Hongru Xu, Liu Fu & Nana Zhan leg.

**Diagnosis and description.** For details see Li *et al.* (2019).

**Distribution.** China (Yunnan Province).





**FIGURE 11.** Baigu Cave, type locality of *Lagynochthonius baiguensis* sp. nov., A. Entrance; B. The external environment; C. Inside the cave entrance; D. Areas where *L. baiguensis* sp. nov. specimens were collected.

***Lagynochthonius biyunensis* Hou, Feng & Zhang, 2023**

Chinese name. 碧云拉伪蝎

*Lagynochthonius biyunensis* Hou, Feng & Zhang, 2023a: 29–33, figs 6–11.

**Material examined.** ♂ (Ps.-MHBV-GZC190805-01) (holotype): China, Guizhou Province, Panzhou City, Chengguan Town, Nanmen Village, Biyun Park, Biyun Cave, under the detritus and on the walls in the deep zone [25.771919°N, 104.640000°E], 1496 m a.s.l., 5 August 2019, Zegang Feng, Zhaoyi Li & Chen Zhang leg. 4 ♂ (Ps.-MHBV-HBUARA#2022-498-01–04) (paratypes), 2 ♀ (Ps.-MSWU-HBUARA#2022-498-05–06) (paratypes), with the same location as the holotype, 2 August 2022, Yanmeng Hou, Lu Zhang, Jianzhou Sun & Wenlong Fan leg.

**Diagnosis and description.** For details see Hou *et al.* (2023a).

**Distribution.** China (Guizhou Province).

***Lagynochthonius brachydigitatus* Zhang & Zhang, 2014**

Chinese name. 短指拉伪蝎

*Lagynochthonius brachydigitatus* Zhang & Zhang, 2014: 171–175, figs 1–3.

**Material examined.** ♂ (Ps.-MHBV-ZJ13070401) (holotype) 4 ♂ (Ps.-MHBV-ZJ13070402–05) (paratypes), 5 ♀ (Ps.-MSWU-ZJ13070406–10) (paratypes): China, Zhejiang Province, Suichang County, Jiulong Mountains, Yanping [28.366667°N, 118.883333°E], 868 m a.s.l., 4 July 2013, Fubin Zhang leg.

**Diagnosis and description.** For details see Zhang & Zhang (2014).

**Distribution.** China (Zhejiang Province).

***Lagynochthonius crassus* Hou, Gao & Zhang, 2022**

Chinese name. 厚掌拉伪蝎

*Lagynochthonius crassus* Hou, Gao & Zhang, 2022b: 6–11, figs 2–5.

**Material examined.** ♂ (Ps.-MHBH-HBUARA#2021-28801) (holotype), 1 ♂ (Ps.-MHBH-HBUARA#2021-28802) (paratype), 2 ♀ (Ps.-MHBH-HBUARA#2021-28803–04) (paratypes): China, Yunnan Province, Maguan County, Miechang Township, Laomenzhai Village, cave without name (Unnamed Cave 1), under stones and detritus in deep zone [22.892042°N, 104.097089°E], 1508 m a.s.l., 21 April 2021, Zegang Feng leg.

**Diagnosis and description.** For details see Hou *et al.* (2022b).

**Distribution.** China (Yunnan Province).

***Lagynochthonius daidaiensis* Hou, Feng & Zhang, 2023**

Chinese name. 呆呆拉伪蝎

*Lagynochthonius daidaiensis* Hou, Feng & Zhang, 2023b: 87–92, figs 10–13.

**Material examined.** ♀ (Ps.-MHBH-HBUARA#2021-176-01) (holotype), 2 ♀ (Ps.-MHBH-HBUARA#2021-176-0102–03) (paratypes): China, Yunnan Province, Qiubei County, Shuanglongying Town, Pingtan Village, Daidai Cave [24.329535°N, 104.239257°E], 1228 m a.s.l., 20 July 2021, Zegang Feng, Hongru Xu, Liu Fu & Nana Zhan leg.

**Diagnosis and description.** For details see Hou *et al.* (2023b).

**Distribution.** China (Yunnan Province).

***Lagynochthonius duo* Sun, Guo & Zhang, 2024**

Chinese name. 双毛拉伪蝎

*Lagynochthonius duo* Sun, Guo & Zhang, 2024: 103–109, figs 1–5.

**Material examined.** ♂ (Ps.-MHBH-GX2022080201) (holotype), 1 ♀ (Ps.-MHBH-GX2022080202) (paratype), 3 ♂ (Ps.-MHBH-GX2022080203–05) (paratypes): China, Guangxi Zhuang Autonomous Region, Guilin City, Longsheng Autonomous County, Longji Town, Anjiangping Area, under topsoil and in the leaf litter layer [25.704208°N, 110.051075°E], 419 m a.s.l., 2 August 2023, Kun Yu & Jianzhou Sun leg.

**Diagnosis and description.** For details see Sun *et al.* (2024).

**Distribution.** China (Guangxi Zhuang Autonomous Region).

***Lagynochthonius fengi* Hou, Gao & Zhang, 2022**

Chinese name. 冯氏拉伪蝎

*Lagynochthonius fengi* Hou, Gao & Zhang, 2022b: 11–16, figs 6–9.

**Material examined.** ♂ (Ps.-MHBH-HBUARA#2021-41701) (holotype), 3 ♂ (Ps.-MHBH-HBUARA#2021-41702–04) (paratypes), 9 ♀ (Ps.-MHBH-HBUARA#2021-41705–13) (paratypes): China, Yunnan Province, Yanjin County, Miaoba Town, Maliu Village, cave without name (Unnamed Cave 2) [27.914089°N, 104.391589°E], 594 m a.s.l., 30 September 2021, Zegang Feng, Yanmeng Hou, Lu Zhang & Liu Fu leg.

**Diagnosis and description.** For details see Hou *et al.* (2022b).

**Distribution.** China (Yunnan Province).

***Lagynochthonius galeatus* sp. nov.**

Chinese name. 盔突拉伪蝎

Figs 12–16

**Type material.** Holotype ♀ (Ps.-MHBH-GZ2024012801): China, Guizhou Province, Zunyi City, Yanshan County, Yanshan Cave [28.80022624°N, 107.90048060°E], 987 m a.s.l., 28 January 2024, Jiaqi Zhao, Yitun Xu & Jianzhou Sun leg.

**Etymology.** The specific name is derived from the Latin word “*galeatus*”, meaning helmet-shaped, which refers to the shape of galea.

**Diagnosis.** (♀). Small sized hypogean species; galea helmet-shaped; carapace without eyes or eyespots, anterior margin smooth and epistome hump-shaped; tergites I–IV each with four setae. Pedipalps slender, chela 6.11 times as long as broad; femur 7.00 times as long as broad; both chelal fingers without intercalary teeth and a modified accessory tooth (*td*) on prolateral-retrolateral face; chemosensory setae (*sc*) present on dorsum of chelal hand.

**Description.** Adult female (holotype) (Figs 12, 13, 14, 15).

**Color** generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.

**Cephalothorax** (Figs 13E, 14A): carapace nearly subquadrate, 0.95 times as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin smooth, without serrations; epistome hump-shaped, without eyes or eyespots; with 18 setae arranged s4s: 4: 4: 2: 2, most setae heavy, 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 the sole pair of setae of posterior row. Manducatory process with two acuminate distal setae, anterior seta more than 1/2 length of medial seta; apex of coxa I with a rounded anteromedial process; coxae II with 10 terminally indented coxal spines on each side, set as an

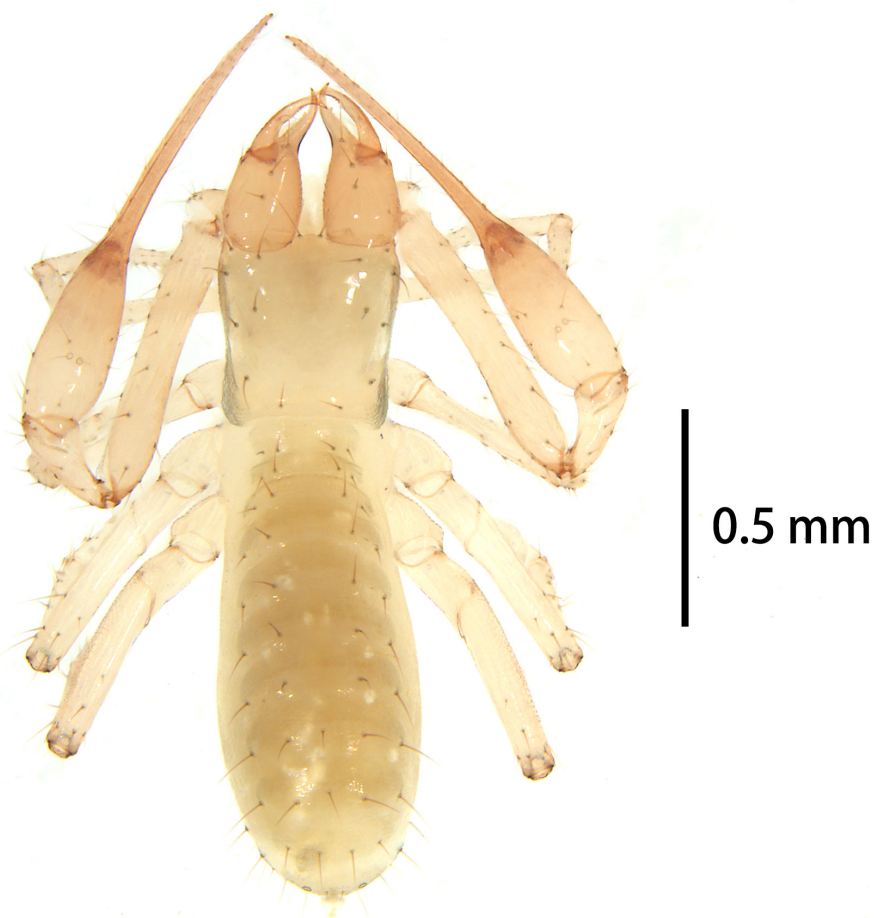


FIGURE 12. *Lagynochthonius galeatus* sp. nov., holotype female (dorsal view).

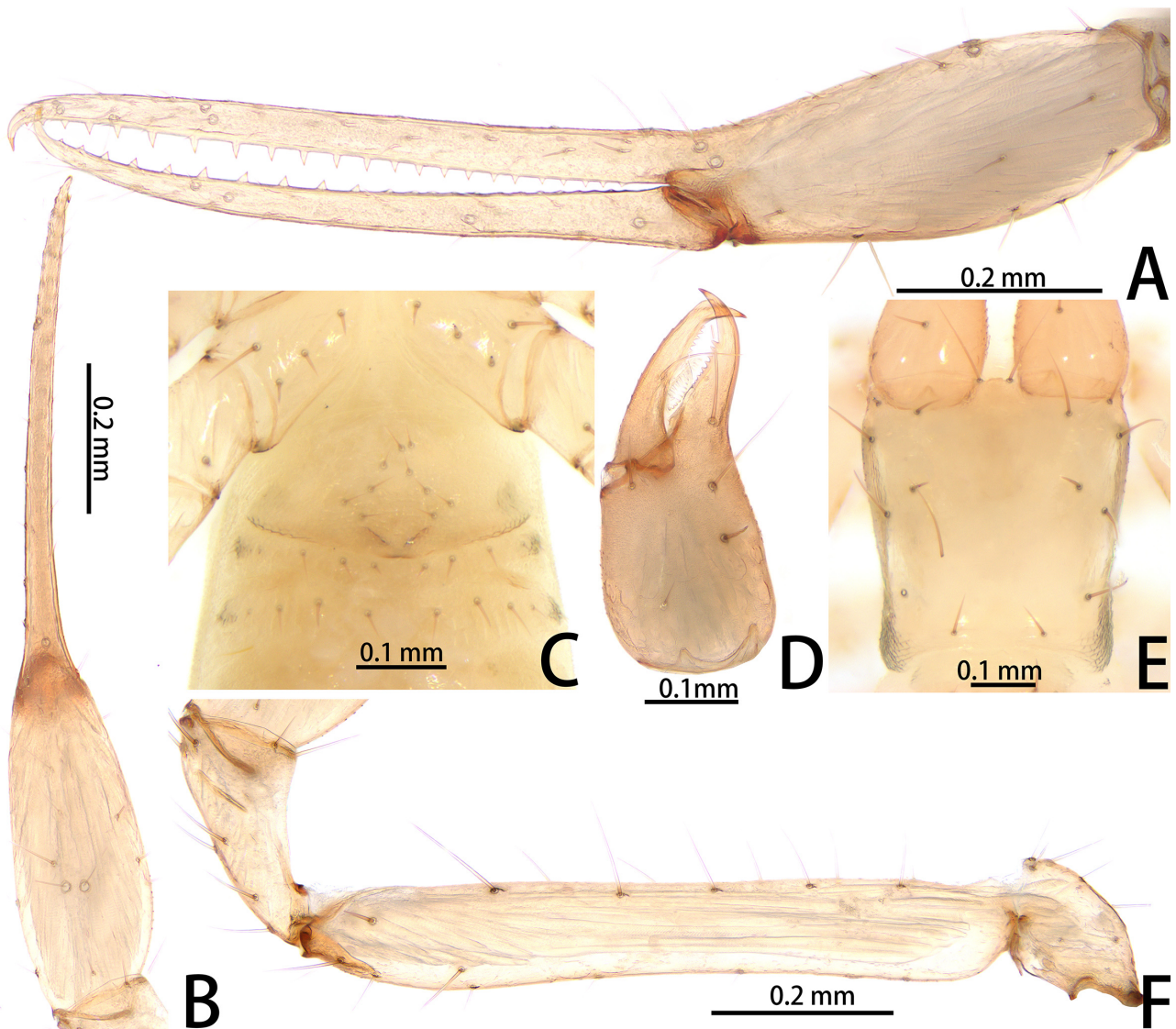
oblique and arc row, central spines slightly longer than the others (Fig. 14D); intercoxal tubercle absent; chaetotaxy of coxae: P 3, I 3, II 4, III 5, IV 5.

**Chelicera** (Figs 13D, 14B): almost as long as carapace, 1.76 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 11 teeth, distal one largest; movable finger with 8 contiguous small teeth; galea helmet-shaped (Fig. 14B). Serrula exterior with 19 and serrula interior with 12 blades. Rallum with eight blades, the distal one longest and recumbent basally, with fine barbules and slightly set apart from the other blades, latter tightly grouped and with long pinnae, some of which are subdivided (Fig. 14C).

**Pedipalp** (Figs 13A–B, 13E, 14E, 15A–B): trochanter 1.82, femur 7.00 patella 2.33, chela 6.11, hand 2.44 times as long as broad; femur 2.75 times as long as patella; movable chelal finger 1.52 times as long as hand and 0.61 times as long as chela. Setae generally long and acuminate. Chelal hand gradually constricted towards fingers, apodeme complex of movable chelal finger strongly 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, *t* situated at the same level as *it* and distal to *b*; *est* situated distal to *b* and close to *it* (Figs. 13A, 15A). Microsetae (chemosensory setae) present on dorsum of chelal hand (Figs. 13B, 15B). Both chelal fingers with a row of teeth, spaced regularly along the margin, teeth smaller distally and proximally: fixed finger with 23 well-spaced, pointed teeth, and a modified accessory tooth on prolateral-retrolateral face (*td*, slightly distal to *dx*); movable finger with 10 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: 4: 4: 4: 4: 4: 5: 5: 4: T2T: 0. Sternal chaetotaxy IV–XII: 10: 10: 9: 9: 9: 11: 9: -: 2. Genital region: sternite II with 10 setae scattered on median area, sternite III with a row of 10 setae. (Fig. 13C).



**FIGURE 13.** *Lagynochthonius galeatus* sp. nov., holotype female (A–F): 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).

**Legs** (Fig. 15C–D): fine granulation present on anterodorsal faces of femur IV and patella IV. Leg I: femur 2.00 times as long as patella; tarsus 2.05 times as long as tibia. Leg IV: femoropatella 3.53 times as long as deep; tibia 5.25 times as long as deep; with basal tactile setae on both tarsal segments: basitarsus 3.33 times as long as deep (TS = 0.40), telotarsus 11.50 times as long as deep and 2.30 times as long as basitarsus (TS = 0.35). Setae of leg I (trochanter to tibia) 4: 9: 6: 8, setae of leg IV (trochanter to basitarsus) 1: 3: 6: 9: 9. 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 1.49. Pedipalps: trochanter 0.20/0.11 (1.82), femur 0.77/0.11 (7.00), patella 0.28/0.12 (2.33), chela 1.10/0.18 (6.11), hand 0.44/0.18 (2.44), movable chelal finger length 0.67. Chelicera 0.37/0.21 (1.76), movable finger length 0.22. Carapace 0.40/0.42 (0.95). Leg I: trochanter 0.13/0.10 (1.30), femur 0.42/0.06 (7.00), patella 0.21/0.05

(4.20), tibia 0.21/0.05 (4.20), tarsus 0.43/0.05 (8.60). Leg IV: trochanter 0.20/0.12 (1.67), femoropatella 0.60/0.17 (3.53), tibia 0.42/0.08 (5.25), basitarsus 0.20/0.06 (3.33), telotarsus 0.46/0.04 (11.50).

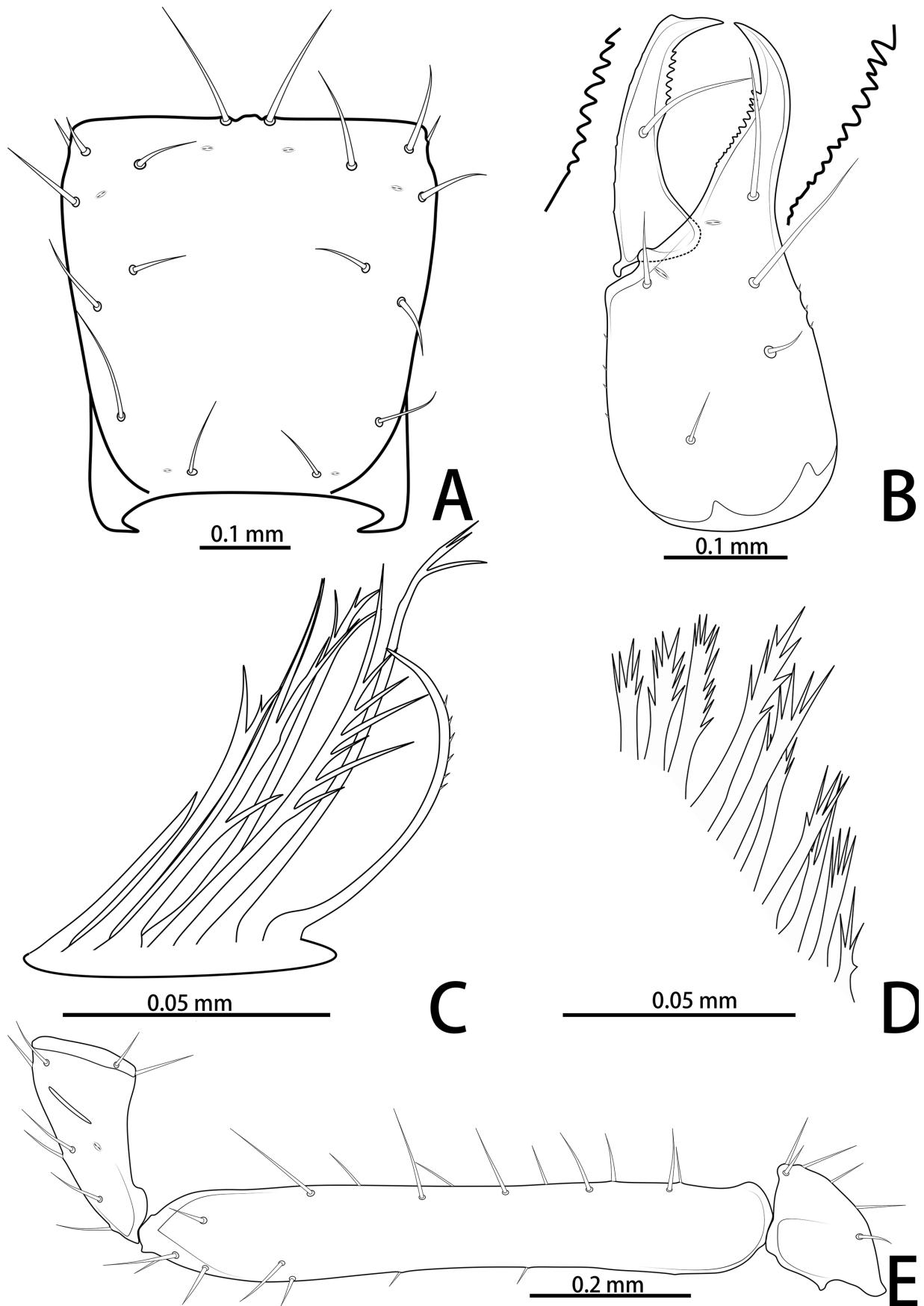
**Remarks.** *Lagynochthonius galeatus* sp. nov. differs from all other hypogean *Lagynochthonius* species from China by the presence of helmet-shaped galea.

**Ecology.** The specimen was collected under a small stone block inside the cave.

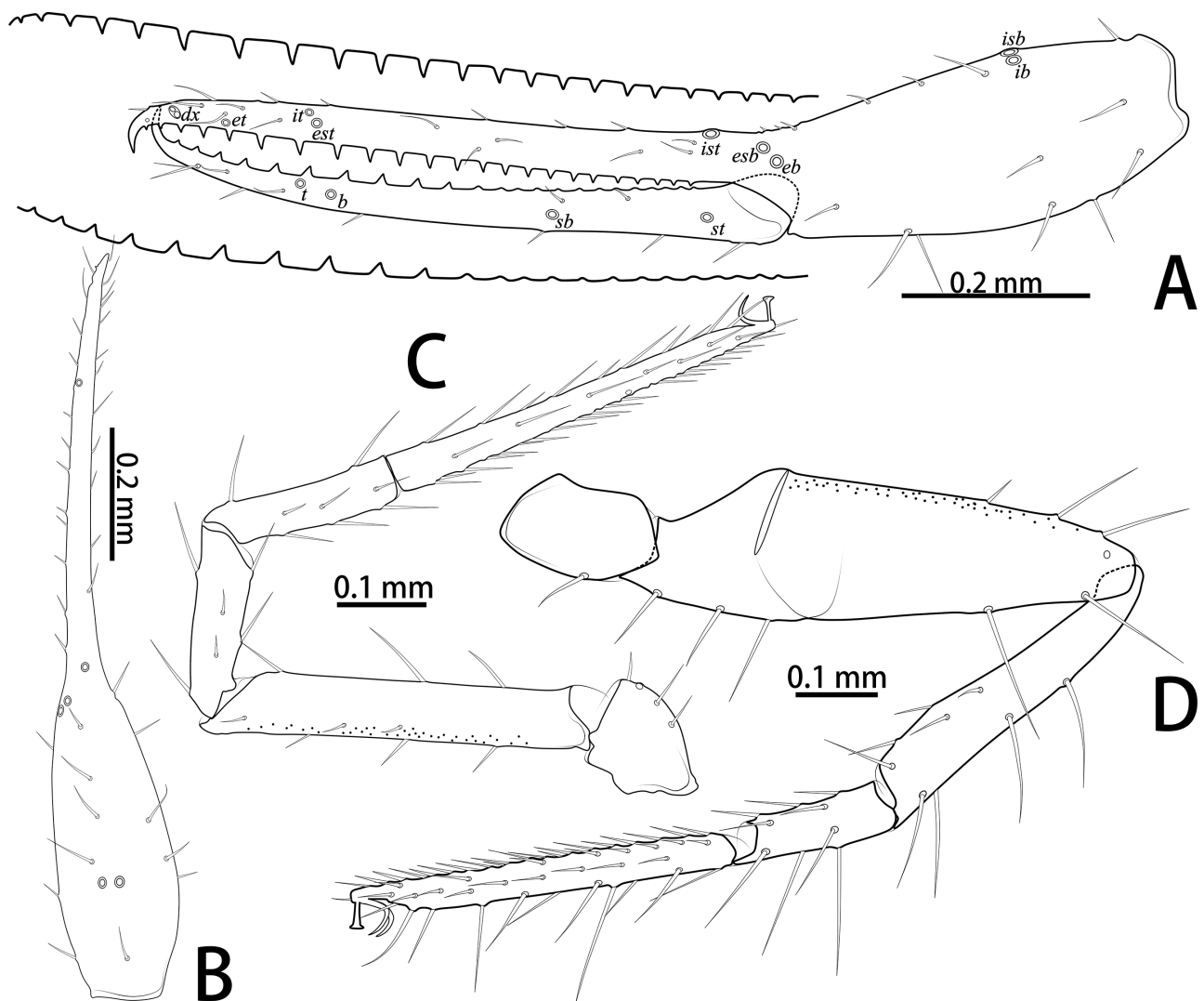
**Distribution.** Known only from the type locality, Yanshan Cave (China, Guizhou Province).

***Lagynochthonius gibbus* Sun, Guo & Zhang, 2024**  
Chinese name. 驼峰拉伪蝎

*Lagynochthonius gibbus* Sun, Guo & Zhang, 2024: 109–115, figs 6–9.



**FIGURE 14.** *Lagynochthonius galeatus* sp. nov., holotype female: 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).



**FIGURE 15.** *Lagynochthonius galeatus* sp. nov., holotype female: 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).

**Material examined.** ♂ (Ps.-MHBGZ2022070301) (holotype), 1 ♀ (Ps.-MHBGZ2022070302) (paratype): China, Guizhou Province, Tongren City, Jiangkou County, 500 m near Wanjiatun, under topsoil and in the leaf litter layer [27.725694°N, 108.688306°E], 509 m a.s.l., 3 July 2022, Yanmeng Hou, Lu Zhang, Nana Zhan, Jianzhou Sun & Long Lin leg. 2 ♂ (Ps.-MHBGZ2022062805–06) (paratypes) and 2 ♀ (Ps.-MHBGZ2022062803–04) (paratypes): Tongren City, Sinan County, Zhangjiazhai Town, 700 m near Zhangjiaping, under topsoil and in the leaf litter layer [27.944211°N, 108.072722°E], 731 m a.s.l., 28 June 20, Yanmeng Hou, Lu Zhang, Nana Zhan, Jianzhou Sun & Long Lin leg.

**Diagnosis and description.** For details see Sun *et al.* (2024).

**Distribution.** China (Guizhou Province).

***Lagynochthonius guangyangensis* sp. nov.**

Chinese name. 广养拉伪蝎

Figs 17–21

**Typematerial.** Holotype ♂ (Ps.-MHBGZ2019100601): China, Guangxi Zhuang Autonomous Region, Baise City, Tiandon County, Silin Town, Guangyang Cave [23.518475°N, 107.393634°E], 363 m a.s.l., 6 October 2019, Zegang Feng & Lingchen Zhao leg. Paratypes: 1 ♂ (Ps.-MHBGZ2019100602) and 3 ♀ (Ps.-MHBGZ2019100603–05), all with the same data as the holotype.

**Etymology.** Named after the type locality, Guangyang Cave.

**Diagnosis.** (♂♀). Moderately sized hypogean species; carapace without eyes or eyespots, anterior margin smooth and epistome strongly point; tergites I–III each with two setae, tergite IV with four setae. Rallum with eight blades. Pedipalps slender, chela 8.67–9.53 (♂), 8.33–8.63 (♀) times as long as broad; femur 8.36–8.69



FIGURE 16. Yanshan Cave, type locality of *Lagynochthonius galeatus* sp. nov., A. Entrance; B– C. Areas where *L. galeatus* sp. nov. specimens were collected.

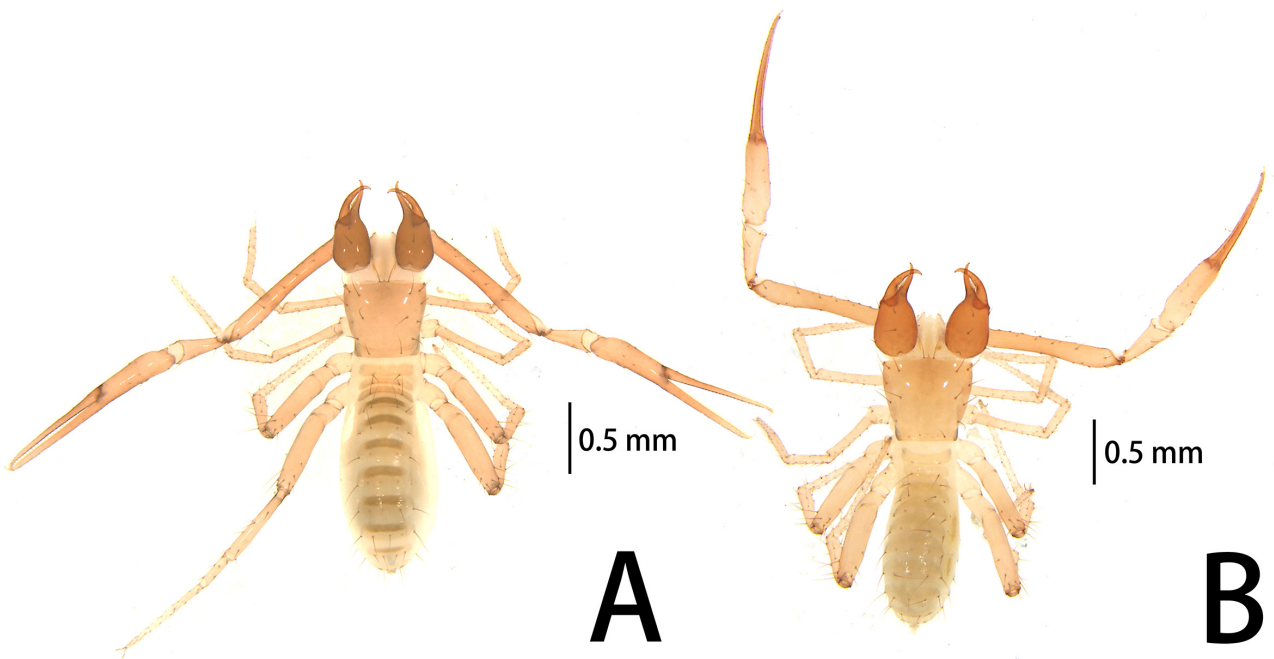
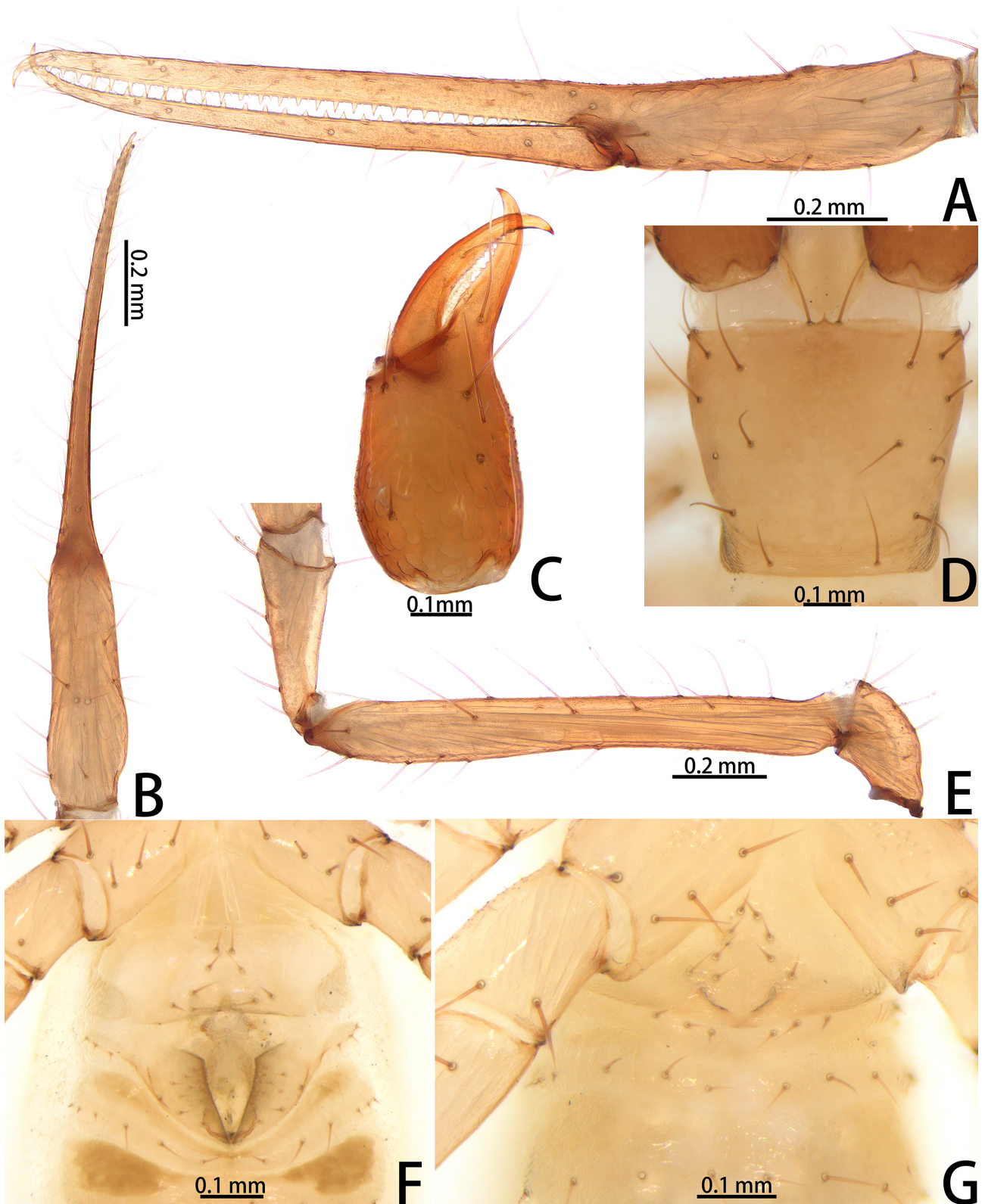
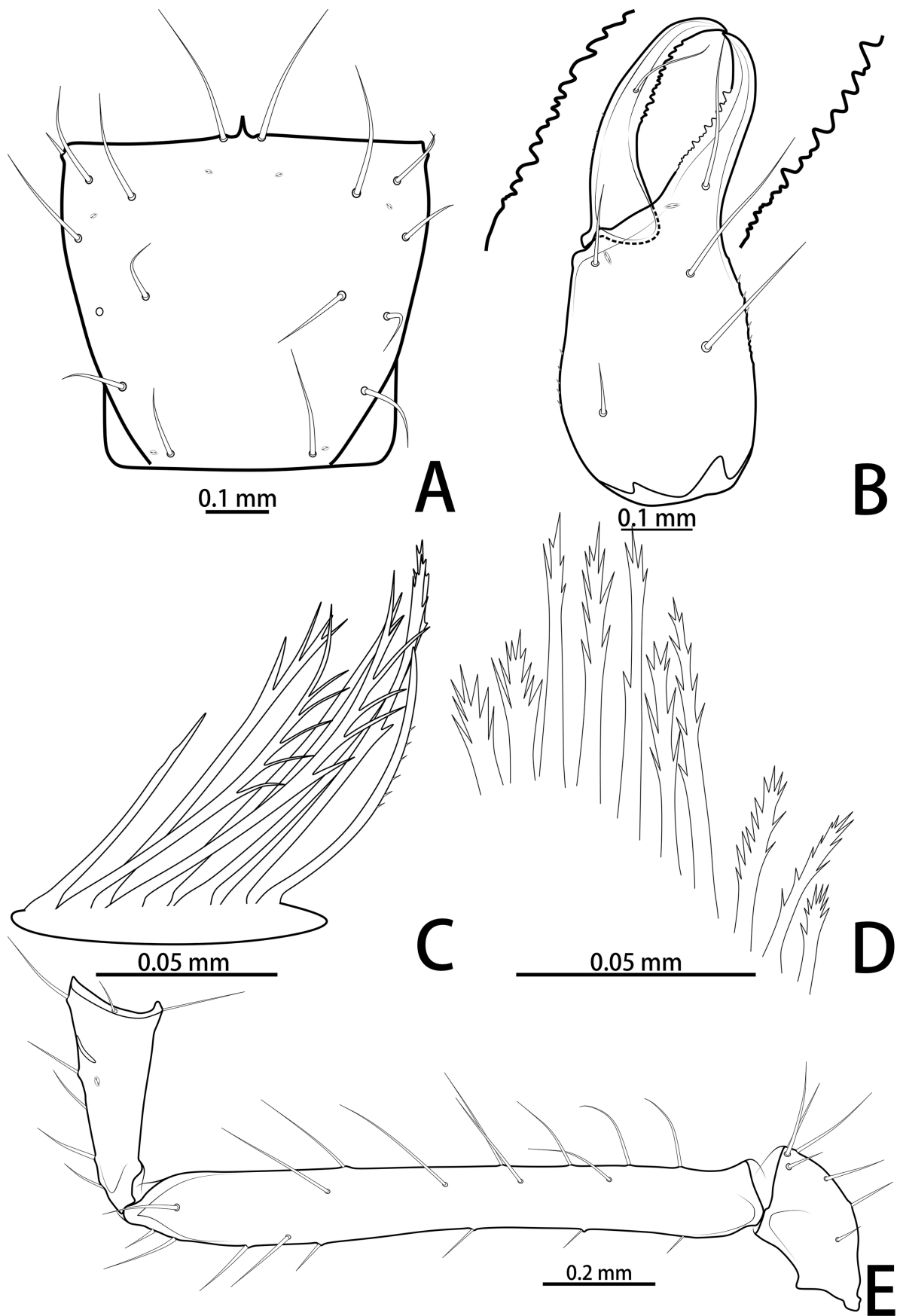


FIGURE 17. *Lagynochthonius guangyangensis* sp. nov., A. Holotype male (dorsal view); B. Paratype female (dorsal view).

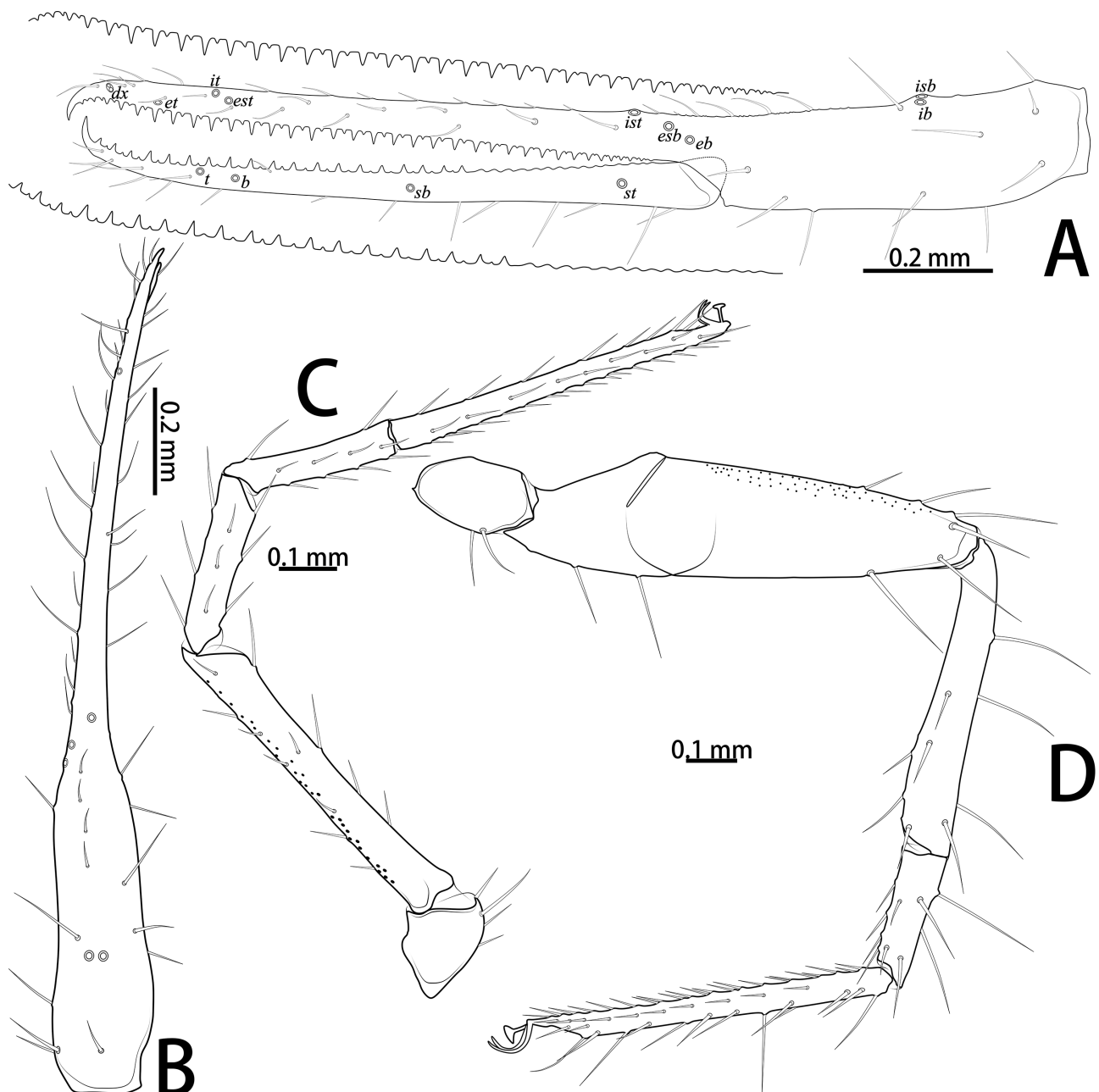


**FIGURE 18.** *Lagynochthonius guangyangensis* sp. nov., holotype male (A–F), paratype female (G): A. Left chela (lateral view); B. Left chela (dorsal view); C. Left chelicera (dorsal view); D. Carapace (dorsal view); E. Left pedipalp (minus chela, dorsal view); F. Male genital area (ventral view); G. Female genital area (ventral view).





**FIGURE 19.** *Lagynochthonius guangyangensis* sp. nov., holotype male: 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).



**FIGURE 20.** *Lagynochthonius guangyangensis* sp. nov., holotype male: 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).

(♂), 7.53–8.42 (♀) times as long as broad; both chelal fingers with intercalary teeth and a modified accessory tooth (*td*) on prolateral-retrolateral face; chemosensory setae (*sc*) present on dorsum of chelal hand.

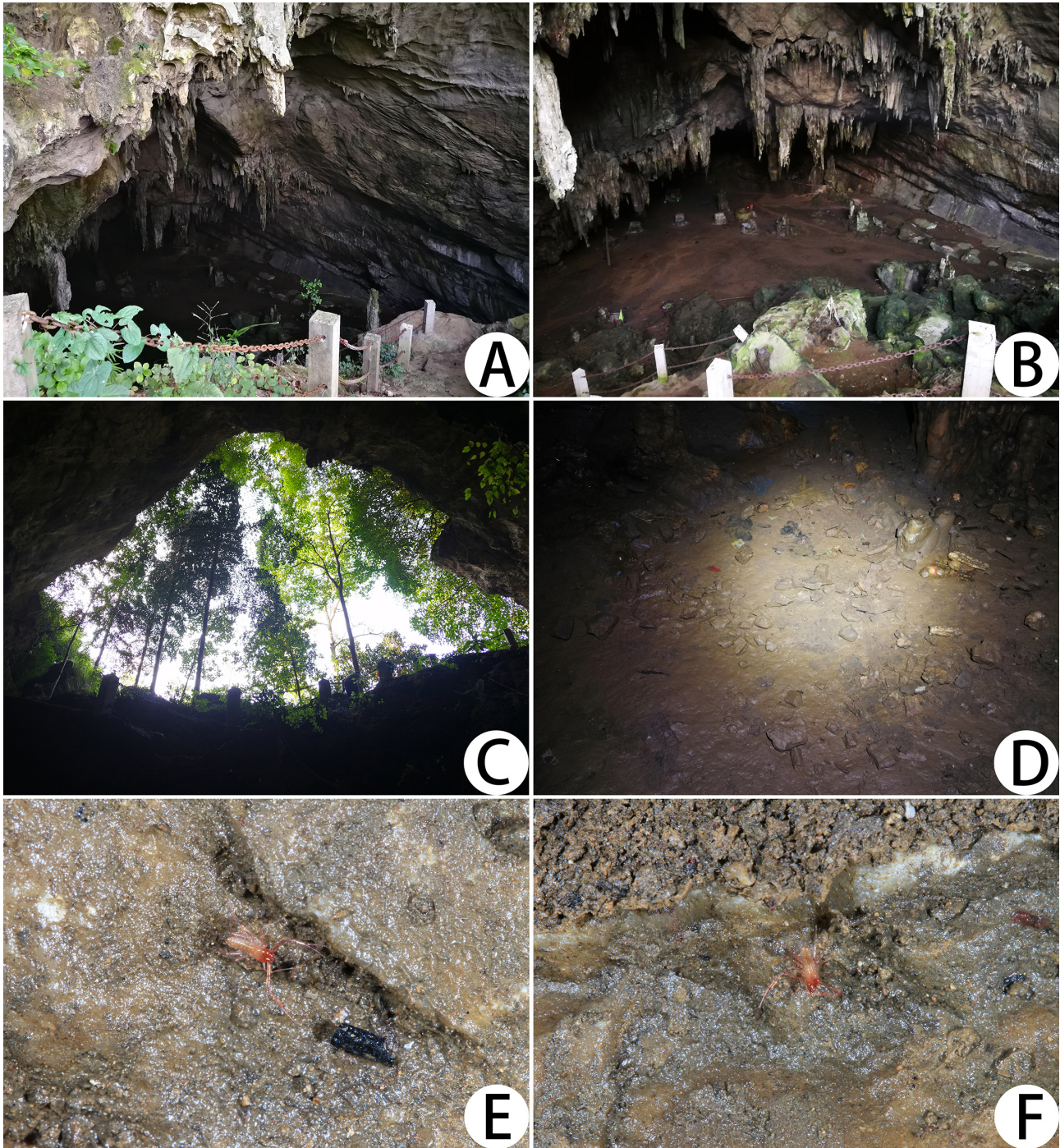
**Description.** Adult males (holotype and paratype) (Figs 17A, 18A–F, 19, 20).

**Color** generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.

**Cephalothorax** (Figs 18D, 19A): carapace nearly subquadrate, 0.93–0.95 times as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin smooth, without serrations; epistome

strongly point, without eyes or eyespots; with 18 setae arranged s4s: 4: 4: 2: 2, most setae heavy, 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 the sole pair of setae of posterior row. Manducatory process with two acuminate distal setae, anterior seta more than 1/2 length of medial seta; apex of coxa I with a rounded anteromedial process; coxae II with 9–11 terminally indented coxal spines on each side, set as an oblique and arc row, central spines slightly longer than the others (Fig. 19D); intercoxal tubercle absent; chaetotaxy of coxae: P 3, I 3, II 4, III 5, IV 5.

**Chelicera** (Figs 18C, 19B): almost as long as



**FIGURE 21.** Guanyang Cave, type locality of *Lagynochthonius guanyangensis* sp. nov., A–B. Entrance; C: Inside the cave entrance; D. Areas where *L. guanyangensis* sp. nov. specimens were collected; E–F. Live *L. guanyangensis* sp. nov. in its natural environment.

carapace, 1.84–1.91 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 15–16 teeth, distal one largest; movable finger with 14–15 retrorse contiguous small teeth; galea completely vestigial (Fig.

19B). Serrula exterior with 25–27 and serrula interior with 13 blades. Rallum with eight blades, the distal one longest and recumbent basally, with fine barbules and slightly set apart from the other blades, latter tightly grouped and with long pinnae, some of which are subdivided (Fig. 19C).

**Pedipalp** (Figs 18A–B, 18E, 19E, 20A–B): trochanter 1.75–1.81, femur 8.36–8.69, patella 2.41, chela 8.67–9.53, hand 3.17–3.47 times as long as broad; femur 2.76–2.85 times as long as patella; movable chelal finger 1.72–1.75

times as long as hand and 0.63–0.64 times as long as chela. Setae generally long and acuminate. Chelal hand gradually constricted towards fingers, apodeme complex of movable chelal finger strongly 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* situated midway between *b* and *st*; *b* and *t* situated subdistally, *t* slightly distal to *it* and distal to *b*; *est* situated distal to *b* and close to *it* (Figs. 18A, 20A). Microsetae (chemosensory setae) present on dorsum of chelal hand (Figs. 18B, 20B). Both chelal fingers with a row of teeth, spaced regularly along the margin, teeth smaller distally and proximally: fixed finger with 31–33 well-spaced, pointed teeth, plus 26–31 intercalary microdenticles, and a modified accessory tooth on prolateral-retrolateral face (*td*, slightly distal to *dx*); movable finger with 20 well-spaced, pointed teeth, plus 16–18 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: 2: 2: 2: 4: 4: 4: 5: 5: 5: 4: T2T: 0. Sternal chaetotaxy IV–XII: 12: 8–10: 7: 8: 9: 9: 9: -: 2. Genital region: sternite II with 8–10 setae scattered on median area, genital opening slit-like, sternite III with 20–28 setae (Fig. 18F).

**Legs** (Fig. 20C–D): fine granulation present on anterodorsal faces of femur IV and patella IV. Leg I: femur 1.94–1.97 times as long as patella; tarsus 2.00–2.26 times as long as tibia. Leg IV: femoropatella 4.04–4.19 times as long as deep; tibia 5.40–5.80 times as long as deep; with basal tactile setae on both tarsal segments: basitarsus 3.00–3.13 times as long as deep (TS = 0.28–0.33), telotarsus 12.40–14.00 times as long as deep and 2.58–2.80 times as long as basitarsus (TS = 0.35–0.36). Setae of leg I (trochanter to tibia) 4: 12: 9: 9, setae of leg IV (trochanter to basitarsus) 2–3: 2–3: 5–6: 9–10: 9–10. Arolium not divided, slightly shorter than the simple claws.

**Adult females** (paratypes) (Figs 17B, 18G). Mostly same as males; tergal chaetotaxy I–XII: 2: 2: 2: 4: 4: 4: 5: 5: 5: 4: T2T: 0; sternal chaetotaxy IV–XII: 6–8: 8: 9: 8–9: 8–9: 9–10: 9–11: -: 2. Genital region: sternite II with 9–10 setae scattered on median area, sternite III with a row of six setae.

**Dimensions** (length/breadth or, in the case of the legs, length/depth in mm; ratios in parentheses). Males: body length 2.00–2.03. Pedipalps: trochanter 0.28–0.29/0.06 (1.75–1.81), femur 1.13–1.17/0.13–0.14 (8.36–8.69), patella 0.41/0.17 (2.41), chela 1.56–1.62/0.17–0.18 (8.67–9.53), hand 0.57–0.59/0.17–0.18 (3.17–3.47), movable chelal finger length 0.98–1.03. Chelicera 0.59–0.63/0.32–0.33 (1.84–1.91), movable finger length 0.33–0.35. Carapace 0.55–0.57/0.59–0.60 (0.93–0.95). Leg I: trochanter 0.17–0.18/0.10–0.11 (1.64–1.70), femur 0.59–0.66/0.08 (7.38–8.25), patella 0.30–0.34/0.07

(4.29–4.86), tibia 0.27–0.32/0.05–0.06 (5.33–5.40), tarsus 0.61–0.64/0.05–0.06 (10.67–12.20). Leg IV: trochanter 0.24–0.25/0.15–0.18 (1.33–1.67), femoropatella 0.88–0.93/0.21–0.23 (4.04–4.19), tibia 0.54–0.58/0.10 (5.40–5.80), basitarsus 0.24–0.25/0.08 (3.00–3.13), telotarsus 0.62–0.70/0.05 (12.40–14.00).

Females: body length 2.00–2.03. Pedipalps: trochanter 0.28–0.29/0.16–0.18 (1.75–1.81), femur 1.13–1.17/0.13–0.14 (8.36–8.69), patella 0.41/0.17 (2.41), chela 1.56–1.62/0.17–0.19 (8.37–9.53), hand 0.57–0.59/0.17–0.19 (3.05–3.47), movable chelal finger length 0.98–1.03. Chelicera 0.59–0.65/0.32–0.35 (1.84–1.91), movable finger length 0.33–0.37. Carapace 0.55–0.60/0.59–0.64 (0.93–0.95). Leg I: trochanter 0.17–0.18/0.10–0.11 (1.64–1.70), femur 0.59–0.66/0.08 (7.38–8.25), patella 0.30–0.34/0.07 (4.29–4.86), tibia 0.27–0.32/0.05–0.06 (5.33–5.40), tarsus 0.61–0.64/0.05–0.06 (10.67–12.20). Leg IV: trochanter 0.24–0.25/0.15–0.18 (1.33–1.67), femoropatella 0.88–0.93/0.21–0.23 (4.04–4.19), tibia 0.54–0.58/0.10 (5.40–5.80), basitarsus 0.24–0.25/0.08 (3.00–3.13), telotarsus 0.62–0.70/0.05 (12.40–14.00).

**Remarks.** *Lagynochthonius guangyangensis* sp. nov. differs from all other hypogean species of the genus except *L. guanniensis*, *L. fengi*, *L. serratus* and *L. xiaolinensis* by both chelal fingers bearing intercalary teeth, the presence of two setae on tergites I–III and X, and carapace without eyes or eyespots. It differs from *L. guanniensis*, *L. fengi*, *L. serratus* and *L. xiaolinensis* by the presence of four setae on tergite IV and the strongly pointed epistome (Hou *et al.* 2022b, 2023a).

**Ecology.** All specimens were collected under rocks and on the ground inside the cave.

**Distribution.** Known only from the type locality, Guangyang Cave (China, Guangxi Zhuang Autonomous Region).

### *Lagynochthonius guanniensis* Hou, Feng & Zhang, 2023

Chinese name. 关牛拉伪蝎  
Figs 22–26

*Lagynochthonius guanniensis* Hou, Feng & Zhang, 2023a: 11–16, figs 6–9.

**Material examined.** ♀ (Ps.-MHBV-GZXF-20-02-01) (holotype), 1 ♀ (Ps.-MSWU-GZXF-20-02-02) (paratype): China, Guizhou Province, Xifeng County, Wenquan Town, Wenquan Village, Guanniu Cave, under the detritus in the deep zone [27.223333°N, 106.871667°E], 853 m a.s.l., 15 August 2020, Zegang Feng, Hongru Xu & Yanmeng Hou leg; 10 ♂ (Ps.-MHBV-GZ2024012501–10), 6 ♀ (Ps.-MHBV-GZ2024012511–16): China, Guizhou Province, Guiyang City, Xifeng County, Wenquan Town, Guanniu Cave 1 [27.22384538°N, 106.86832882°E], 849 m a.s.l., 25 January 2024, Jiaqi Zhao, Yitin Xu & Jianzhou Sun leg.

**Revised diagnosis.** (♂♀). Moderately sized hypogean species; carapace without eyes or eyespots, anterior margin smooth and epistome small and pointed,



FIGURE 22. *Lagynochthonius guanniensis*, A. Male (dorsal view); B. Female (dorsal view).

triangular; tergites I–IV each with two setae. Pedipalps slender, chela 7.31–7.83 (♂), 6.70–7.33 (♀) times as long as broad; femur 7.94–8.69 (♂), 7.83–7.56 (♀) times as long as broad; both chelal fingers with intercalary teeth and a modified accessory tooth (*td*) on prolateral-retrolateral face; chemosensory setae (*sc*) present on dorsum of chelal hand.

**Description.** Adult males (Figs 22A, 23A–F, 24, 25).

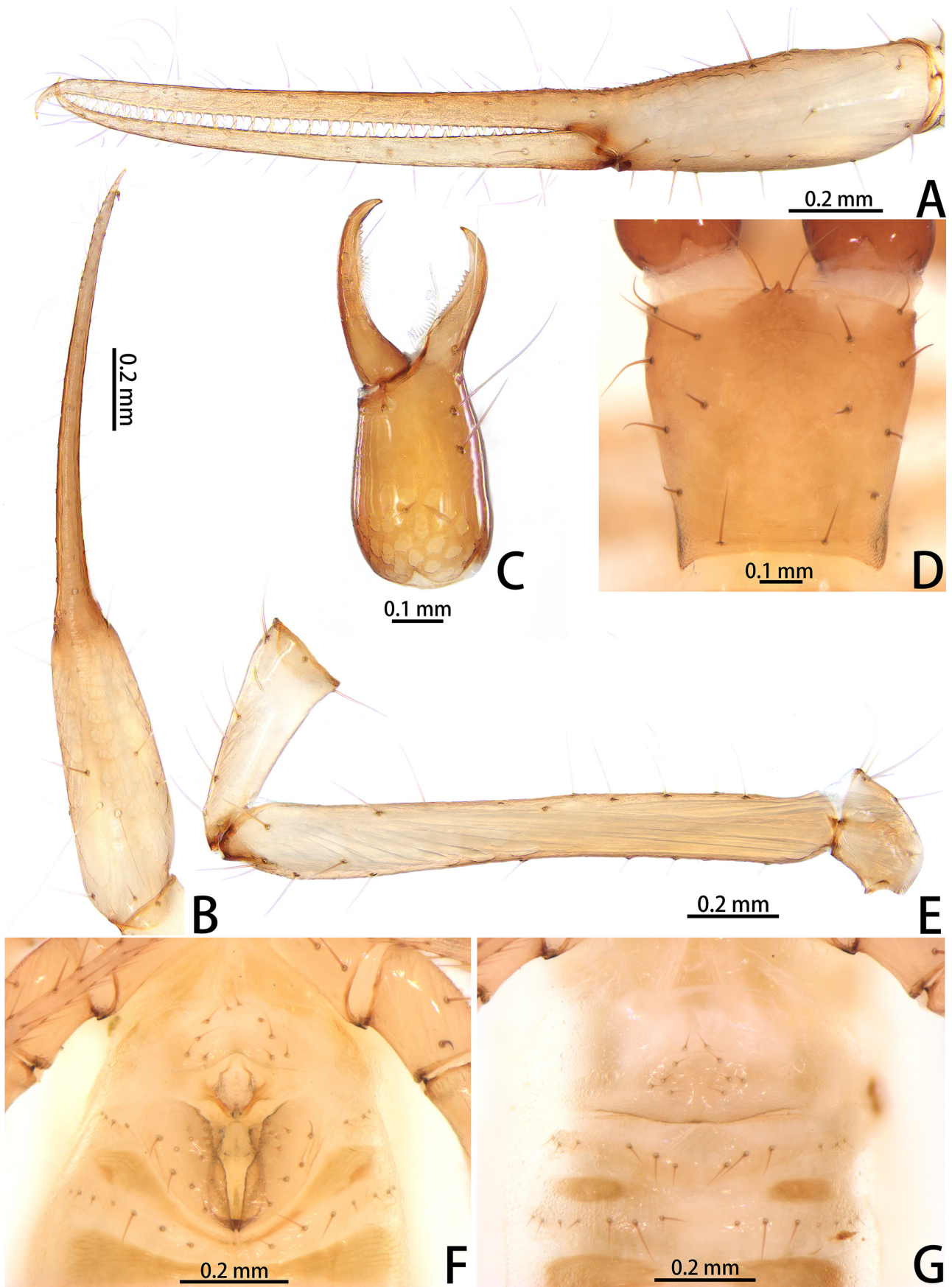
**Color** generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.

**Cephalothorax** (Figs 23D, 24A): carapace nearly subquadrate, 0.97–1.00 times as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin smooth, without serrations; epistome small and point; without eyes or eyespots; with 18 setae arranged s4s: 4: 4: 2: 2, most setae heavy, 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 the sole pair of setae of posterior row. Manducatory process with two acuminate distal setae, anterior seta less than 1/2 length of medial seta; apex of coxa I with a rounded anteromedial process; coxae II with 9–10 terminally indented coxal spines on each side, set as an oblique and arc row, central spines slightly longer than the others (Fig. 24D); intercoxal tubercle absent; chaetotaxy of coxae: P 3, I 3, II 4, III 5, IV 5.

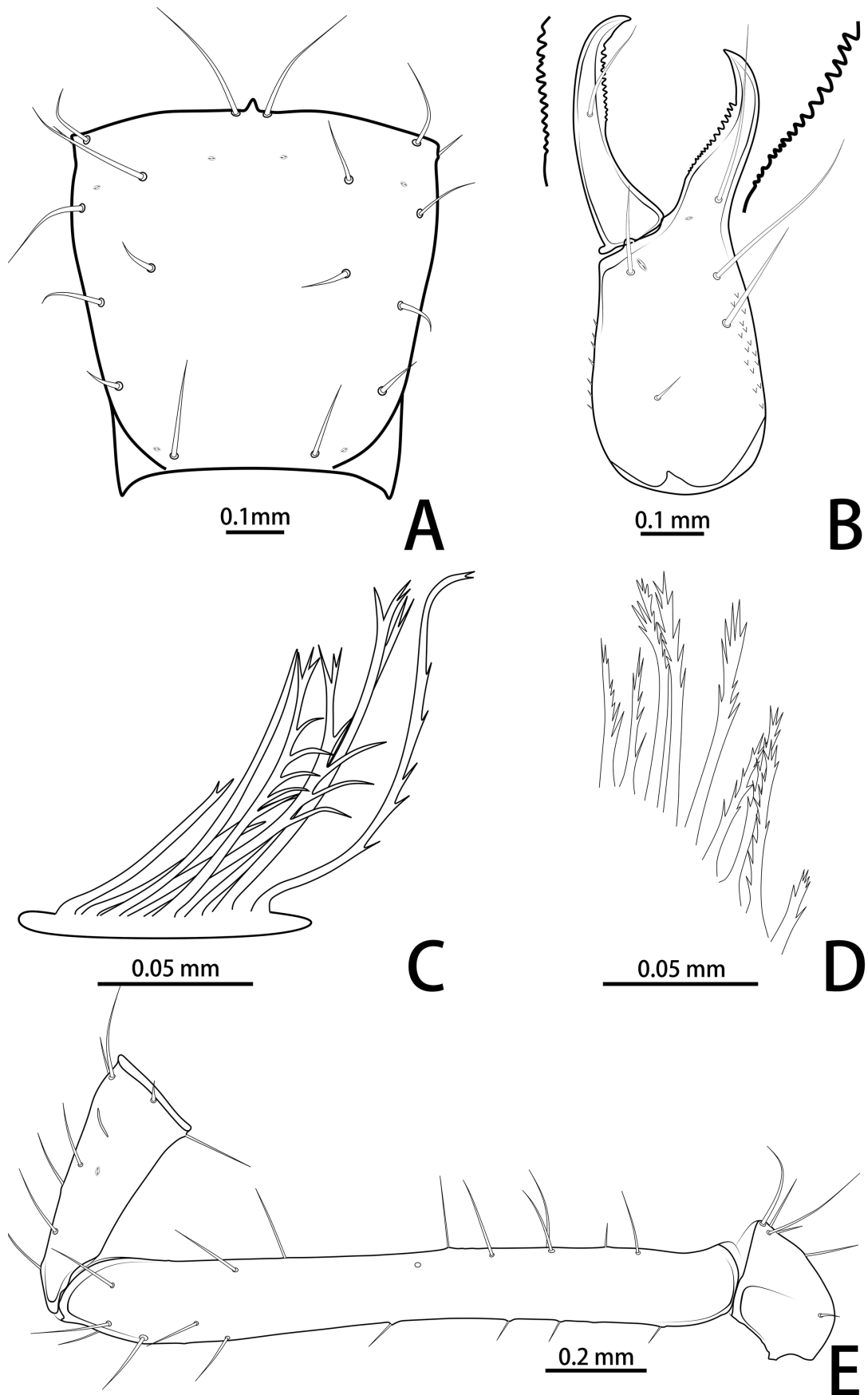
**Chelicera** (Figs 23C, 24B): almost as long as carapace, 1.91–2.06 times as long as broad; five setae and two lyrifissures (exterior condylar lyrifissure and exterior lyrifissure) present on hand, all setae acuminate, ventrobasal setae shorter than others; movable finger with one medial seta. Cheliceral hand with moderate wrinkle on both ventral and dorsal sides. Both fingers well provided

with teeth, fixed finger with 17–19 teeth, distal one largest; movable finger with 13–15 retrorse contiguous small teeth; galea completely vestigial (Fig. 24B). Serrula exterior with 17–24 and serrula interior with 12–15 blades. Rallum with eight blades, the distal one longest and recumbent basally, with fine barbules and slightly set apart from the other blades, latter tightly grouped and with long pinnae, some of which are subdivided (Fig. 24C).

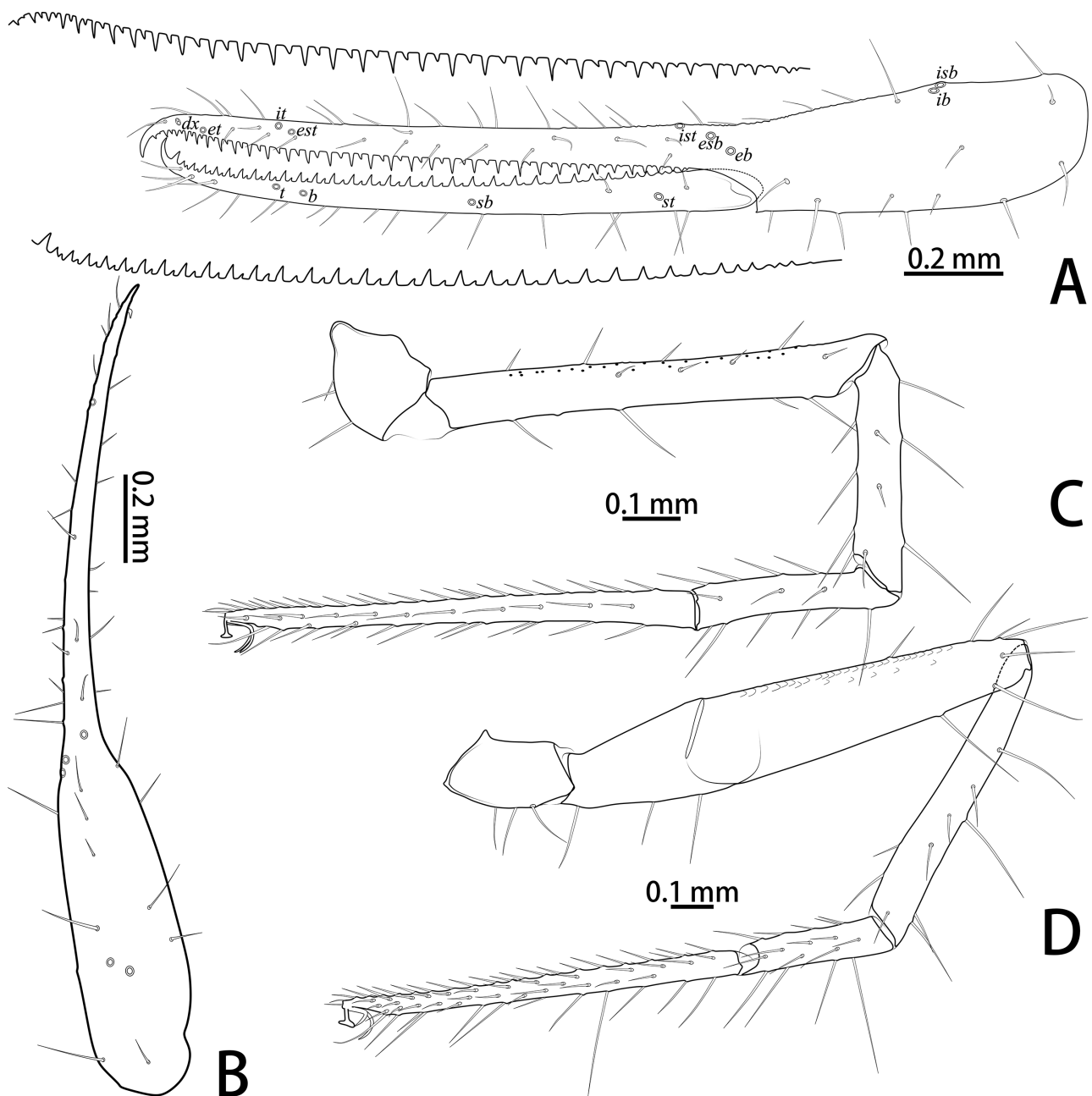
**Pedipalp** (Figs 23A–B, 23E, 24E, 25A–B): trochanter 1.89, femur 7.94–8.69 patella 2.55–2.70, chela 7.31–7.83, hand 2.81–3.08 times as long as broad; femur 2.41–2.57 times as long as patella; movable chelal finger 1.55–1.67 times as long as hand and 0.61–0.63 times as long as chela. Setae generally long and acuminate. Chelal hand gradually constricted towards fingers, apodeme complex of movable chelal finger strongly 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* situated midway between *b* and *st*; *b* and *t* situated subdistally, *t* situated at the same level as *it* and distal to *b*; *est* situated distal to *b* (Figs. 23A, 25A). Microsetae (chemosensory setae) present on dorsum of chelal hand (Figs. 23B, 25B). Both chelal fingers with a row of teeth, heterodentate, spaced regularly along the margin, teeth smaller distally and proximally: fixed finger with 31–36 well-spaced, pointed teeth, plus 27–31 intercalary microdenticles, and a modified accessory tooth on prolateral-retrolateral face (*td*, slightly distal to *dx*); movable finger with 30–33 well-spaced, pointed teeth, plus 4–6 vestigial, rounded and contiguous basal teeth and 24–27 intercalary microdenticles.



**FIGURE 23.** *Lagynochthonius guanniensis*, male (A–F), female (G): 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).



**FIGURE 24.** *Lagynochthonius guanniuensis*, male: 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).



**FIGURE 25.** *Lagynochthonius guanniensis*, male: 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).

**Opisthosoma:** generally typical, pleural membrane finely granulated. All tergites and sternites undivided; setae uniseriate and acuminate. Tergal chaetotaxy I–XII: 2: 2: 2: 2–3: 4: 4: 4: 4: 5: 2: T2T: 0. Sternal chaetotaxy IV–XII: 12: 8–10: 7–8: 6–7: 7: 7: 7: -: 2. Genital region: sternite II with 9–11 setae scattered on median area, genital opening slit-like, sternite III with 18–20 setae (Fig. 23F).

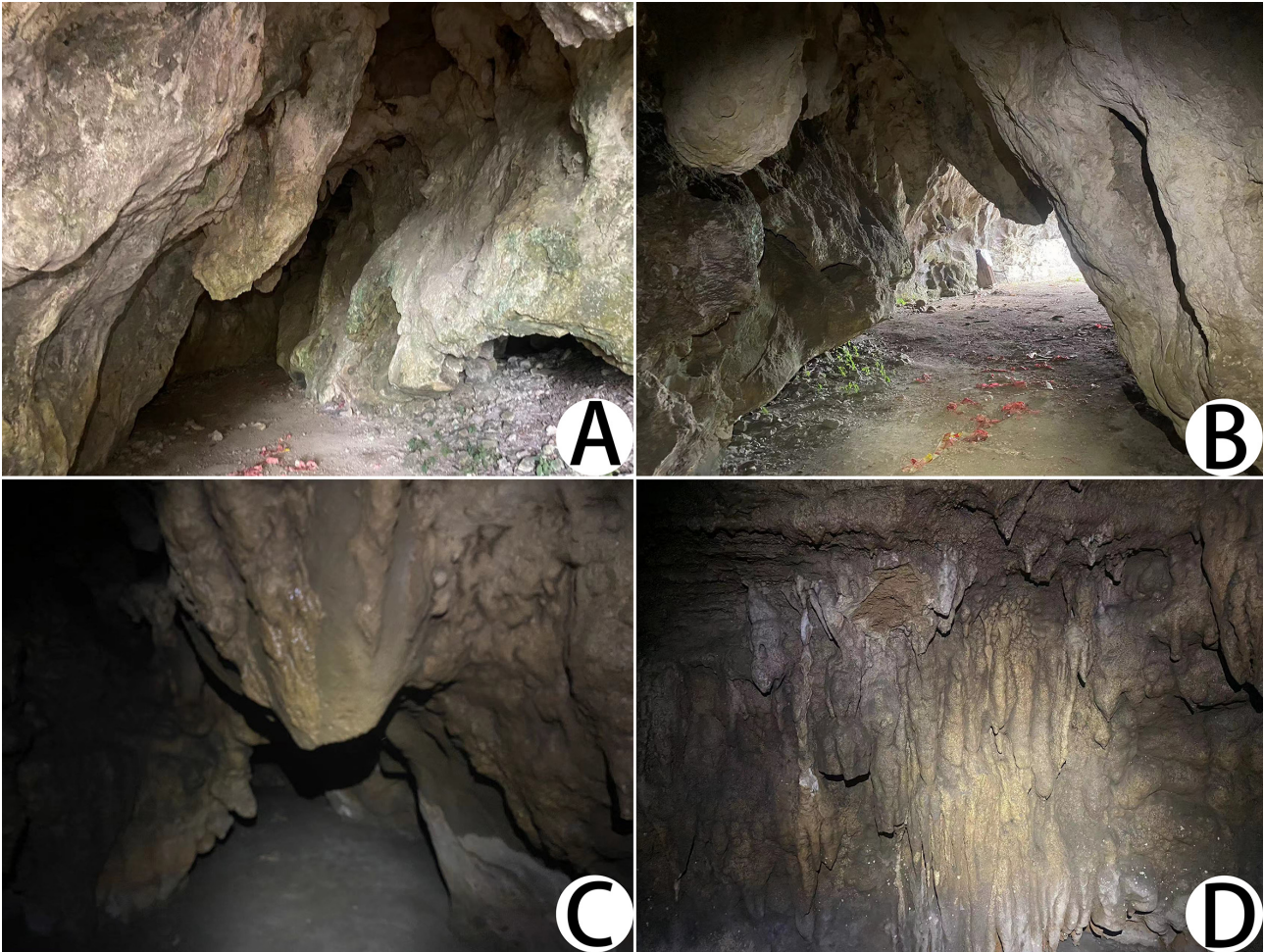
**Legs** (Fig. 25C–D): fine granulation present on anterodorsal faces of femur IV and patella IV. Leg I: femur 1.77–2.00 times as long as patella; tarsus 2.36–2.44 times as long as tibia. Leg IV: femoropatella 4.62–5.76 times as long as deep; tibia 6.91–7.60 times as long as deep; with basal tactile setae on both tarsal segments: basitarsus 4.63–4.75 times as long as deep (TS = 0.26–

0.38), telotarsus 16.00–16.67 times as long as deep and 2.55–2.70 times as long as basitarsus (TS = 0.20–0.30). Setae of leg I (trochanter to tibia) 3: 6–9: 6–7: 5–9, setae of leg IV (trochanter to basitarsus) 1–3: 3: 6: 8–10: 6–9. Arolium not divided, slightly shorter than the simple claws.

**Adult females** (Figs 22B, 23G). Mostly same as males; tergal chaetotaxy I–XII: 2: 2: 2: 2: 4: 4: 4: 4: 5: 2: T2T: 0; sternal chaetotaxy IV–XII: 8–12: 7–9: 8: 7: 7–8: 7–8: 7–8: -: 2. Genital region: sternite II with 9–10 setae scattered on median area, sternite III with a row of 8–12 setae.

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





**FIGURE 26.** Guanniu Cave 1, type locality of *Lagynochthonius guanniuensis*, A. Entrance; B. Inside the cave entrance; C–D. Areas where *L. guanniuensis* specimens were collected.

Males: body length 2.07–2.24. Pedipalps: trochanter 0.34–0.36/0.18–0.19 (1.89), femur 1.35–1.39/0.16–0.17 (7.94–8.69), patella 0.54–0.56/0.20–0.22 (2.55–2.70), chela 1.88–1.99/0.24–0.26 (7.31–7.83), hand 0.73–0.75/0.24–0.26 (2.81–3.08), movable chelal finger length 1.15–1.25. Chelicera 0.65–0.66/0.32–0.34 (1.91–2.06), movable finger length 0.38. Carapace 0.62–0.65/0.62–0.65 (0.97–1.00). Leg I: trochanter 0.22–0.23/0.12–0.14 (1.57–1.77), femur 0.78–0.86/0.08–0.09 (8.67–9.56), patella 0.43–0.45/0.07–0.09 (4.78–6.43), tibia 0.34–0.36/0.07–0.08 (4.38–5.14), tarsus 0.83–0.88/0.06–0.07 (12.14–14.67). Leg IV: trochanter 0.28–0.32/0.17–0.19 (1.56–1.71), femoropatella 1.20–1.21/0.21–0.26 (4.62–5.76), tibia 0.76–0.79/0.10–0.11 (6.91–7.60), basitarsus 0.37–0.38/0.08 (4.63–4.75), telotarsus 0.96–1.00/0.06 (16.00–16.67).

Females: body length 2.08–2.69. Pedipalps: trochanter 0.36–0.37/0.18–0.21 (1.76–2.06), femur 1.36–1.41/0.18–0.21 (7.83–8.56), patella 0.54–0.58/0.21–0.22 (2.45–2.71), chela 1.89–2.01/0.27–0.30 (6.70–7.33), hand 0.73–0.76/0.27–0.30 (2.53–2.61), movable chelal finger length 1.16–1.24. Chelicera 0.71–0.75/0.35–0.39 (1.87–2.02), movable finger length 0.38–0.42. Carapace 0.66–0.69/0.63–0.68 (0.98–1.09). Leg I: trochanter

0.23–0.24/0.12–0.17 (1.35–2.00), femur 0.72–0.85/0.08–0.09 (9.00–10.62), patella 0.39–0.45/0.08–0.10 (1.85–1.98), tibia 0.31–0.37/0.07–0.08 (3.88–5.29), tarsus 0.85–0.86/0.07 (12.14–12.29). Leg IV: trochanter 0.29–0.34/0.16–0.18 (1.81–1.89), femoropatella 1.13–1.22/0.22–0.27 (4.52–5.50), tibia 0.70–0.79/0.11 (6.36–7.18), basitarsus 0.34–0.39/0.09–0.10 (3.40–4.33), telotarsus 0.94–0.98/0.06–0.08 (11.75–16.16).

**Remarks.** *Lagynochthonius guanniuensis* was described from two female specimens by Hou, Feng & Zhang (2023). Additional specimens were collected recently at the type locality (Guanniu Cave in Guiyang City, Guizhou Province, China), including ten males and six females, which conform to the diagnostic characteristics of *L. guanniuensis*. We also refine the diagnosis of *L. guanniuensis* based on the holotype and the new specimens examined.

*Lagynochthonius guanniuensis* differs from all other hypogean species of the genus except *L. fengi*, *L. serratus* and *L. xiaolinensis* by both chelal fingers with intercalary teeth, the presence of two setae on tergites I–III and X, and carapace without eyes or eyespots. It differs from *L. fengi*, *L. serratus* and *L. xiaolinensis* by its longer chela (1.88–1.99 mm (♂), 1.89–2.01 mm (♀) compared to 1.53–1.54

mm (♂), 1.53–1.55 mm (♀) in *L. fengi*, 1.68–1.76 mm (♂), 1.79–1.81 mm (♀) in *L. serratus* and 1.75 mm (♂) in *L. xiaolinensis* and the markedly curved chelal fingers in dorsal view (straight or slightly curved in dorsal view in *L. fengi*, *L. serratus* and *L. xiaolinensis*) (Hou *et al.* 2022b).

**Ecology.** All the specimens were collected from the stone walls inside the cave (Fig. 26C–D).

**Distribution.** Known only from the type locality, Guanniu Cave 1 (China, Guizhou Province).

### *Lagynochthonius harveyi* Hu & Zhang, in Zhang & Zhang, 2014

Chinese name. 哈氏拉伪蝎

*Lagynochthonius harveyi* Hu & Zhang in Zhang & Zhang, 2014: 171 (replacement name for *Lagynochthonius microdentatus* Hu & Zhang, 2012b).

**Material examined.** ♂ (holotype), 4 ♂ (paratypes) and 8 ♀ (paratypes): China, Yunnan Province, Dali City, entrance to Cangshan National Geologiocal Park [25.683333°N, 100.133333°E], 6 August 2010, Junfang Hu leg.

**Diagnosis and description.** For details see Hu & Zhang (2012b).

**Distribution.** China (Yunnan Province).

### *Lagynochthonius hepingensis* Sun, Guo & Zhang, 2024

Chinese name. 和平拉伪蝎

*Lagynochthonius hepingensis* Sun, Guo & Zhang, 2024: 115–121, figs 10–13.

**Material examined.** ♂ (Ps.-MHBU-GZ2022080701) (holotype), 5 ♂ (Ps.-MHBU-GZ2022080702–06) (paratypes) and 2 ♀ (Ps.-MHBU-GZ2022080707–08) (paratypes): China, Guizhou Province, Qianxinan Prefecture, Wangmu County, Dayi Town, Heping Village, near Provincial Highway 209, under topsoil and in the leaf litter layer [25.398556°N, 106.126967°E], 1553 m a.s.l., 7 August 2022, Yanmeng Hou, Lu Zhang, Jianzhou Sun & Wenlong Fan leg.

**Diagnosis and description.** For details see Sun, Guo & Zhang (2024).

**Distribution.** China (Guizhou Province).

### *Lagynochthonius houi* Sun, Guo & Zhang, 2024

Chinese name. 侯氏拉伪蝎

*Lagynochthonius houi* Sun, Guo & Zhang, 2024: 121–126, figs 14–17.

**Material examined.** 1 ♂ (Ps.-MHBU-GZ2022080901) (holotype), 2 ♂ (Ps.-MHBU-GZ2022080902–03) (paratypes) and 1 ♀ (Ps.-MHBU-GZ2022080904) (paratype): China, Guizhou Province, Qiannan Prefecture,

Pintang County, Tangbian Town, Xindian Village, under topsoil and in the leaf litter layer [25.628386°N, 106.731986°E], 991 m a.s.l., 9 August 2022, Yanmeng Hou, Lu Zhang, Jianzhou Sun & Wenlong Fan leg.

**Diagnosis and description.** For details see Sun, Guo & Zhang (2024).

**Distribution.** China (Guizhou Province).

### *Lagynochthonius infirmus* sp. nov.

Chinese name. 弱眼拉伪蝎

Figs 27–30

**Type material.** Holotype ♂ (Ps.-MHBU-SC2020083001): China, Sichuan Province, Luzhou City, Gulin County, Guanniu Cave 2 [28.038775°N, 105.812703°E], 890 m a.s.l., 30 August 2020, Zegang Feng, Hongru Xu & Yangmeng Hou leg. Paratypes: 4 ♀ (Ps.-MHBU-SC2020083002–05), all with the same data as the holotype.

**Etymology.** The specific name is derived from the Latin word “*infirmus*”, meaning feeble, which refers to the two eyespots.

**Diagnosis.** (♂♀). Moderately sized hypogean species; carapace with two eyespots, anterior margin smooth and epistome small and triangular; tergites I–IV each with four setae. Pedipalps slender, chela 8.47 (♂), 7.57–8.05 (♀) times as long as broad; femur 8.69 (♂), 7.75–8.13 (♀) times as long as broad; both chelal fingers without intercalary teeth and a modified accessory tooth (*td*) on prolateral-retrolateral face; chemosensory setae (*sc*) present on dorsum of chelal hand.

**Description.** Adult male (holotype) (Figs 27A, 28A–D, 28F–H, 29, 30).

**Color** generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.

**Cephalothorax** (Figs 27D, F, 28A): 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 smooth, without serrations; epistome strongly point, with two eyespots; with 18 setae arranged s4s: 4: 4: 2: 2, most setae heavy, 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 the sole pair of setae of posterior row. Manducatory process with two acuminate distal setae, anterior seta less than 1/2 length of medial seta; apex of coxa I with a rounded anteromedial process; coxae II with 8 terminally indented coxal spines on each side, set as an oblique and arc row, central spines slightly longer than the others (Fig. 29D); intercoxal tubercle absent; chaetotaxy of coxae: P 3, I 3, II 4, III 5, IV 5.

**Chelicera** (Figs 28C, 29B): almost as long as carapace, 1.84 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.

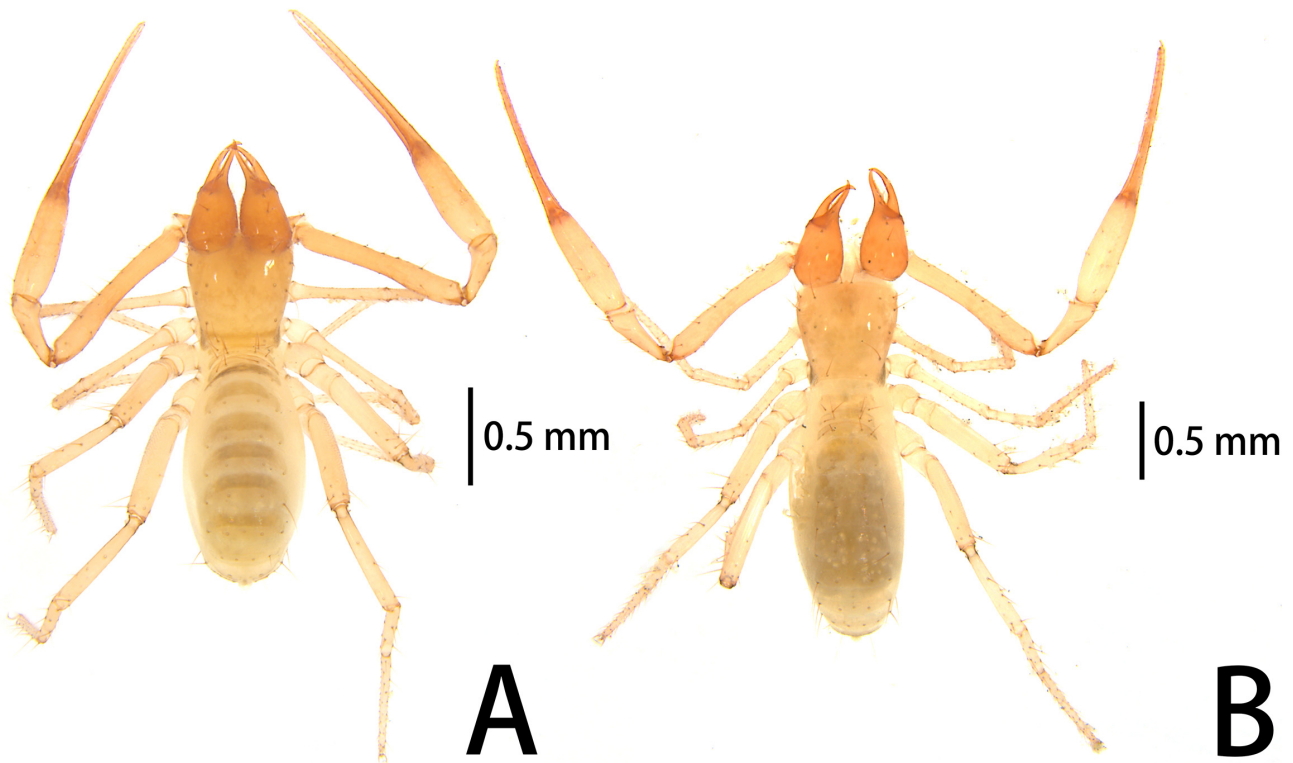


FIGURE 27. *Lagynochthonius infirmus* sp. nov., A. Holotype male (dorsal view); B. Paratype female (dorsal view).

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 16 retrorse contiguous small teeth; galea completely vestigial (Fig. 28B). Serrula exterior with 25–27 and serrula interior with 13 blades. Rallum with eight blades, the distal one longest and recumbent basally, with fine barbules and slightly set apart from the other blades, latter tightly grouped and with long pinnae, some of which are subdivided (Fig. 29C).

**Pedipalp** (Figs 28A–B, 28G, 29E, 30A–B): trochanter 1.53, femur 8.69, patella 2.93, chela 8.47, hand 3.32 times as long as broad; femur 2.56 times as long as patella; movable chelal finger 1.56 times as long as hand and 0.61 times as long as chela. Setae generally long and acuminate. Chelal hand gradually constricted towards fingers, apodeme complex of movable chelal finger strongly 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, *t* situated at the same level as *it* and distal to *b*; *est* situated distal to *b* and close to *it* (Figs. 28A, 30A). Microsetae (chemosensory setae) present on dorsum of chelal hand (Figs. 28B, 30B). Both chelal fingers with a row of teeth, spaced regularly along the margin, teeth smaller distally

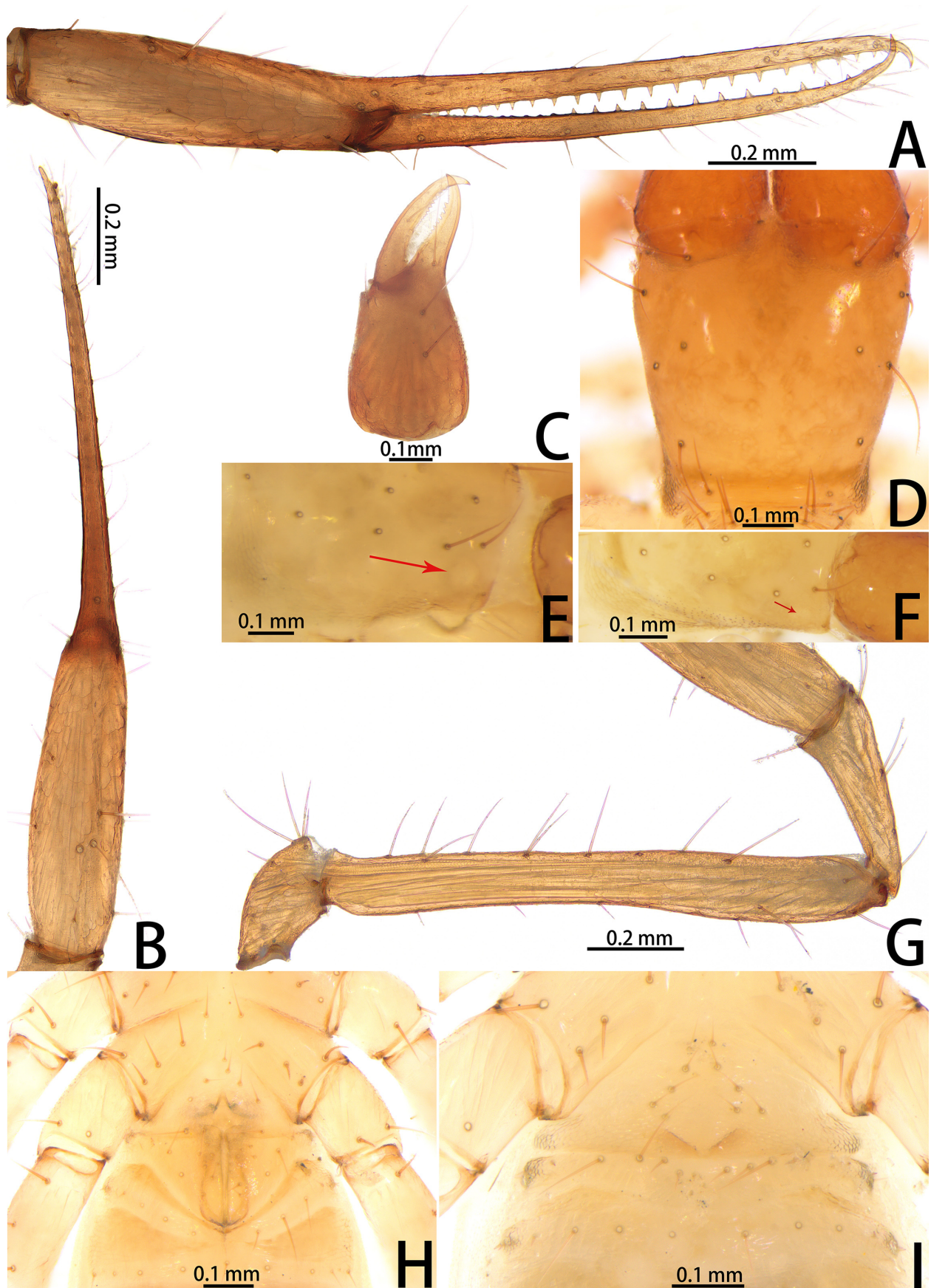
and proximally: fixed finger with 23 well-spaced, pointed teeth, and a modified accessory tooth on prolateral-retrolateral face (*td*, slightly distal to *dx*); movable finger with 13 well-spaced, pointed teeth, plus 10 vestigial, rounded and contiguous basal teeth.

**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: 4: 5: 4: T2T: 0. Sternal chaetotaxy IV–XII: 8: 9: 8: 9: 9: 14: 9: -: 2. Genital region: sternite II with 6 setae scattered on median area, genital opening slit-like, sternite III with 22 setae (Fig. 28H).

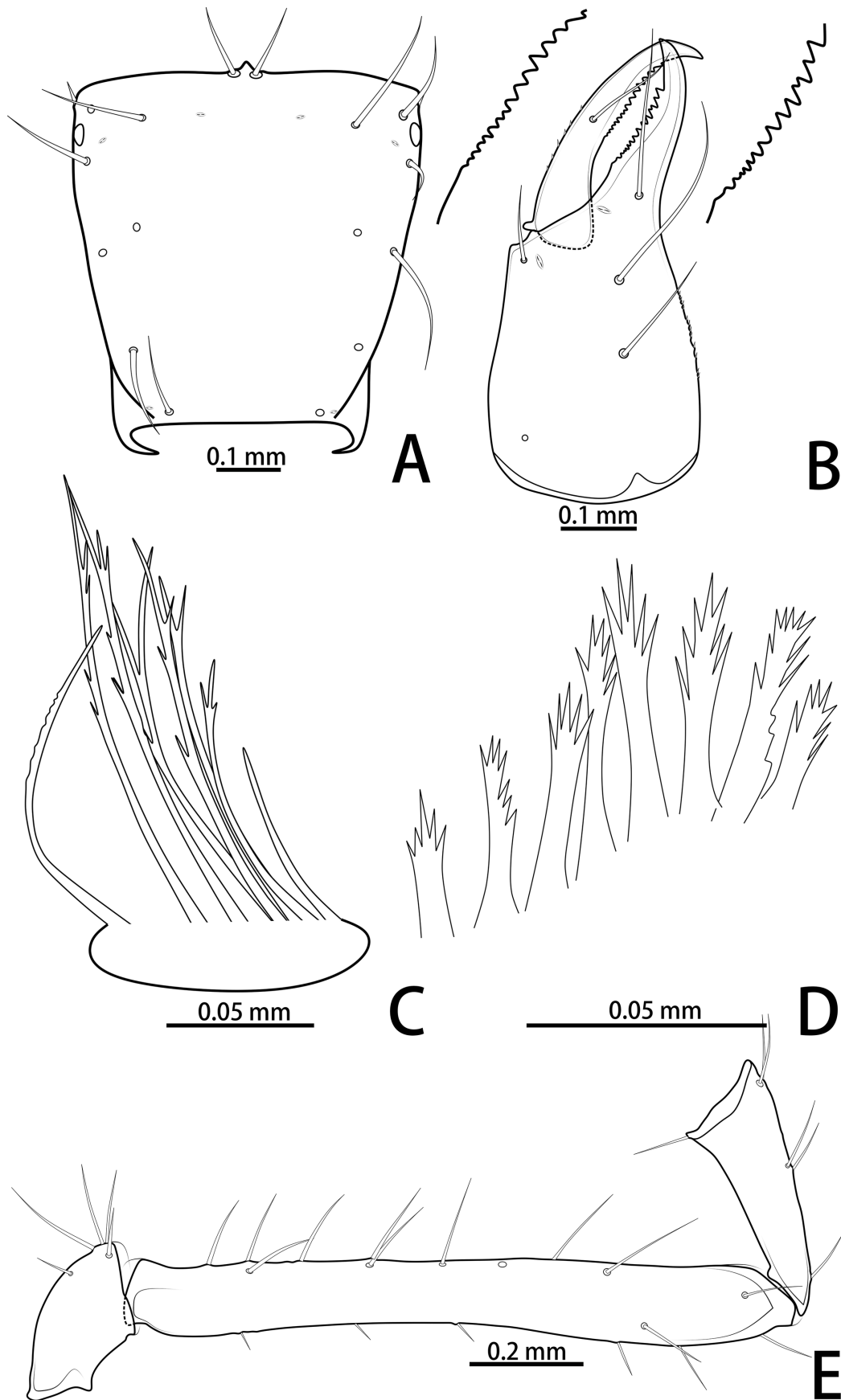
**Legs** (Fig. 30C–D): fine granulation present on anterodorsal faces of femur IV and patella IV. Leg I: femur 1.88 times as long as patella; tarsus 2.45 times as long as tibia. Leg IV: femoropatella 3.72 times as long as deep; tibia 6.40 times as long as deep; with basal tactile setae on both tarsal segments: basitarsus 4.00 times as long as deep (TS = 0.31), telotarsus 15.80 times as long as deep and 2.47 times as long as basitarsus (TS = 0.23). Setae of leg I (trochanter to tibia) 2: 8: 8: 10, setae of leg IV (trochanter to basitarsus) 2: 3: 4: 10: 9. Arolium not divided, slightly shorter than the simple claws.

**Adult females** (paratypes) (Figs 27B, 28I). Mostly same as male; tergal chaetotaxy I–XII: 4: 4: 4: 4: 4: 4: 4: 4: 5: 4: T2T: 0; sternal chaetotaxy IV–XII: 6–8: 8–10: 8–9: 9: 9–11: 9–11: 9–11: -: 2. Genital region: sternite II with 10 setae scattered on median area, sternite III with a row of 6–10 setae.

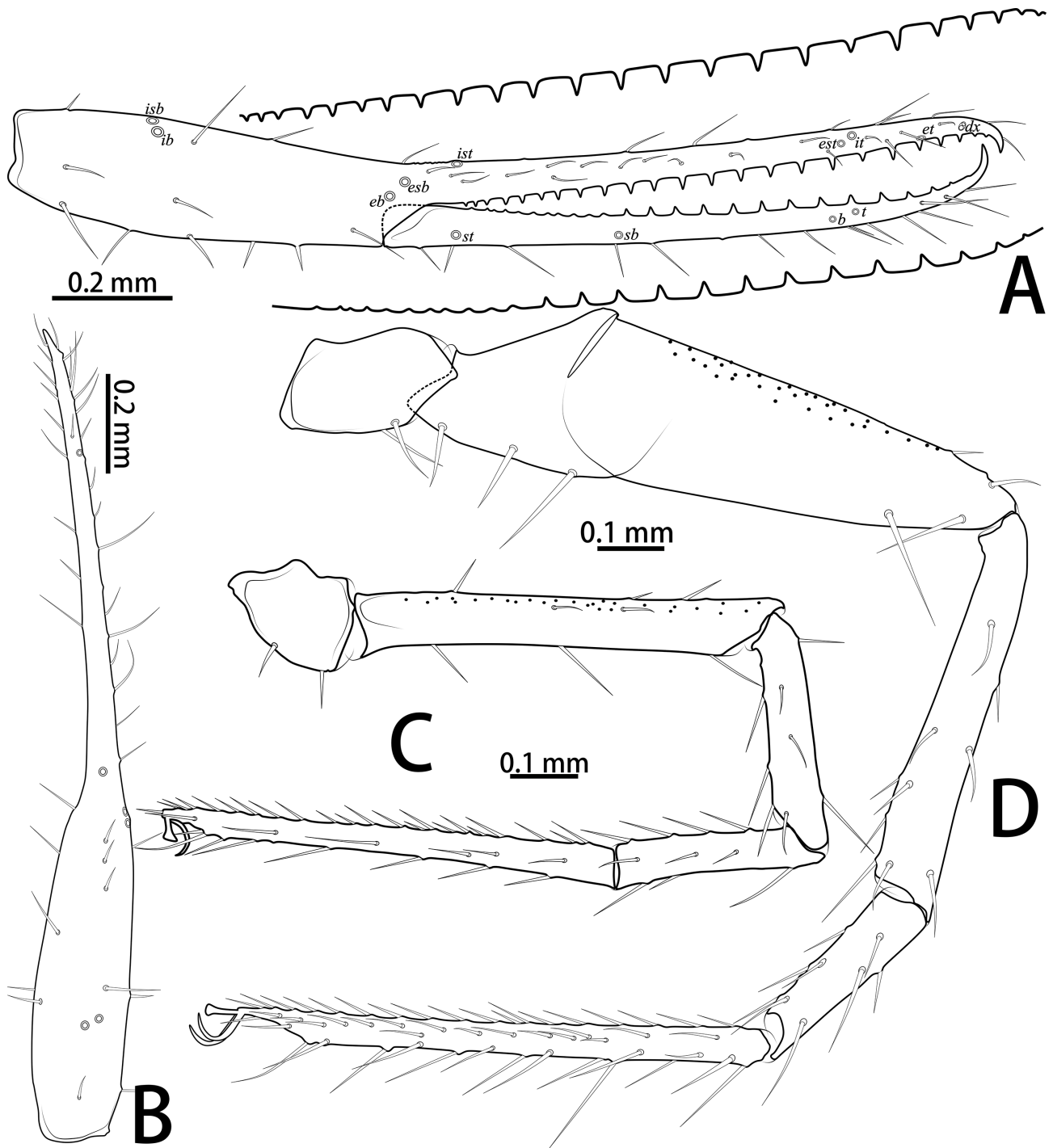
**Dimensions** (length/breadth or, in the case of the legs, length/depth in mm; ratios in parentheses). Male: body



**FIGURE 28.** *Lagynochthonius infirmus* sp. nov., holotype male (A–D, F–H), paratype female (E, I): A. Right chela (lateral view); B. Right chela (dorsal view); C. Left chelicera (dorsal view); D. Carapace (dorsal view); E. Female carapace (dorsal-lateral view), indicate eyespot (red arrow); F. Male carapace (dorsal-lateral view), indicate eyespot (red arrow); G. Right pedipalp (minus chela, dorsal view); H. Male genital area (ventral view); I. Female genital area (ventral view).



**FIGURE 29.** *Lagynochthonius infirmus* sp. nov., holotype male: A. Carapace (dorsal view); B. Left chelicera (dorsal view), with details of teeth; C. Rallum; D. Coxal spines on coxae II (ventral view); E. Right pedipalp (minus chela, dorsal view).



**FIGURE 30.** *Lagynochthonius infirmus* sp. nov., holotype male: A. Right chela (lateral view), with details of teeth and trichobothrial pattern; B. Right chela (dorsal view); C. Leg I (lateral view); D. Leg IV (lateral view).

length 1.87. Pedipalps: trochanter 0.23/0.15 (1.53), femur 1.13/0.13 (8.69), patella 0.44/0.15 (2.93), chela 1.61/0.19 (8.47), hand 0.63/0.19 (3.32), movable chelal finger length 0.98. Chelicera 0.57/0.31 (1.84), movable finger length 0.31. Carapace 0.58/0.55 (1.05). Leg I: trochanter 0.18/0.11 (1.64), femur 0.64/0.08 (8.00), patella 0.34/0.07 (4.86), tibia 0.29/0.06 (4.83), tarsus 0.71/0.05 (14.20). Leg IV: trochanter 0.23/0.13 (1.77), femoropatella 0.93/0.25 (3.72), tibia 0.64/0.10 (6.40), basitarsus 0.32/0.08 (4.00), telotarsus 0.79/0.05 (15.80).

Females: body length 1.86–2.49. Pedipalps: trochanter 0.33–0.35/0.16–0.17 (2.06), femur 1.22–1.27/0.15–0.16 (7.75–8.13), patella 0.45–0.51/0.18 (2.50–2.83), chela 1.69–1.77/0.22–0.23 (7.57–8.05), hand 0.67–0.70/0.22–0.23 (3.00–3.18), movable chelal finger length 0.99–1.27. Chelicera 0.63–0.69/0.34–0.38 (1.80–1.82), movable finger length 0.33–0.36. Carapace 0.58–0.63/0.64–0.67 (0.88–0.97). Leg I: trochanter 0.16–0.21/0.11–0.16 (1.30–1.67), femur 0.66–0.73/0.08–0.10 (6.70–8.25), patella 0.30–0.35/0.07–0.08 (4.13–4.75), tibia 0.31–0.33/0.06

(5.17–5.50), tarsus 0.71–0.78/0.05–0.06 (11.83–14.40). Leg IV: trochanter 0.24–0.30/0.14–0.15 (1.60–2.14), femoropatella 0.95–1.05/0.24–0.26 (3.65–4.20), tibia 0.63–0.69/0.09–0.10 (6.30–7.22), basitarsus 0.29–0.32/0.08–0.09 (3.56–4.00), telotarsus 0.76–0.84/0.05–0.06 (12.83–15.20).

**Remarks.** *Lagynochthonius infirmus* sp. nov. differs from all other hypogean *Lagynochthonius* species except *L. crassus* and *L. latipectus* by the absence of intercalary teeth on chelal fingers and the presence of two eyespots on the carapace. It differs from *L. crassus* and *L. latipectus* by the small and triangular epistome (obtuse, small, round in *L. crassus* and *L. latipectus*) and its longer chela (1.61 mm (♂), 1.69–1.77 mm (♀) compared to 1.54–1.57 mm (♂), 1.55–1.60 mm (♀) in *L. crassus* and 1.32–1.38 mm (♂), 1.35–1.50 mm (♀) in *L. latipectus*) (Hou *et al.* 2022b, 2023a).

**Distribution.** Known only from the type locality, Guanniu Cave 2 (China, Sichuan Province).

***Lagynochthonius jingshengensis* sp. nov.**

Chinese name. 菁盛拉伪蝎

Figs 31–35

**Typematerial.** Holotype ♂ (Ps.-MHBU-GX2021072901): China, Guangxi Zhuang Autonomous Region, Hechi City, Jingsheng Town, cave without name (Unnamed Cave 3) [23.973227°N, 108.29204°E], 609.6 m a.s.l., 29 July 2021, Zegang Feng, Hongru Xu, Liu Fu & Nana Zhan leg. Paratypes: 1 ♂ (Ps.-MHBU-GX2021072902) and 1 ♀ (Ps.-MHBU-GX2021072903), all with the same data as the holotype.

**Etymology.** Named after the town of Jingsheng, near the type locality.

**Diagnosis.** (♂♀). Small sized hypogean species; carapace without eyes or eyespots, anterior margin smooth and epistome obtuse and small, round; tergites I–II each with two setae, tergites III–IV each with four setae. Pedipalps slender, chela 6.50–6.92 (♂), 6.07 (♀) times as long as broad; femur 6.78–7.13 (♂), 6.20 (♀) times as long as broad; both chelal fingers without intercalary teeth and a modified accessory tooth (*td*) on prolateral-retrolateral face; chemosensory setae (*sc*) present on dorsum of chelal hand.

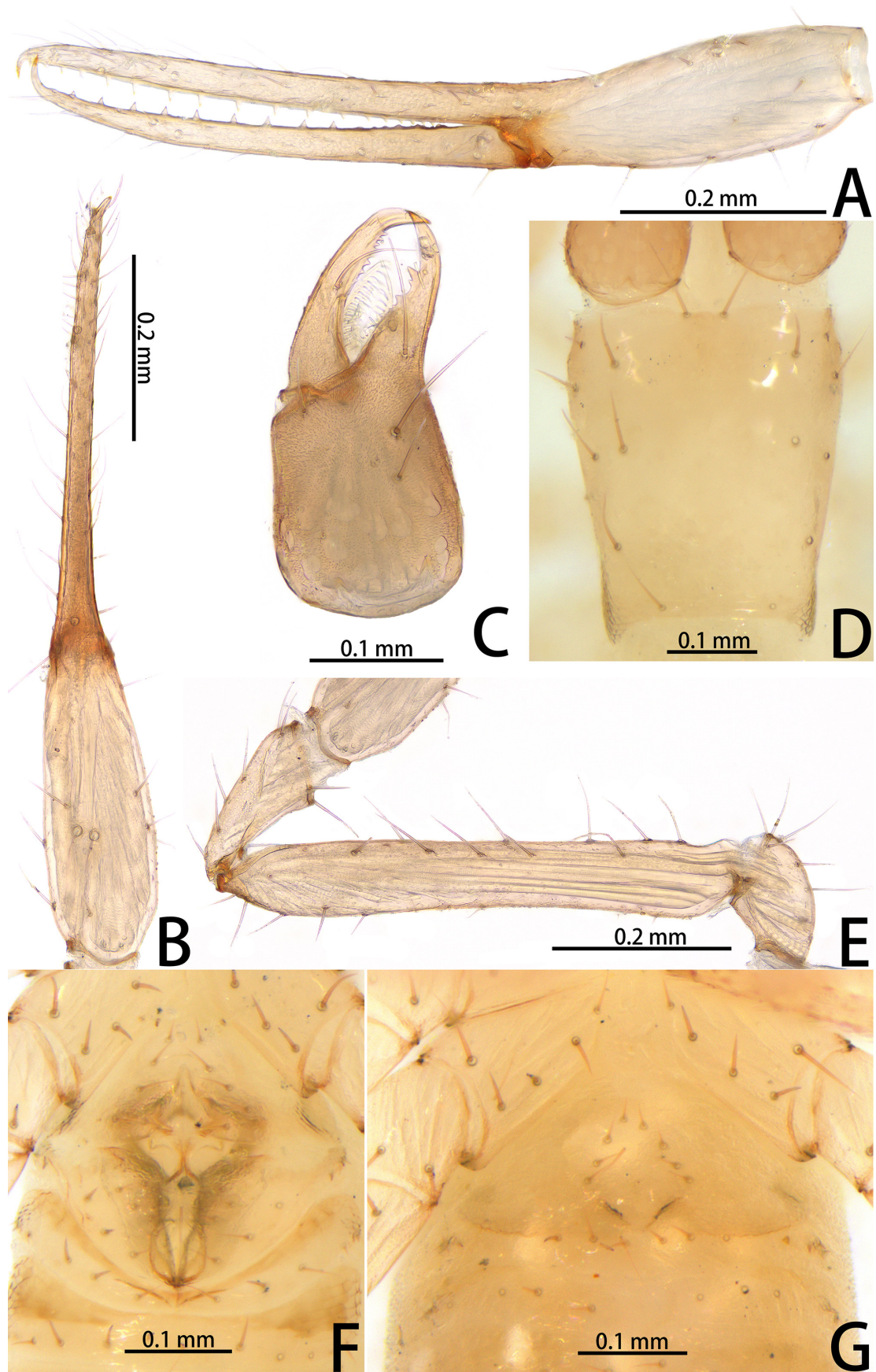
**Description.** Adult males (holotype and paratype) (Figs 31A, 32A–F, 33, 34).

**Color** generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.

**Cephalothorax** (Figs 32D, 33A): carapace nearly subquadrate, 1.00–1.09 times as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin smooth, without serrations; epistome obtuse and small, round, without eyes or eyespots; with 18 setae arranged s4s: 4: 4: 2: 2, most setae heavy, 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 the sole pair of setae of posterior row. Manducatory process with two acuminate distal setae, anterior seta more than 1/2 length of medial seta; apex of coxa I with a rounded anteromedial process; coxae II with 8–10 terminally indented coxal spines on each side, set as an oblique and arc row, central spines

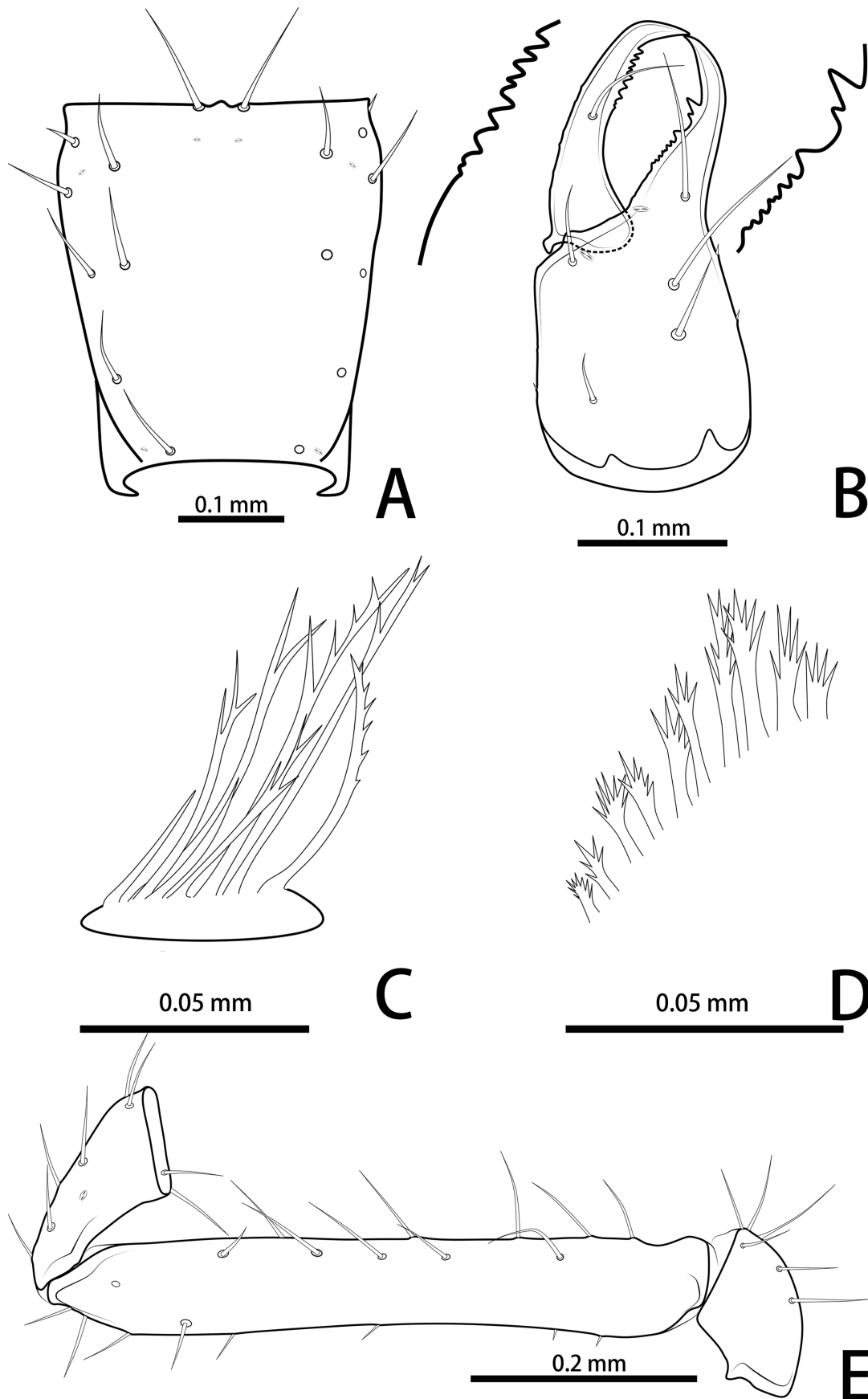


**FIGURE 31.** *Lagynochthonius jingshengensis* sp. nov., A. Holotype male (dorsal view); B. Paratype female (dorsal view).

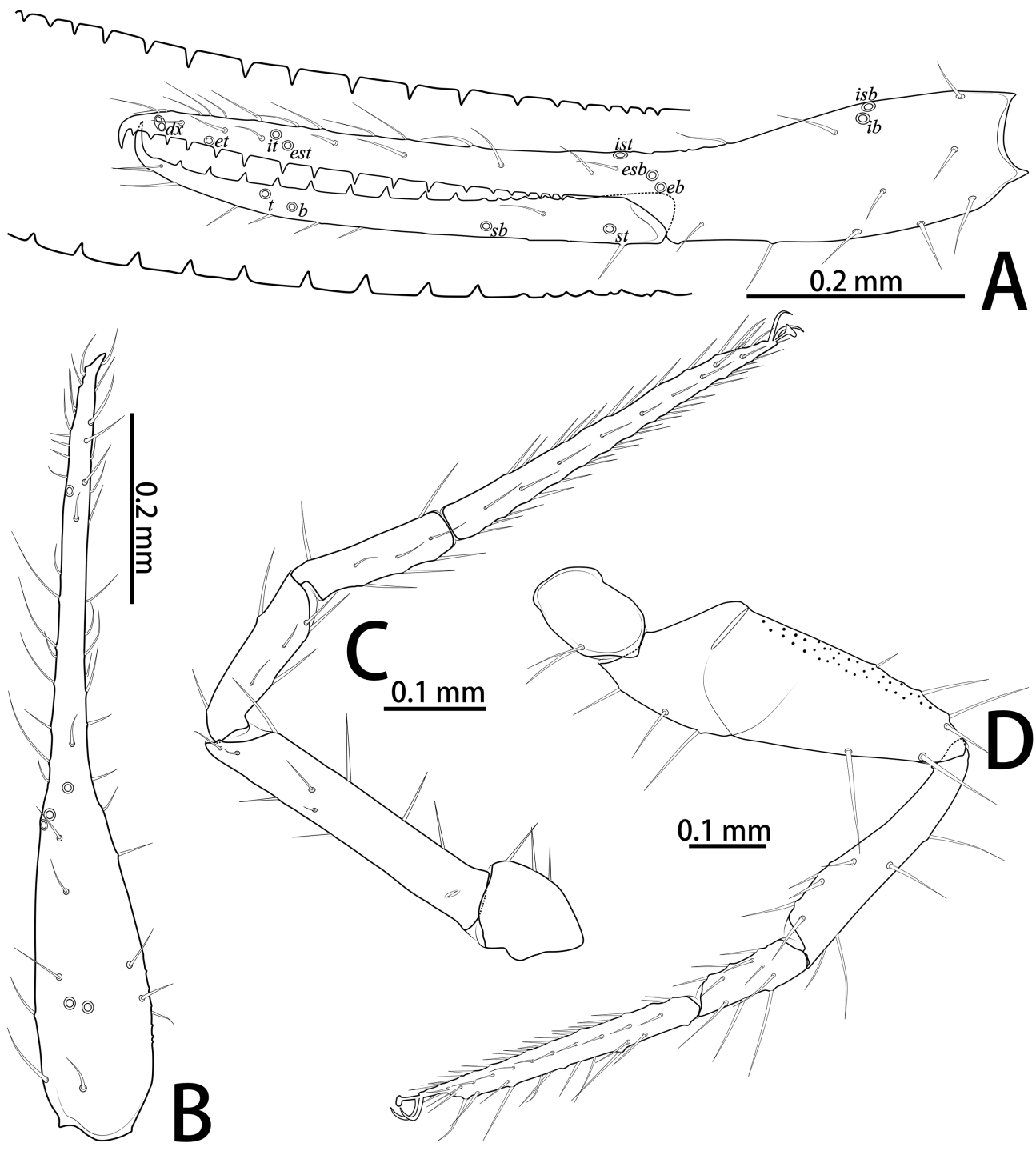


**FIGURE 32.** *Lagynochthonius jingshengensis* sp. nov., holotype male (A–F), paratype female (G): A. Left chela (lateral view); B. Left chela (dorsal view); C. Left chelicera (dorsal view); D. Carapace (dorsal view); E. Left pedipalp (minus chela, dorsal view); F. Male genital area (ventral view); G. Female genital area (ventral view).





**FIGURE 33.** *Lagynochthonius jingshengensis* sp. nov., holotype male: 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).



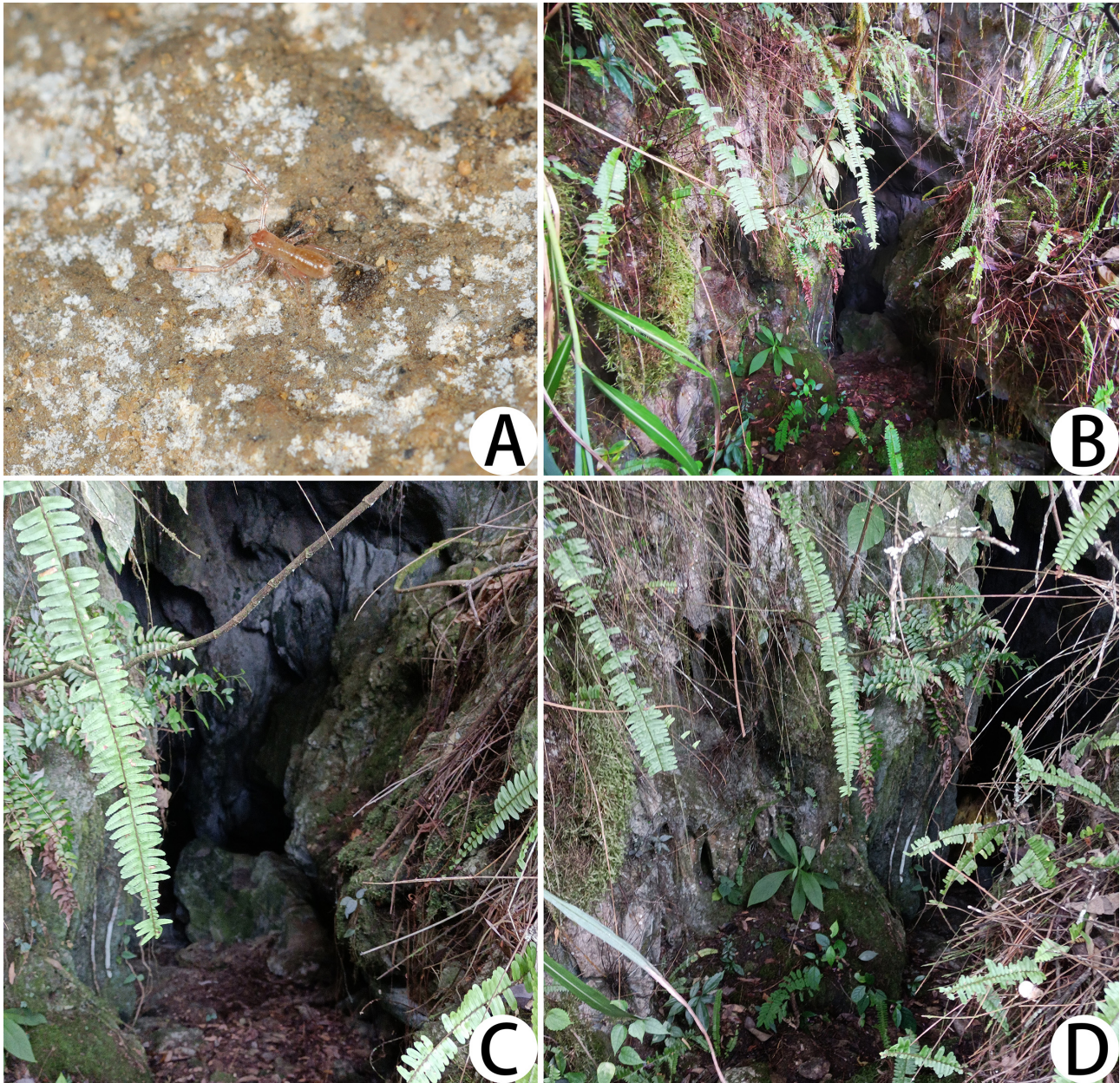
**FIGURE 34.** *Lagynochthonius jingshengensis* sp. nov., holotype male: A. Left chela (lateral view), with details of teeth and trichobothrial pattern; B. Left chela (dorsal view); C. Leg I (lateral view); D. Leg IV (lateral view).

slightly longer than the others (Fig. 33D); intercoxal tubercle absent; chaetotaxy of coxae: P 3, I 3, II 4, III 5, IV 5.

**Chelicera** (Figs 32C, 33B): almost as long as carapace, 1.82–1.88 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 8–9 teeth, distal one largest; movable finger with 7–9 retrorse contiguous small teeth; galea completely vestigial (Fig. 33B). Serrula exterior with 17–19 and serrula interior with 12–13 blades. Rallum with eight blades, the distal one longest and recumbent basally, with fine barbules and slightly set apart from the other blades, latter tightly grouped and with long pinnae, some of which are subdivided (Fig. 33C).

**Pedipalp** (Figs 32A–B, 32E, 33E, 34A–B): trochanter 1.78–2.14, femur 6.78–7.13, patella 2.33–2.63, chela



**FIGURE 35.** Unnamed Cave 3, type locality of *Lagynochthonius jingshengensis* sp. nov., A. Live *L. jingshengensis* sp. nov. in its natural environment; B–D. Inside the cave entrance.

6.50–6.92, hand 2.50–2.58 times as long as broad; femur 2.65–2.71 times as long as patella; movable chelal finger 1.60–1.65 times as long as hand and 0.61–0.62 times as long as chela. Setae generally long and acuminate. Chelal hand gradually constricted towards fingers, apodeme complex of movable chelal finger strongly 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, *t* slightly distal to *it* and distal to *b*; *est* situated distal to *b* and close to *it* (Figs. 32A, 34A).

Microsetae (chemosensory setae) present on dorsum of chelal hand (Figs. 32B, 34B). Both chelal fingers with a row of teeth, spaced regularly along the margin, teeth smaller distally and proximally: fixed finger with 17–19 well-spaced, pointed teeth, and a modified accessory tooth on prolateral-retrolateral face (*td*, slightly distal to *dx*); movable finger with 8–9 well-spaced, pointed teeth, plus 8–10 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: 4–5: 4: 4: 4: 5: 5: 4: T2T: 0. Sternal chaetotaxy IV–XII: 12: 10: 9–10: 9–10: 10: 8–11: 9–11: -: 2. Genital region: sternite II with 6–8 setae scattered on median area, genital opening slit-like, sternite III with 12–18 setae (Fig. 32F).

**Legs** (Fig. 34C–D): fine granulation present on anterodorsal faces of femur IV and patella IV. Leg I: femur 1.88–1.94 times as long as patella; tarsus 2.27–2.31 times as long as tibia. Leg IV: femoropatella 2.88–3.00 times as long as deep; tibia 4.88–5.33 times as long as deep; with basal tactile setae on both tarsal segments: basitarsus 2.50–3.00 times as long as deep (TS = 0.33–0.40), telotarsus 10.00–12.33 times as long as deep and 2.47–2.67 times as long as basitarsus (TS = 0.30–0.32). Setae of leg I (trochanter to tibia) 3: 6–10: 7–8: 7–8, setae of leg IV (trochanter to basitarsus) 3: 2–3: 5–6: 9–10: 9–10. Arolium not divided, slightly shorter than the simple claws.

**Adult female** (paratype) (Figs 31B, 32G). Mostly same as males; tergal chaetotaxy I–XII: 2: 2: 4: 4: 4: 4: 4: 5: 4: T2T: 0; sternal chaetotaxy IV–XII: 6: 10: 10: 9: 9: 9: 9: -: 2. Genital region: sternite II with eight setae scattered on median area, sternite III with a row of six setae.

**Dimensions** (length/breadth or, in the case of the legs, length/depth in mm; ratios in parentheses). Males: body length 1.22–1.24. Pedipalps: trochanter 0.15–0.16/0.07–0.09 (1.78–2.14), femur 0.57–0.61/0.08–0.09 (6.78–7.13), patella 0.21/0.08–0.09 (2.33–2.63), chela 0.78–0.83/0.12 (6.50–6.92), hand 0.30–0.31/0.12 (2.50–2.58), movable chelal finger length 0.48–0.51. Chelicera 0.30–0.31/0.16–0.17 (1.82–1.88), movable finger length 0.16–0.17. Carapace 0.31–0.35/0.31–0.32 (1.00–1.09). Leg I: trochanter 0.10–0.12/0.07–0.08 (1.43–1.50), femur 0.30–0.31/0.05–0.06 (5.17–6.00), patella 0.16–0.18/0.04–0.05 (3.60–4.00), tibia 0.15–0.16/0.04 (3.75–4.00), tarsus 0.34–0.37/0.03–0.04 (9.25–11.33). Leg IV: trochanter 0.16/0.10–0.11 (1.45–1.60), femoropatella 0.48–0.49/0.16–0.17 (2.88–3.00), tibia 0.32–0.34/0.06–0.07 (4.88–5.33), basitarsus 0.15/0.05–0.06 (2.50–3.00), telotarsus 0.37–0.40/0.03–0.04 (10.00–12.33).

Female: body length 1.33. Pedipalps: trochanter 0.16/0.10 (1.60), femur 0.62/0.10 (6.20), patella 0.21/0.10 (2.10), chela 0.85/0.14 (6.07), hand 0.34/0.14 (2.43), movable chelal finger length 0.51. Chelicera 0.33/0.19 (1.74), movable finger length 0.18. Carapace 0.36/0.34 (1.06). Leg I: trochanter 0.11/0.07 (1.57), femur 0.33/0.06 (5.50), patella 0.19/0.06 (3.17), tibia 0.16/0.04 (4.00), tarsus 0.39/0.03 (13.00). Leg IV: trochanter 0.16/0.10 (1.60), femoropatella 0.50/0.15 (3.33), tibia 0.34/0.07 (4.86), basitarsus 0.15/0.05 (3.00), telotarsus 0.40/0.04 (10.00).

**Remarks.** *Lagynochthonius jingshengensis* sp. nov. most closely resembles *L. tuoluensis* in the absence of intercalary teeth, the presence of two setae on tergites I–II, the obtuse, small, round epistome and absence of eyes or eyespots on the carapace, but differs in following combination of characters: chelal finger 1.60–1.65 (♂) times longer than hand and fixed finger with 17–19 well-spaced, pointed teeth compared to chelal finger 1.56–1.59 (♂) times longer than hand and fixed chelal finger with 26–27 macrodenticles in *L. tuoluensis* (Hou *et al.* 2023a).

**Ecology.** All specimens were collected on the ground inside the cave.

**Distribution.** Known only from the type locality (China, Guangxi Zhuang Autonomous Region).

### *Lagynochthonius laoxueyanensis* Hou, Gao & Zhang, 2022

Chinese name. 老穴岩拉伪蝎

*Lagynochthonius laoxueyanensis* Hou, Gao & Zhang, 2022a: 75–81, figs 7–10.

**Material examined.** ♂ (Ps.-MHBH-HBUARA#2021-445-01) (holotype), 2 ♀ (Ps.-MHBH-HBUARA#2021-445-02–03) (paratypes): China, Yunnan Province, Yanshan County, Zhela Township, Liuzhao Village, Laoxueyan Cave [23.650542°N, 104.595692°E], 1665 m a.s.l., 17 October 2021, Zegang Feng, Yanmeng Hou, Lu Zhang and Liu Fu leg.

**Diagnosis and description.** For details see Hou, Gao & Zhang (2022a).

**Distribution.** China (Yunnan Province).

### *Lagynochthonius latipectus* Hou, Gao & Zhang, 2023

Chinese name. 阔胸拉伪蝎

*Lagynochthonius latipectus* Hou, Gao & Zhang, 2023a: 16–21, figs 10–14.

**Material examined.** ♂ (Ps.-MHBH-HBUARA#2022-525-01) (holotype), 5 ♂ (Ps.-MHBH-HBUARA#2022-525-02–06) (paratypes), 10 ♀ (Ps.-MSWU-HBUARA#2022-525-07–16) (paratypes): China, Guizhou Province, Jiangkou County, Taiping Town, Yunshe Village, Xianren Cave, under stones and detritus in deep zone [27.748589°N, 108.815461°E], 517 m a.s.l., 15 August 2022, Yanmeng Hou, Lu Zhang, Jianzhou Sun & Wenlong Fan leg. 3 ♀ (Ps.-MSWU-HBUARA#2022-306-01–03) (paratypes), China, Guizhou Province, Jiangkou County, Nuxi Town, Mengjiatun Village, Shenxian Cave, [27.827531°N, 108.859253°E], 452 m a.s.l., 4 July 2022, Yanmeng Hou, Nana Zhan, Long Lin & Jianzhou Sun leg.

**Diagnosis and description.** For details see Hou, Gao & Zhang (2023a).

**Distribution.** China (Guizhou Province).

### *Lagynochthonius leptopalpus* Hu & Zhang, 2012

Chinese name. 长触拉伪蝎

*Lagynochthonius leptopalpus* Hu & Zhang, 2012a: 224–228, figs 1–6, 14.

**Material examined.** ♂ (holotype), 3 ♂ (paratypes) and 2 ♀ (paratypes): China, Hainan Province, Ledong County, Jian-fengling Mountain (18.766667°N, 108.900000°E), 31 May 2009, Chao Zhang leg.

**Diagnosis and description.** For details see Hu & Zhang (2012a).

**Distribution.** China (Hainan Province).

***Lagynochthonius longedentatus* Hou, Feng & Zhang, 2023**

Chinese name. 长齿拉伪蝎

*Lagynochthonius longedentatus* Hou, Feng & Zhang, 2023a: 21–26, figs 15–18.

**Material examined.** ♂ (Ps.-MHBH-HBUARA#2021-433-01) (holotype), 2 ♀ (Ps.-MSWU-HBUARA#2021-433-02) (paratypes): China, Guizhou Province, Ceheng County, Rongdu Town, Hongbaituo Village, Hongbaituo Cave, under stones in the deep zone [25.078419°N, 105.717767°E], 1033 m a.s.l., 10 October 2021, Zegang Feng, Yanmeng Hou, Lu Zhang & Liu Fu leg.

**Diagnosis and description.** For details see Hou, Feng & Zhang (2023a).

**Distribution.** China (Guizhou Province).

***Lagynochthonius longquanensis* sp. nov.**

Chinese name. 龙泉拉伪蝎

Figs 36–39

**Type material.** Holotype ♀ (Ps.-MHBH-SC2019100601): China, Sichuan Province, Luzhou City, Xuyong County, Lubu Town, Longquan Cave [28.10264792°N, 105.47175407°E], 363 m a.s.l., 6 October 2019, Zegang Feng, Liu Fu, Long Hao & Jiaqi Zhao leg.

**Etymology.** Named after the type locality, Longquan Cave.

**Diagnosis.** (♀). small sized hypogean species; galea slightly bump-shaped; carapace with two eyespots, anterior margin smooth; epistome absent; tergites I–II each with two setae, tergites III–IV with four setae. Rallum with eight blades. Pedipalps slender, chela 5.50 times as long as broad; femur 5.54 times as long as broad; both chelal fingers without intercalary teeth and a modified accessory tooth (*td*) on prolateral-retrolateral face; chemosensory setae (*sc*) present on dorsum of chelal hand.

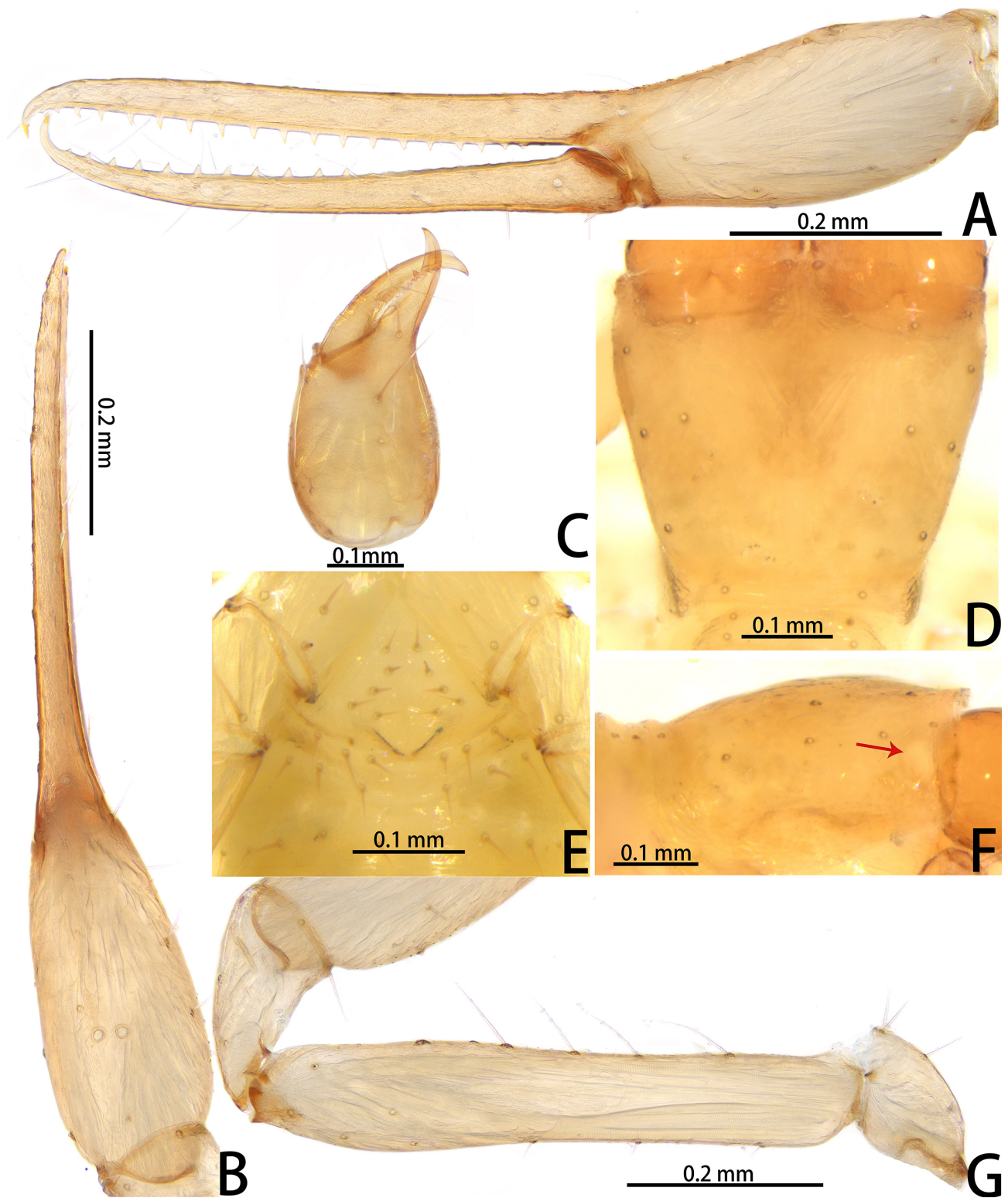
**Description.** Adult female (holotype) (Figs 36A, 37, 38, 39).

**Color** generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.

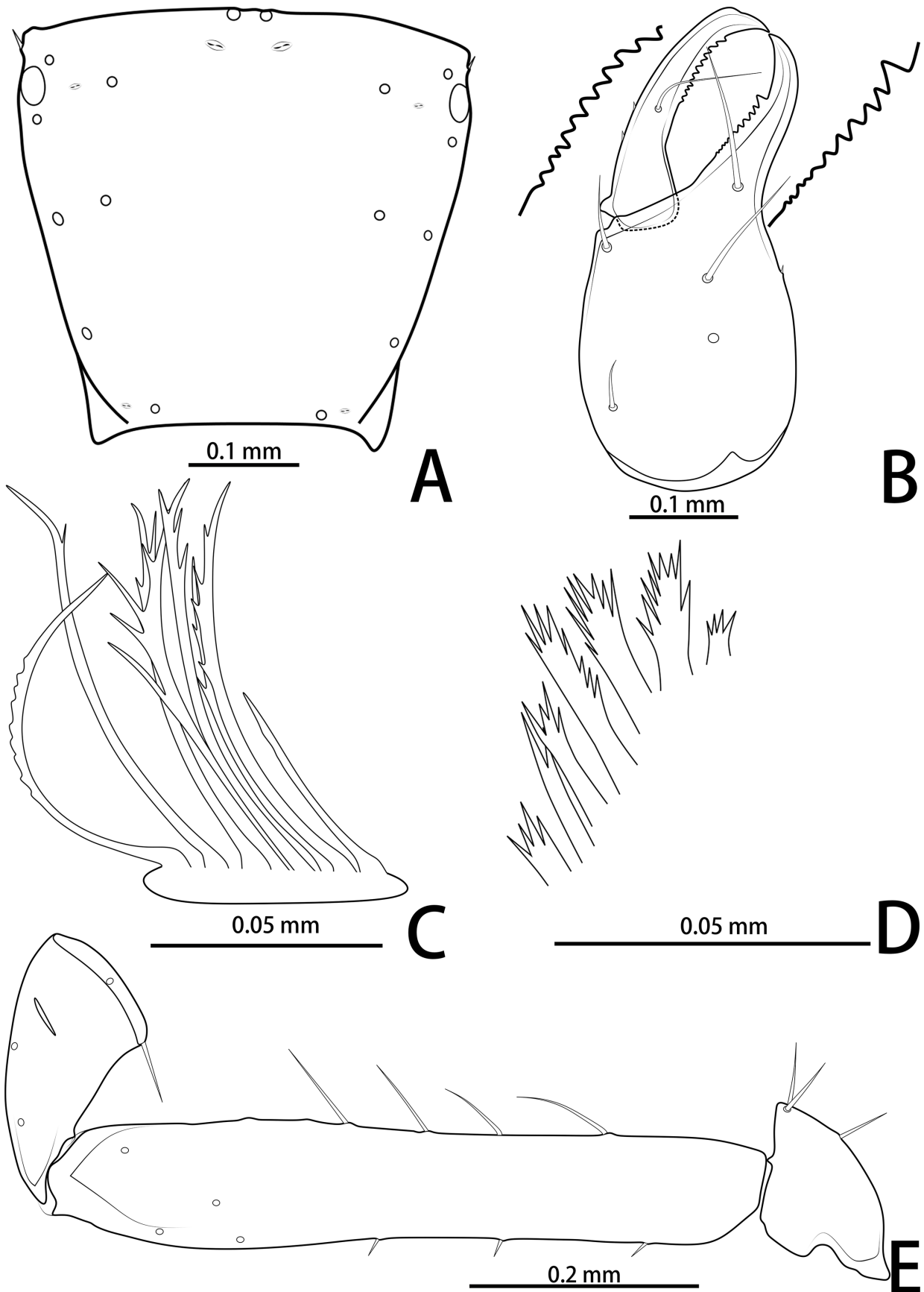
**Cephalothorax** (Figs 37D, F, 38A): carapace



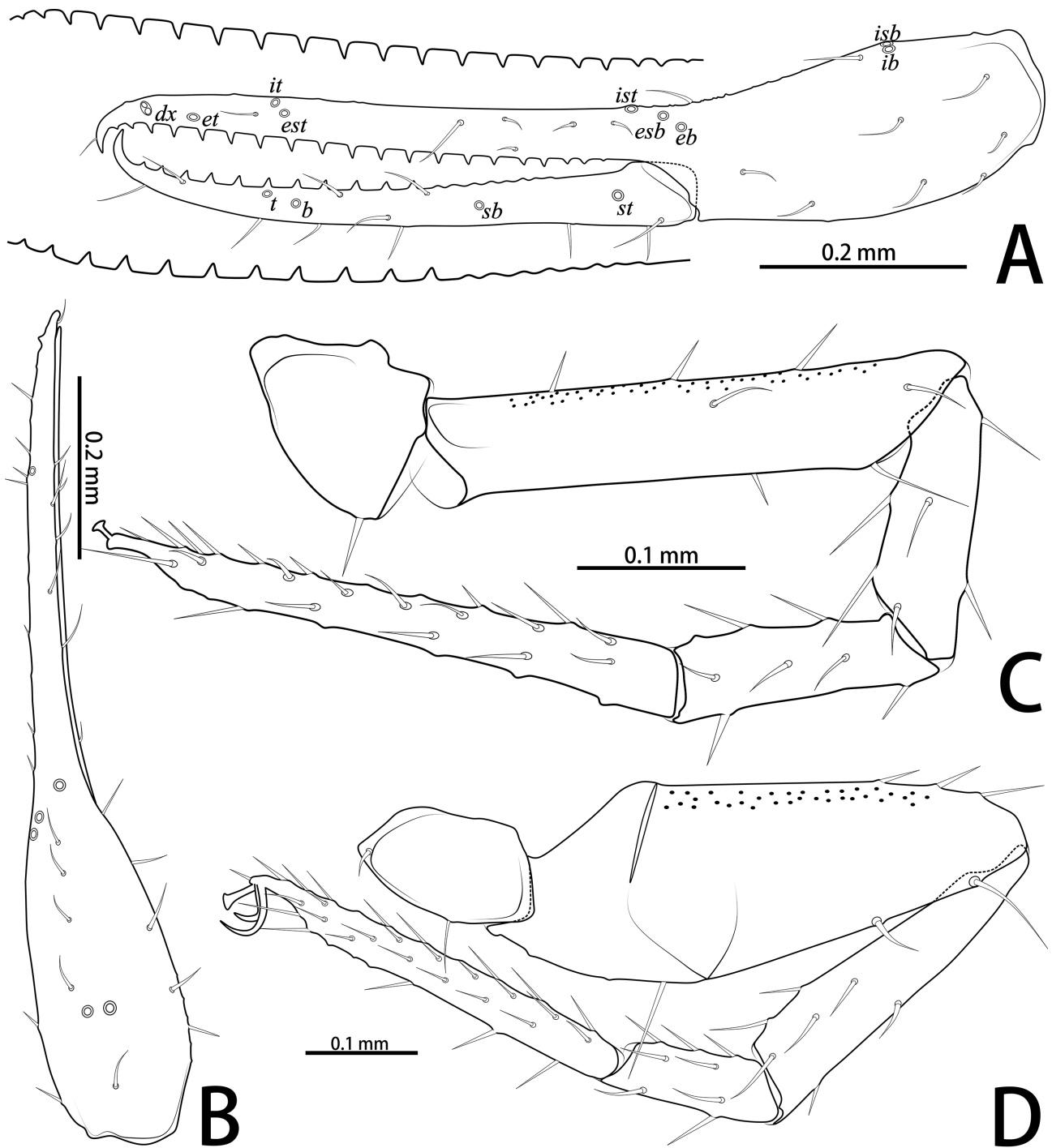
**FIGURE 36.** *Lagynochthonius longquanensis* sp. nov., holotype female (dorsal view).



**FIGURE 37.** *Lagynochthonius longquanensis* sp. nov., holotype female (A–F): A. Left chela (lateral view); B. Left chela (dorsal view); C. Left chelicera (dorsal view); D. Carapace (dorsal view); E. Female genital area (ventral view); F. Carapace (lateral view), indicate eyespot (red arrow); G. Left pedipalp (minus chela, dorsal view).



**FIGURE 38.** *Lagynochthonius longquanensis* sp. nov., holotype male: 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).



**FIGURE 39.** *Lagynochthonius longquanensis* sp. nov., holotype male: 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).

nearly subquadrate, 0.90 times as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin smooth, without serrations; epistome absent, with two eyespots; with 18 setae arranged s4s: 4: 4: 2: 2; with three pairs of lyrifissures, first and second pair situated middle and flank to the 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 1/2 length of medial seta; apex of coxa I with a rounded anteromedial process;

coxae II with 7 terminally indented coxal spines on each side, set as an oblique and arc row, central spines slightly longer than the others (Fig. 38D); intercoxal tubercle absent; chaetotaxy of coxae: P 3, I 3, II 4, III 5, IV 5.

**Chelicera** (Figs 37C, 38B): almost as long as carapace, 1.71 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 retrorse contiguous small teeth; galea represented by a very slight bump on movable finger (Fig. 37B). Serrula exterior with 22 and serrula interior with 13 blades. Rallum with eight blades, the distal one longest and recumbent basally, with fine barbules and slightly set apart from the other blades, latter tightly grouped and with long pinnae, some of which are subdivided (Fig. 38C).

**Pedipalp** (Figs 37A–B, 37G, 38E, 39A–B): trochanter 1.90, femur 5.54, patella 2.00, chela 5.50, hand 2.25 times as long as broad; femur 2.58 times as long as patella; movable chelal finger 1.44 times as long as hand and 0.59 times as long as chela. Setae generally long and acuminate. Chelal hand gradually constricted towards fingers, apodeme complex of movable chelal finger strongly 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, *t* slightly distal to *it* and distal to *b*; *est* situated distal to *b* and close to *it* (Figs. 37A, 39A). Microsetae (chemosensory setae) present on dorsum of chelal hand (Figs. 37B, 39B). Both chelal fingers with a row of teeth, spaced regularly along the margin, teeth smaller distally and proximally: fixed finger with 19 well-spaced, pointed teeth, and a modified accessory tooth on proteral-retrolateral face (*td*, slightly distal to *dx*); movable finger with 11 well-spaced, pointed teeth, 7 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: 5: 6: 5: 6: 5: 4: T2T: 0. Sternal chaetotaxy IV–XII: 8: 10: 10: 10: 10: 10: 8: -: 2. Genital region: sternite II with 10 setae scattered on median area, sternite III with a row of 6 setae (Fig. 37E).

**Legs** (Fig. 39C–D): fine granulation present on anterodorsal faces of femur IV and patella IV. Leg I: femur 1.88 times as long as patella; tarsus 2.18 times as long as tibia. Leg IV: femoropatella 2.26 times as long as deep; tibia 4.43 times as long as deep; with basal tactile setae on both tarsal segments: basitarsus 3.00 times as long as deep (TS = 0.40), telotarsus 7.25 times as long as deep and 1.93 times as long as basitarsus (TS = 0.38). Setae of leg I (trochanter to tibia) 1: 7: 6: 7, setae of leg IV (trochanter to basitarsus) 2: 1: 5: 7: 7. 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 0.99. Pedipalps: trochanter 0.19/0.10 (1.90), femur 0.61/0.11 (5.54), patella 0.24/0.12 (2.00), chela 0.88/0.16 (5.50), hand 0.36/0.16 (2.25), movable chelal finger length 0.52. Chelicera 0.36/0.21 (1.71), movable finger length 0.21. Carapace 0.37/0.41 (0.90). Leg I: trochanter 0.11/0.07 (1.57), femur 0.30/0.06 (5.00), patella 0.16/0.05

(3.20), tibia 0.16/0.04 (4.00), tarsus 0.35/0.03 (11.67). Leg IV: trochanter 0.15/0.10 (1.50), femoropatella 0.43/0.19 (2.26), tibia 0.31/0.07 (4.43), basitarsus 0.15/0.05 (3.00), telotarsus 0.29/0.04 (7.25).

**Remarks.** *Lagynochthonius longquanensis* sp. nov. differs from all other hypogean species of the genus except *L. infirmus* sp. nov. by the absence of intercalary teeth on both chelal fingers, the presence of two setae on tergites I–II and the presence of two eyespots on the carapace. It differs *infirmus* sp. nov. by the shorter (0.88 mm (♀) compared to 1.69–1.77 mm (♀) in *L. infirmus* sp. nov.) and thinner chela (5.50 (♀) times as long as broad compared to 7.75–8.13 (♀) times as long as broad in *L. infirmus* sp. nov.), the presence of four setae in tergite III (vs. two in *L. infirmus* sp. nov.), and the absence of epistome (vs. present in *L. infirmus* sp. nov.).

**Distribution.** Known only from the type locality, Longquan Cave (China, Sichuan Province).

### *Lagynochthonius longyanensis* Hou, Feng & Zhang, 2023

Chinese name. 龙岩拉伪蝎

*Lagynochthonius longyanensis* Hou, Feng & Zhang, 2023a: 26–31, figs 19–22.

**Material examined.** ♂ (Ps.-MHBU-HBUARA#2021-153-01) (holotype), 2 ♂ (Ps.-MSWU-HBUARA#2021-153-02–03) (paratypes), 1 ♀ (Ps.-MSWU-HBUARA#2021-153-04) (paratype): China, Guizhou Province, Bozhou District, Fengxiang Town, Qingkeng Village, Longyan Cave, under stones in the deep zone [27.630383°N, 106.501917°E], 1082 m a.s.l., 6 July 2021, Zegang Feng, Hongru Xu, Liu Fu & Nana Zhan leg.

**Diagnosis and description.** For details see Hou, Feng & Zhang (2023a).

**Distribution.** China (Guizhou Province).

### *Lagynochthonius maanensis* Hou, Feng & Zhang, 2023

Chinese name. 马鞍拉伪蝎

Figs 40–44

*Lagynochthonius maanensis* Hou, Feng & Zhang, 2023a: 31–35, figs 23–26.

**Material examined.** ♀ (Ps.-MHBU-GZZA-20-18-01) (holotype), paratype: 1 ♀ (Ps.-MSWU-GZZA-20-18-02) (paratype): China, Guizhou Province, Zheng'an County, Hexi Town, Maan Village, Pianxiao Cave, under stones in the deep zone [28.410517°N, 107.442178°E], 932 m a.s.l., 25 August 2020, Zegang Feng, Hongru Xu & Yanmeng Hou leg; 2 ♂ (Ps.-MHBU-GZ2024012701–02), 1 ♀ (Ps.-MHBU-GZ2024012703): China, Guizhou Province, Zunyi City, Zhengan County, Hexi Town, Maan Village, Pianxiao Cave [28.40952199°N, 107.45909766°E], 680 m a.s.l., 27 January 2024, Jiaqi Zhao, Yitin Xu & Jianzhou Sun leg.

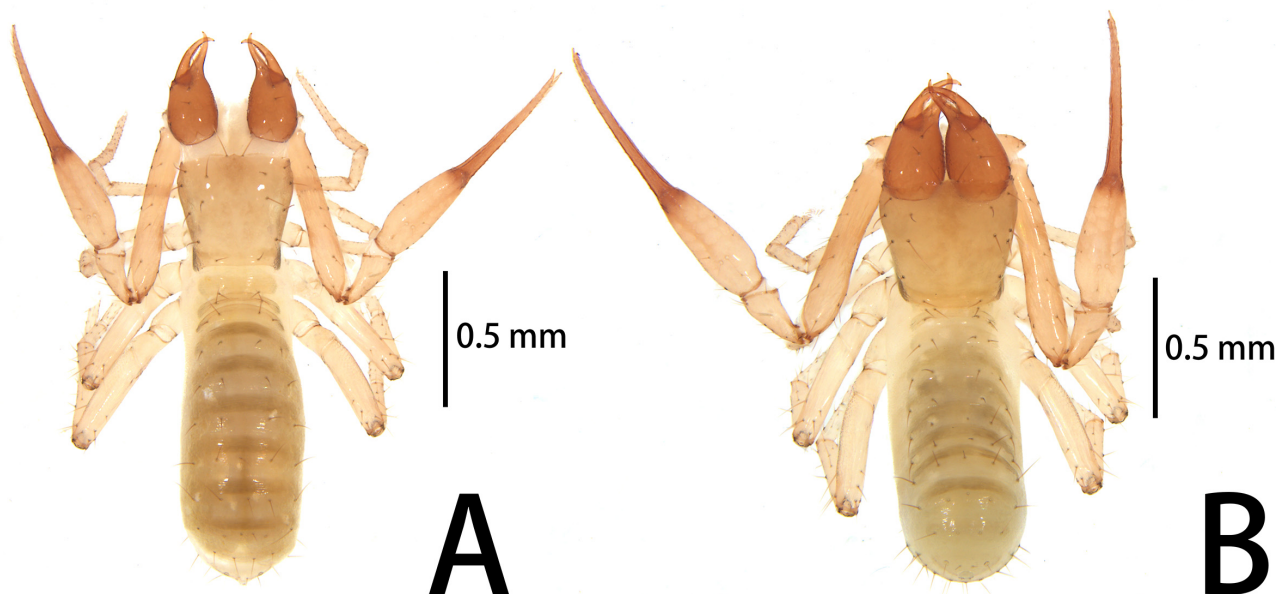


FIGURE 40. *Lagynochthonius maanensis*, A. Male (dorsal view); B. Female (dorsal view).

**Revised diagnosis.** (♂♀). Moderately sized hypogean species; carapace without eyes or eyespots, anterior margin smooth and epistome obtuse and small, round; tergites I–II each with two setae, tergites III–IV each with four setae. Pedipalps slender, chela 5.00–5.94 (♂), 5.84–5.94 (♀) times as long as broad; femur 6.40–6.70 (♂), 5.43–6.55 (♀) times as long as broad; chelal fingers without intercalary teeth and a modified accessory tooth (*td*) on prolateral-retrolateral face; chemosensory setae (*sc*) present on dorsum of chelal hand.

**Description.** Adult males (Figs 40A, 41A–F, 42, 43).

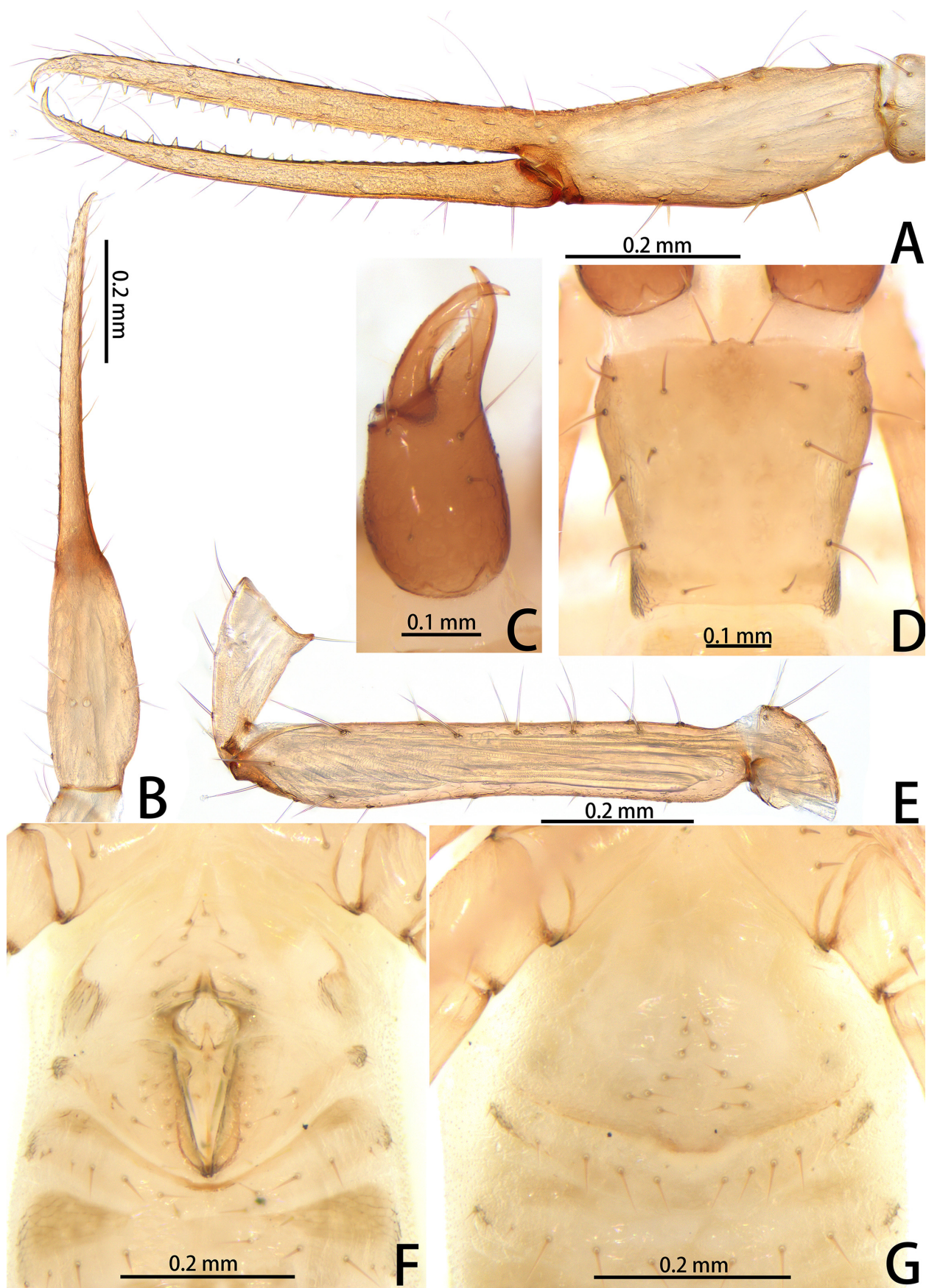
**Color** generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.

**Cephalothorax** (Figs 41D, 42A): carapace nearly subquadrate, 0.95–0.98 times as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin smooth, without serrations; epistome obtuse and small, round, without eyes or eyespots; with 18 setae arranged s4s: 4: 4: 2: 2, most setae heavy, 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 the sole pair of setae of posterior row. Manducatory process with two acuminate distal setae, anterior seta more than 1/2 length of medial seta; apex of coxa I with a rounded anteromedial process; coxae II with 7–9 terminally indented coxal spines on each side, set as an oblique and arc row, central spines slightly longer than the others (Fig. 42D); intercoxal tubercle absent; chaetotaxy of coxae: P 3, I 3, II 4, III 5, IV 5.

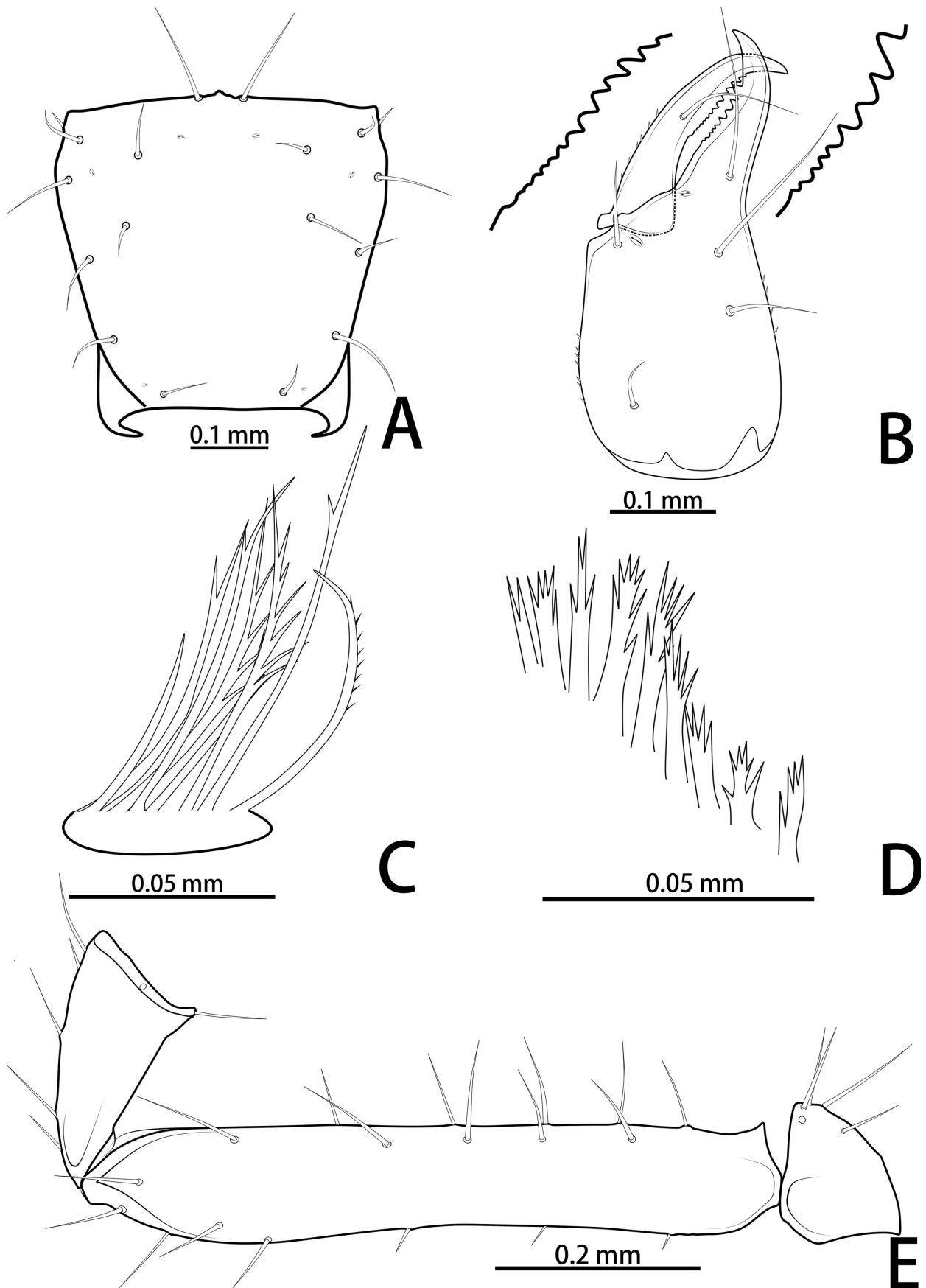
**Chelicera** (Figs 41C, 42B): almost as long as carapace, 1.90 times as long as broad; five setae and two lyrifissures (exterior condylar lyrifissure and exterior lyrifissure)

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 8–9 teeth, distal one largest; movable finger with 11 retrorse contiguous small teeth; galea completely vestigial (Fig. 42B). Serrula exterior with 19–20 and serrula interior with 11 blades. Rallum with 7–8 blades, the distal one longest and recumbent basally, with fine barbules and slightly set apart from the other blades, latter tightly grouped and with long pinnae, some of which are subdivided (Fig. 42C).

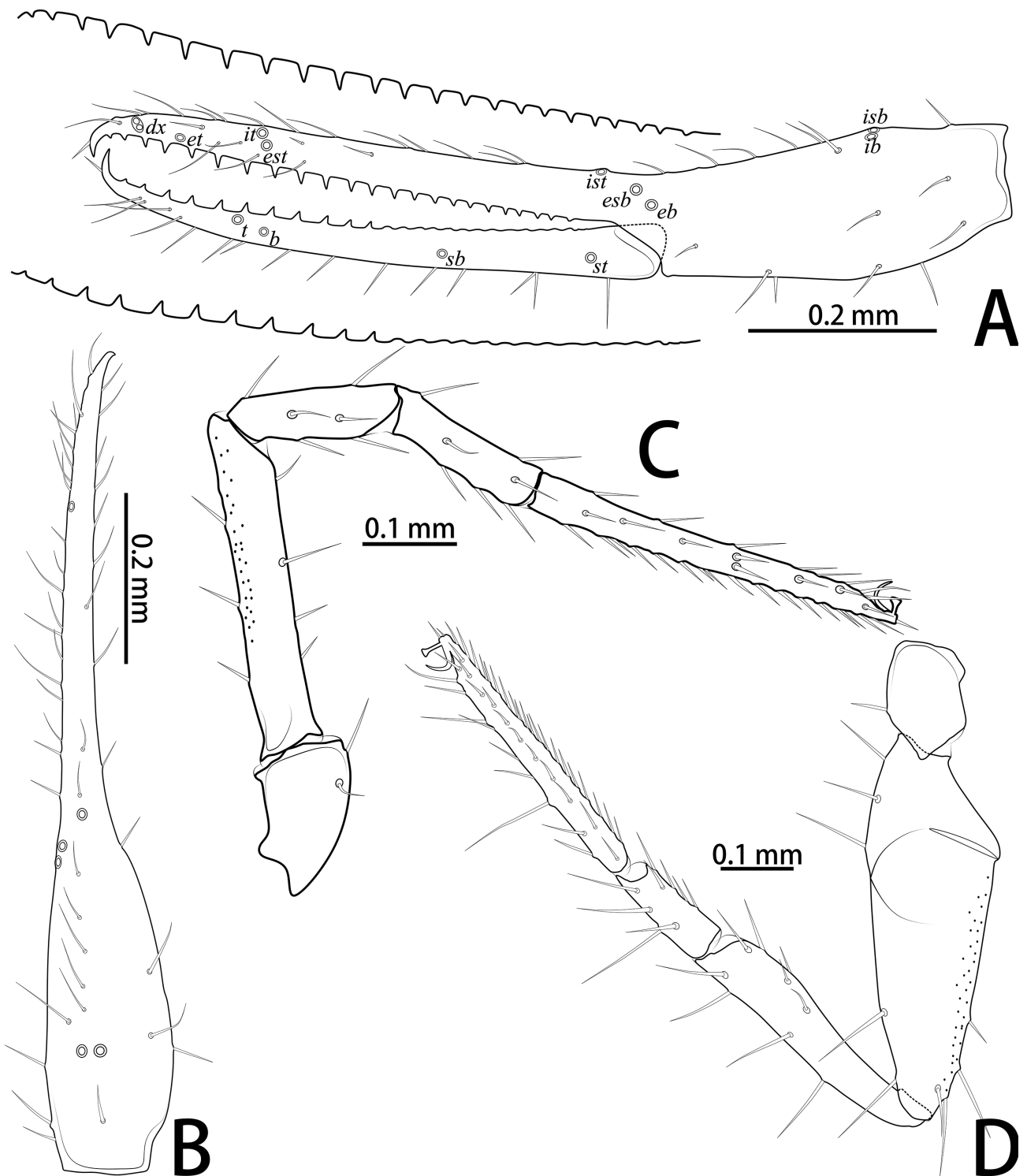
**Pedipalp** (Figs 41A–B, 41E, 42E, 43A–B): trochanter 1.73–2.00, femur 6.40–6.70, patella 2.00–2.08, chela 5.00–5.94, hand 1.89–2.25 times as long as broad; femur 2.67–2.68 times as long as patella; movable chelal finger 1.64 times as long as hand and 0.59 times as long as chela. Setae generally long and acuminate. Chelal hand gradually constricted towards fingers, apodeme complex of movable chelal finger strongly 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, *t* slightly distal to *it* and distal to *b*; *est* situated distal to *b* and close to *it* (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 the margin, teeth smaller distally and proximally: fixed finger with 23–24 well-spaced, pointed teeth, and a modified accessory tooth on prolateral-retrolateral face (*td*, slightly distal to *dx*); movable finger with 10–11 well-



**FIGURE 41.** *Lagynochthonius maanensis*, male (A–F), paratype female (G): 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).



**FIGURE 42.** *Lagynochthonius maanensis*, male: 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).



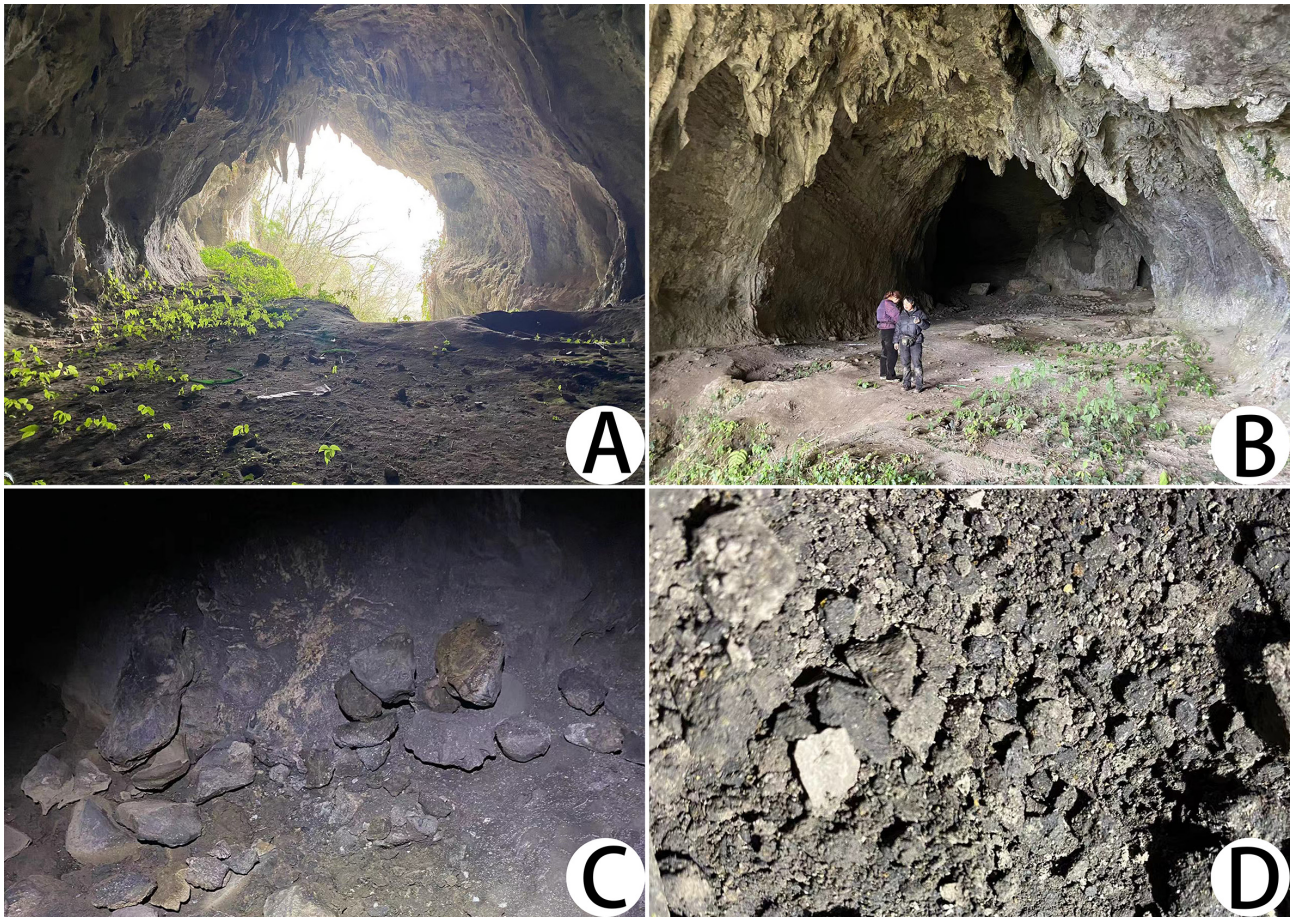
**FIGURE 43.** *Lagynochthonius maanensis*, male: A. Left chela (lateral view), with details of teeth and trichobothrial pattern; B. Left chela (dorsal view); C. Leg I (lateral view); D. Leg IV (lateral view).

spaced, pointed teeth, plus 13–15 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: 4: 4: 4: 4: 5: 5: 6: 4: T2T: 0. Sternal chaetotaxy IV–XII: 10: 10: 8: 9: 10: 11: 8–10: -: 2. Genital region: sternite II with 8 setae scattered on median area, genital

opening slit-like, sternite III with 14–20 setae (Fig. 41F).

**Legs** (Fig. 43C–D): fine granulation present on anterodorsal faces of femur IV and patella IV. Leg I: femur 1.94–2.12 times as long as patella; tarsus 2.24–2.29 times as long as tibia. Leg IV: femoropatella 2.94–3.53 times as long as deep; tibia 4.63–5.00 times as long as deep; with basal tactile setae on both tarsal segments: basitarsus 2.67



**FIGURE 44.** Pianxiao Cave, type locality of *Lagynochthonius maanensis*, A. Inside the cave entrance; B. Entrance; C–D. Areas where *L. maanensis* specimens were collected.

times as long as deep (TS = 0.31–0.38), telotarsus 9.75–10.00 times as long as deep and 2.44–2.50 times as long as basitarsus (TS = 0.30–0.31). Setae of leg I (trochanter to tibia) 2–5: 7–10: 6–9: 7–8, setae of leg IV (trochanter to basitarsus) 1–2: 2: 4–6: 7–8: 6–9. Arolium not divided, slightly shorter than the simple claws.

**Adult females** (Figs 40B, 41G). Mostly same as males; tergal chaetotaxy I–XII: 2–3: 2–3: 4: 4: 4: 4–5: 5: 5–6: 5–6: 4: T2T: 0; sternal chaetotaxy IV–XII: 11: 10: 9: 9: 10: 10: 9: -: 2. Genital region: sternite II with 12 setae scattered on median area, sternite III with a row of 12 setae.

**Dimensions** (length/breadth or, in the case of the legs, length/depth in mm; ratios in parentheses). Males: body length 1.53–1.56. Pedipalps: trochanter 0.19–0.20/0.10–0.11 (1.73–2.00), femur 0.64–0.67/0.10 (6.40–6.70), patella 0.24–0.25/0.12 (2.00–2.08), chela 0.95/0.16–0.19 (5.00–5.94), hand 0.36/0.16–0.19 (1.89–2.25), movable chelal finger length 0.59. Chelicera 0.38–0.40/0.20–0.21 (1.90), movable finger length 0.22. Carapace 0.39–0.41/0.40–0.43 (0.95–0.98). Leg I: trochanter 0.13/0.09 (1.44), femur 0.35–0.36/0.05–0.06 (5.83–7.20), patella 0.17–0.18/0.05–0.06 (2.83–3.60), tibia 0.17/0.04–0.05 (3.40–4.25), tarsus 0.38–0.39/0.04 (9.50–9.75). Leg IV: trochanter 0.14–0.19/0.11–0.12 (1.27–1.58), femoropatella 0.53/0.15–0.18 (2.94–3.53), tibia 0.35–

0.37/0.07–0.08 (4.63–5.00), basitarsus 0.16/0.06 (2.67), telotarsus 0.39–0.40/0.04 (9.75–10.00).

Females: body length 1.50–1.83. Pedipalps: trochanter 0.13–0.22/0.11–0.13 (1.18–1.83), femur 0.69–0.76/0.11–0.14 (5.43–6.55), patella 0.25–0.28/0.12–0.14 (2.00–2.15), chela 1.00–1.11/0.17–0.19 (5.84–5.94), hand 0.39–0.44/0.17–0.19 (2.28–2.32), movable chelal finger length 0.61–0.68. Chelicera 0.45–0.50/0.21–0.24 (1.88–2.17), movable finger length 0.24–0.26. Carapace 0.40–0.47/0.43–0.50 (0.93–0.96). Leg I: trochanter 0.11–0.13/0.10–0.11 (1.00–1.30), femur 0.37–0.40/0.06–0.07 (5.43–6.17), patella 0.18–0.22/0.06 (3.00–3.67), tibia 0.17–0.19/0.04–0.05 (3.60–4.75), tarsus 0.40–0.45/0.04–0.05 (8.80–11.25). Leg IV: trochanter 0.17–0.19/0.10–0.12 (1.56–1.70), femoropatella 0.50–0.59/0.17–0.20 (2.80–3.10), tibia 0.37–0.40/0.08–0.09 (4.44–5.00), basitarsus 0.17–0.18/0.06 (2.83–3.00), telotarsus 0.40/0.04 (10.00–11.50).

**Remarks.** *Lagynochthonius maanensis* was described from two female specimens by Hou, Feng & Zhang (2023). In a recent collection trip, some new specimens were collected at the type locality (Pianxiao Cave in Zunyi City, Guizhou Province, China), including two males and one female, which conform to the diagnostic characteristics of *L. maanensis*. A refined diagnosis was provided in this study.

*Lagynochthonius maanensis* most closely resembles *L. tuoluensis* in the absence of intercalary teeth, the presence of two setae on tergites I–II, the presence of four setae on III–IV, and the absence of eyes or eyespots on the carapace, but differs in following combination of characters: chelal finger 1.64 (♂), 1.55–1.61 (♀) times longer than hand and hand 1.89–2.25 (♂), 2.28–2.32 (♀) times as long as broad compared to chelal finger 1.56–1.59 (♂), 1.48–1.50 (♀) times longer than hand and hand 2.27–2.43 (♂), 2.35–2.38 (♀) times as long as broad in *L. tuoluensis* (Hou *et al.* 2023a).

**Ecology.** All specimens were collected under rocks and mud inside the cave.

**Distribution.** Known only from the type locality (China, Guizhou Province).

### *Lagynochthonius magnidentatus* Hou, Gao & Zhang, 2022

Chinese name. 巨齿拉伪蝎

*Lagynochthonius magnidentatus* Hou, Gao & Zhang, 2022b: 16–19, figs 10–13.

**Material examined.** ♂ (Ps.-MHBH-HBUARA#2021-43201) (holotype), 2 ♂ (Ps.-MHBH-HBUARA#2021-43202–03) (paratypes), 4 ♀ (Ps.-MHBH-HBUARA#2021-43204–07) (paratypes): China, Yunnan Province, Fuyuan County, Huangnihe Town, Longtan Village, Xiao Cave 1, under stones and clods within 150–200 m from the cave entrance [25.165011°N, 104.700386°E], 1445 m a.s.l., 9 October 2021, Zegang Feng, Yanmeng Hou, Lu Zhang & Liu Fu leg.

**Diagnosis and description.** For details see Hou, Gao & Zhang (2022b).

**Distribution.** China (Yunnan Province).

### *Lagynochthonius mawangensis* Hou, Feng & Zhang, 2023

Chinese name. 麻王拉伪蝎

*Lagynochthonius mawangensis* Hou, Feng & Zhang, 2023a: 35–40, figs 27–30.

**Material examined.** ♂ (Ps.-MHBH-GZWC-20-16-01) (holotype), 8 ♂ (Ps.-MHBH-GZWC-20-16-02–GZWC-20-16-09) (paratypes), 2 ♀ (Ps.-MSWU-GZWC-20-16-10–11) (paratypes): China, Guizhou Province, Wuchuan County, Duru sub-district, Mawang Cave, under stones in the deep zone [28.529003°N, 107.882678°E], 706 m a.s.l., 24 August 2020, Zegang Feng, Hongru Xu & Yanmeng Hou leg.

**Diagnosis and description.** For details see Hou, Feng & Zhang (2023a).

**Distribution.** China (Guizhou Province).

### *Lagynochthonius medog* Zhang & Zhang, 2014

Chinese name. 墨脱拉伪蝎

*Lagynochthonius medog* Zhang & Zhang, 2014: 175–178, figs 4–6.

**Material examined.** ♂ (Ps.-MHBH-XZ13092011) (holotype), 7 ♂ (Ps.-MHBH-XZ13092012–18) (paratypes), 2 ♀ (Ps.-MHBH-XZ13092019–20) (paratypes): China, Xizang Autonomous Region, Medog County [29.316667°N, 95.333333°E], 1209 m a.s.l., 20 September 2013, Zhizhong Gao leg.

**Diagnosis and description.** For details see Zhang & Zhang (2014).

**Distribution.** China (Xizang Autonomous Region).

### *Lagynochthonius minimus* Hou, Gao & Zhang, 2022

Chinese name. 小拉伪蝎

*Lagynochthonius minimus* Hou, Gao & Zhang, 2022b: 22–28, figs 14–18.

**Material examined.** ♂ (Ps.-MHBH-HBUARA#2021-44101) (holotype), 3 ♂ (Ps.-MHBH-HBUARA#2021-44102–04) (paratypes), 6 ♀ (Ps.-MHBH-HBUARA#2021-44105–10) (paratypes): China, Yunnan Province, Xichou County, Xingjie Town, Hexin Village, Yanfen Cave, under the stones in deep zone [23.260981°N, 104.563192°E], 1143 m a.s.l., 15 October 2021, Zegang Feng, Yanmeng Hou, Lu Zhang & Liu Fu leg.

**Diagnosis and description.** For details see Hou, Gao & Zhang (2022b).

**Distribution.** China (Yunnan Province).

### *Lagynochthonius niger* Hu & Zhang, 2012

Chinese name. 黑色拉伪蝎

*Lagynochthonius niger* Hu & Zhang, 2012a: 228–229, figs 7–13, 15.

**Material examined.** ♂ (holotype), 2 ♀ (paratypes): China, Hainan Province, Diaoluo Mountain (18°39' N, 109°54'E); 6 June 2009, Chao Zhang leg. 1 ♂ (paratype), 1 ♀ (paratype), Hainan Province, Changjiang County, Bawangling (19.116667°N, 109.150000°E); 18 May 2009, Chao Zhang leg; 1 ♀ (paratype), Hainan Province, Baoting County, Qixianling (18.700000°N, 109.683333°E); 9 June 2009, Chao Zhang leg.

**Diagnosis and description.** For details see Hu & Zhang (2012a).

**Distribution.** China (Hainan Province).

### *Lagynochthonius nigriculus* Hou, Feng & Zhang, 2023

Chinese name. 黑背拉伪蝎

*Lagynochthonius nigriculus* Hou, Feng & Zhang, 2023a: 40–46, figs 31–35.

**Material examined.** ♂ (Ps.-MHBH-HBUARA#2021-423-01) (holotype), 4 ♀ (Ps.-MHBH-HBUARA#2021-423-02–HBUARA#2021-423-05) (paratypes): China, Guizhou Province, Weining County, Yangjie Town, Songshan Village, Yuqiyan Cave, under stones in the deep zone [26.989408°N, 104.339911°E], 2143 m a.s.l., 4 October 2021, Zegang Feng, Yanmeng Hou, Lu Zhang & Liu Fu leg. 6 ♀ (Ps.-MSWU-HBUARA#2021-425-01–06) (paratypes), Songshan Village, unnamed cave (Unnamed Cave 4), [26.987408°N, 104.342597°E], 2165 m a.s.l., with the same collection date and collectors as the holotype; 1 ♂ (Ps.-MSWU-HBUARA#2022-495-01) (paratype), 4 ♀ (Ps.-MSWU-HBUARA#2022-495-02–05) (paratypes), Songshan Village, unnamed cave (Unnamed Cave 5), 31 July 2022, Yanmeng Hou, Lu Zhang, Jianzhou Sun & Wenlong Fan leg.

**Diagnosis and description.** For details see Hou, Feng & Zhang (2023a).

**Distribution.** China (Guizhou Province).

**Remarks.** These caves are located very close together.

### *Lagynochthonius retrorsus* Hou, Gao & Zhang, 2022

Chinese name. 逆齿拉伪蝎

*Lagynochthonius retrorsus* Hou, Gao & Zhang, 2022b: 28–33, figs 19–22.

**Material examined.** ♂ (Ps.-MHBH-HBUARA#2021-42101) (holotype), 2 ♂ (Ps.-MHBH-HBUARA#2021-42102–03) (paratypes), 4 ♀ (Ps.-MSWU-HBUARA#2021-42104–07) (paratypes): China, Yunnan Province, Dagan County, Tianxing Town, Xingfu Village, Qinglong Cave, under stones within 100–150 m from the cave entrance [27.722003°N, 103.996906°E], 816 m a.s.l., 3 October 2021, Zegang Feng, Yanmeng Hou, Lu Zhang & Liu Fu leg.

**Diagnosis and description.** For details see Hou, Gao & Zhang (2022b).

**Distribution.** China (Yunnan Province).

### *Lagynochthonius sanhuaensis* Sun, Guo & Zhang, 2024

Chinese name. 三花拉伪蝎

*Lagynochthonius sanhuaensis* Sun, Guo & Zhang, 2024: 126–132, figs 18–21.

**Material examined.** ♂ (Ps.-MHBH-GZ2022070201) (holotype), 2 ♂ (Ps.-MHBH-GZ2022070203 & GZ2022070205) (paratypes), 2 ♀ (Ps.-MHBH-GZ2022070202 & GZ2022070204) (paratypes): China, Guizhou Province, Tongren City, Yinjiang County, 500 m near Sanhua Mountain, under topsoil and in the leaf litter layer [27.844647°N, 108.546156°E], 818 m a.s.l., 7 July 2022, Yanmeng Hou, Lu Zhang, Nana Zhan, Jianzhou Sun & Long Lin leg.

**Diagnosis and description.** For details see Sun, Guo & Zhang (2024).

**Distribution.** China (Guizhou Province).

### *Lagynochthonius serratus* Hou, Gao & Zhang, 2022

Chinese name. 锯齿拉伪蝎

*Lagynochthonius serratus* Hou, Gao & Zhang, 2022b: 33–38, figs 23–26.

**Material examined.** ♂ (Ps.-MHBH-HBUARA#2021-18401) (holotype), 4 ♂ (Ps.-MHBH-HBUARA#2021-18402–05) (paratypes), 2 ♀ (Ps.-MSWU-HBUARA#2021-18406–07) (paratypes): China, Yunnan Province, Malipo County, Donggan Town, cave without name (Unnamed Cave 6), under the stones in deep zone [23.300561°N, 105.196067°E], 1643 m a.s.l., 23 July 2021, Zegang Feng, Hongru Xu, Liu Fu & Nana Zhan leg.

**Diagnosis and description.** For details see Hou, Gao & Zhang (2022b).

**Distribution.** China (Guizhou Province).

### *Lagynochthonius sinensis* (Beier, 1967)

Chinese name. 中华拉伪蝎

*Tyrannochthonius* (*Lagynochthonius*) *sinensis* Beier, 1967: 341–342, fig. 1.

*Lagynochthonius sinensis* (Beier): Harvey, 1991: 185; Schawaller, 1995: 1048; Zhao, Zhang, Jia & Zhu, 2011: 31.

**Material examined.** No specimens were examined.

**Diagnosis and description.** For details see Beier (1967).

**Distribution.** China (Hubei Province).

### *Lagynochthonius spinulentus* Hou, Gao & Zhang, 2022

Chinese name. 多刺拉伪蝎

*Lagynochthonius spinulentus* Hou, Gao & Zhang, 2022b: 38–43, figs 27–30.

**Material examined.** ♂ (Ps.-MHBH-HBUARA#2021-41301) (holotype), 2 ♂ (Ps.-MHBH-HBUARA#2021-41302–03) (paratypes), 2 ♀ (Ps.-MSWU-HBUARA#2021-41304–05) (paratypes): China, Yunnan Province, Zhenxiong County, Zhongtun Town, Qixin Village, Yingshan Cave, under stones within 20–200 m from the cave entrance [27.360672°N, 104.821311°E], 1709 m a.s.l., 28 September 2021, Zegang Feng, Yanmeng Hou, Lu Zhang & Liu Fu leg.

**Diagnosis and description.** For details see Hou, Gao & Zhang (2022b).

**Distribution.** China (Guizhou Province).



***Lagynochthonius tonkinensis* (Beier, 1951)**

Chinese name. 北部湾拉伪蝎

*Tyrannochthonius* (*Lagynochthonius*) *tonkinensis* Beier, 1951: 61–62, fig. 9.

*Lagynochthonius tonkinensis* (Beier): Chamberlin, 1962: 315; Harvey, 1991a: 185; Schawaller, 1994: 727–730, figs 1, 4–5; Schawaller, 1995: 1048; Song, 1996: 76–77, figs 3–5; Jędryczkowski, 1998: 184; Beron, 2002: 33; Zhao, Zhang, Jia and Zhu, 2011: 31; Gao and Zhang, 2013: 840, figs 3, 4.

**Material examined.** No specimens were examined.

**Description.** For details see Beier (1951).

**Distribution.** China (Yunnan Province, Zhejiang Province), Thailand, Vietnam.

**Remarks.** This species was first described by Beier (1951) based on 2 ♀ (holotype and paratype), and first reported in China by Schawaller (1995), and described by Song (1996). Our study found that the specimens described by Schawaller (1995) and Song (1996) may not belong to *L. tonkinensis* because of the distinct difference in size: the length of female palpal femur 0.60 mm, hand 0.40–0.41 mm, finger 0.44–0.45 mm in Beier (1951) but the length of palpal femur 0.43 mm, hand 0.27 mm, finger 0.42 mm in Song (1996). In addition, the geographical distribution of *L. tonkinensis* also is doubtful for Zhejiang Province (Schawaller 1995; Song 1996).

***Lagynochthonius tuoluensis* Hou, Feng & Zhang, 2023**

Chinese name. 妥保拉伪蝎

*Lagynochthonius tuoluensis* Hou, Feng & Zhang, 2023a: 46–50, figs 36–39.

**Material examined.** ♂ (Ps.-MHBUC190806-01) (holotype), 1 ♂ (Ps.-MHBUC190806-02) (paratype), 6 ♀ (Ps.-MSWUC190806-03–08) (paratypes): China, Guizhou Province, Shuicheng District, Duge Town, Hongguang Village, Tuoluodadong Cave, under stones in the deep zone [26.308267°N, 104.695586°E], 1435 m a.s.l., 6 August 2019, Zegang Feng, Zhaoyi Li & Chen Zhang leg.

**Diagnosis and description.** For details see Hou, Feng & Zhang (2023a).

**Distribution.** China (Guizhou Province).

***Lagynochthonius xiaoensis* Hou, Feng & Zhang, 2023**

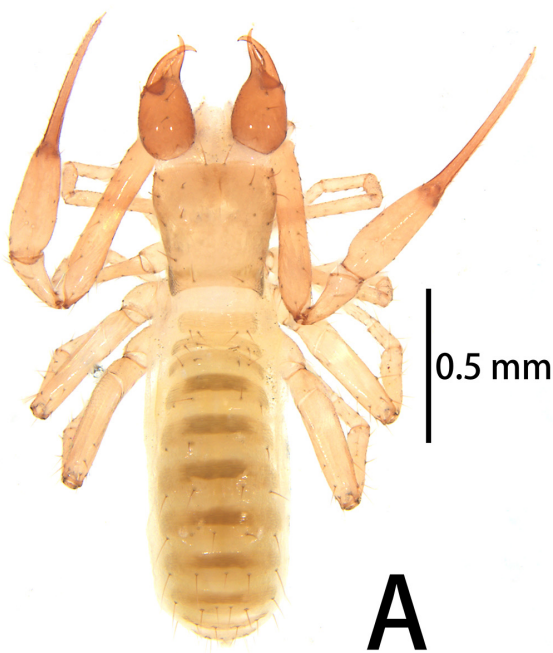
Chinese name. 硝洞拉伪蝎

Figs 45–49

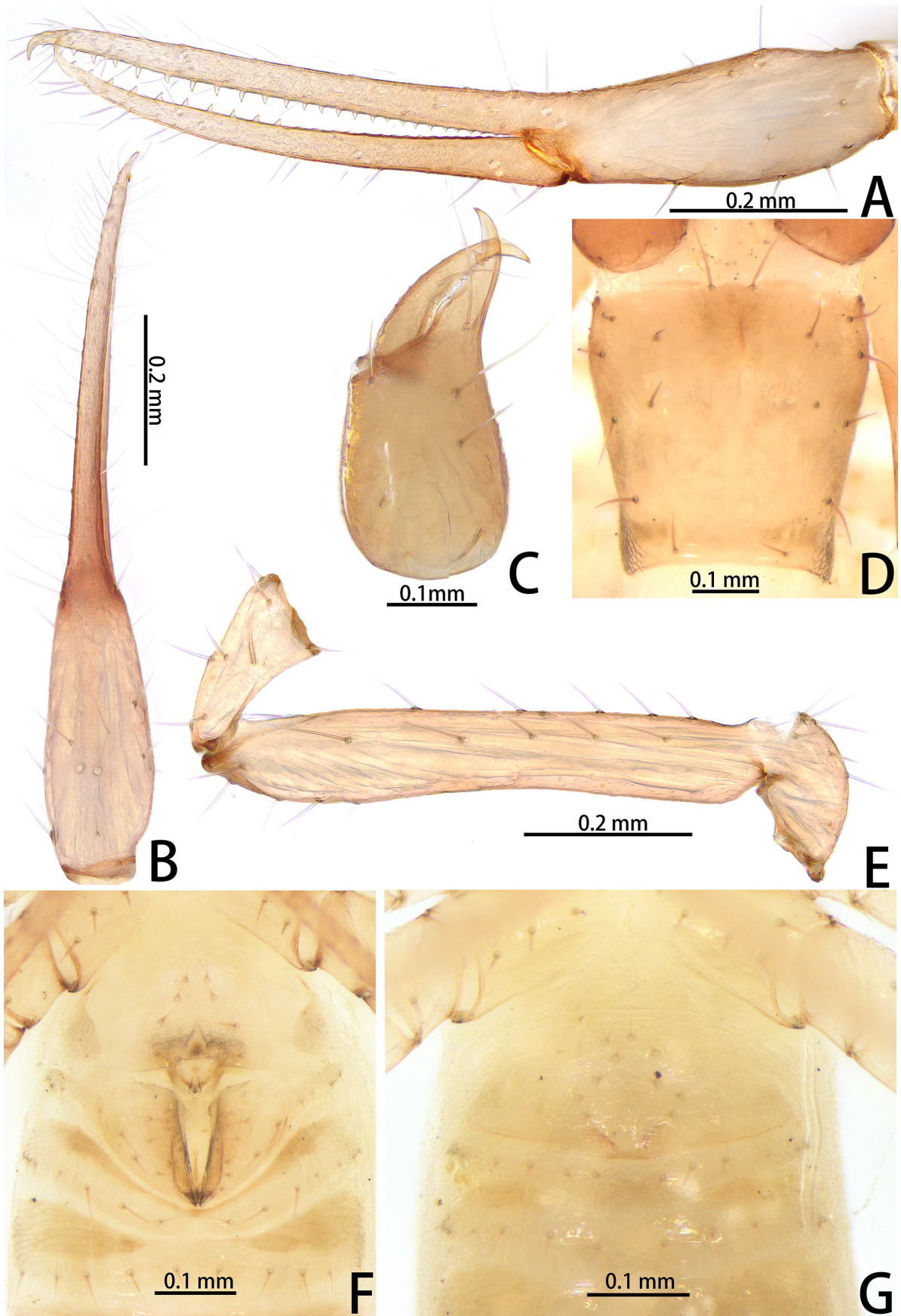
*Lagynochthonius xiaoensis* Hou, Feng & Zhang, 2023a: 51–55, figs 40–43.

**Material examined.** ♀ (Ps.-MHBUC190727-01-01) (holotype), 1 ♀ (Ps.-MSWUC190727-01-02) (paratypes): China, Guizhou Province, Suiyang County, Yangchuan Sub-district, Xinglong Village, Xiao Cave, under stones in the deep zone [27.999336°N, 107.175514°E], 976 m a.s.l., 27 July 2019, Zegang Feng, Zhaoyi Li & Chen Zhang leg; 1 ♂ (Ps.-MHBUC2024012601), 2 ♀ (Ps.-MHBUC2024012602–03): China, Guizhou Province, Zunyi City, Suiyang County, Xiao Cave 2 [27.99897978°N, 107.17482272°E], 948 m a.s.l., 26 January 2024, Jiaqi Zhao, Yitin Xu & Jianzhou Sun leg.

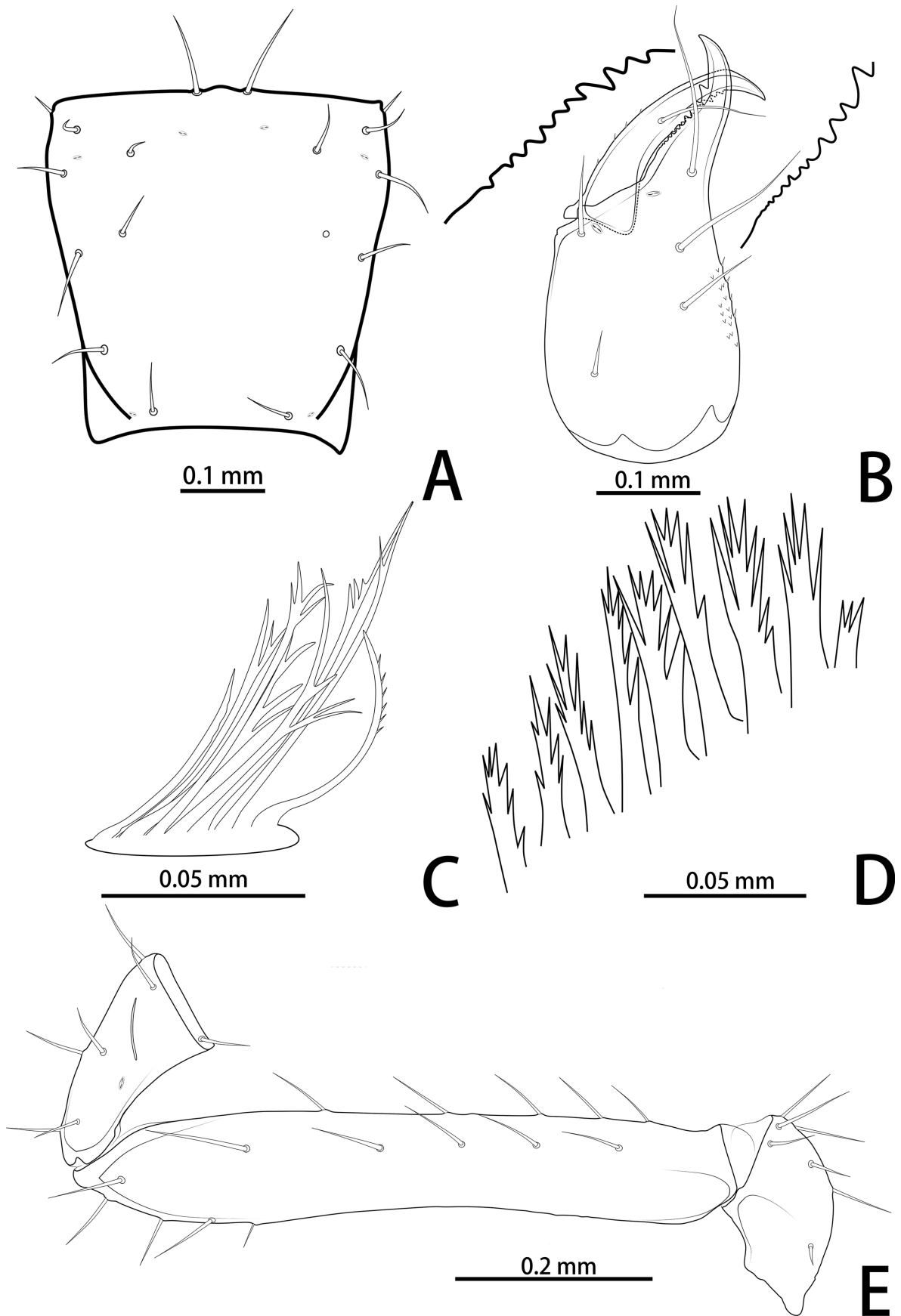
**Revised diagnosis.** (♂♀). Small sized hypogean



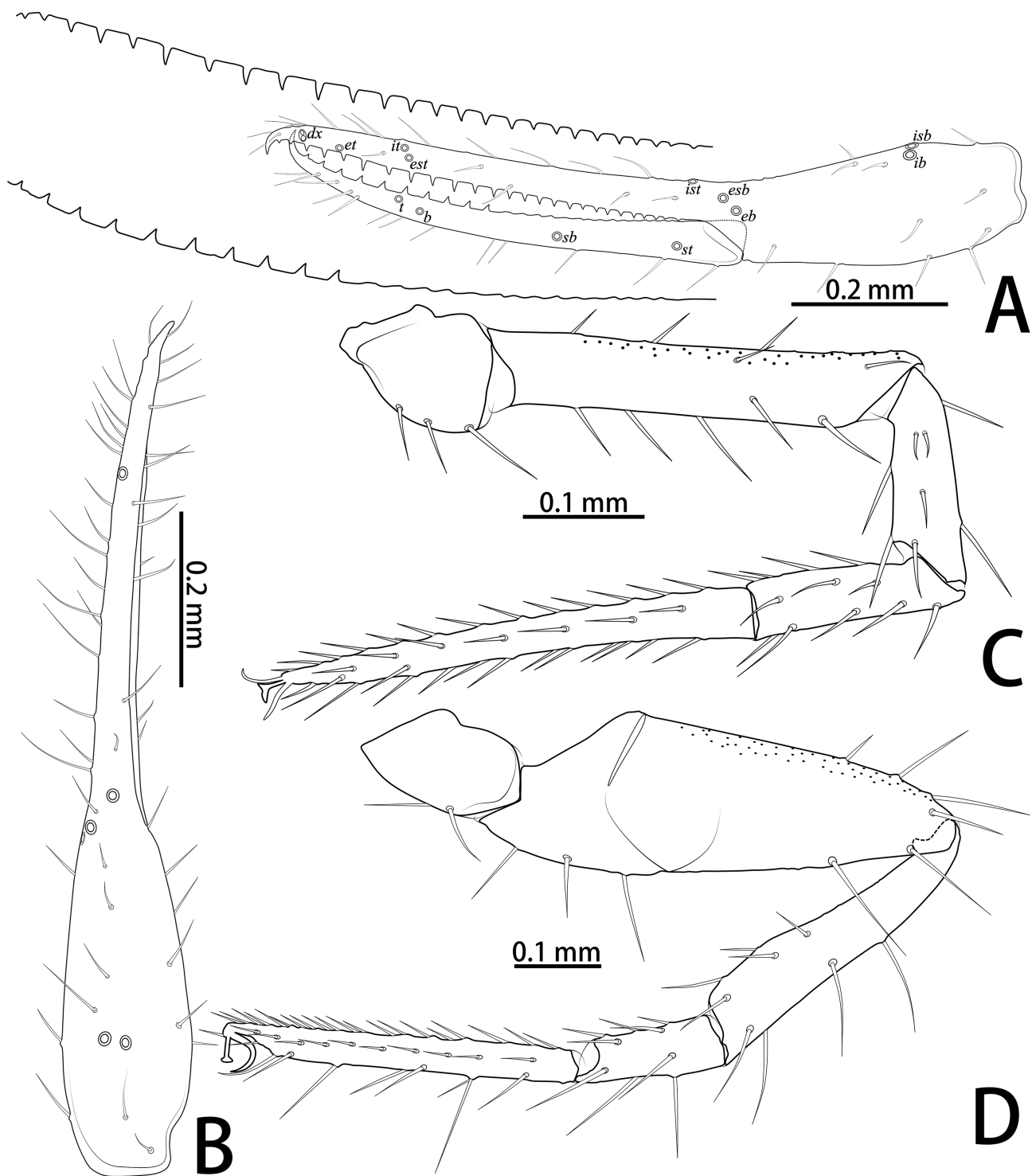
**FIGURE 45.** *Lagynochthonius xiaoensis*, A. Male (dorsal view); B. Female (dorsal view).



**FIGURE 46.** *Lagynochthonius xiaoensis*, male (A–F), female (G): 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).



**FIGURE 47.** *Lagynochthonius xiaoensis*, holotype male: 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).



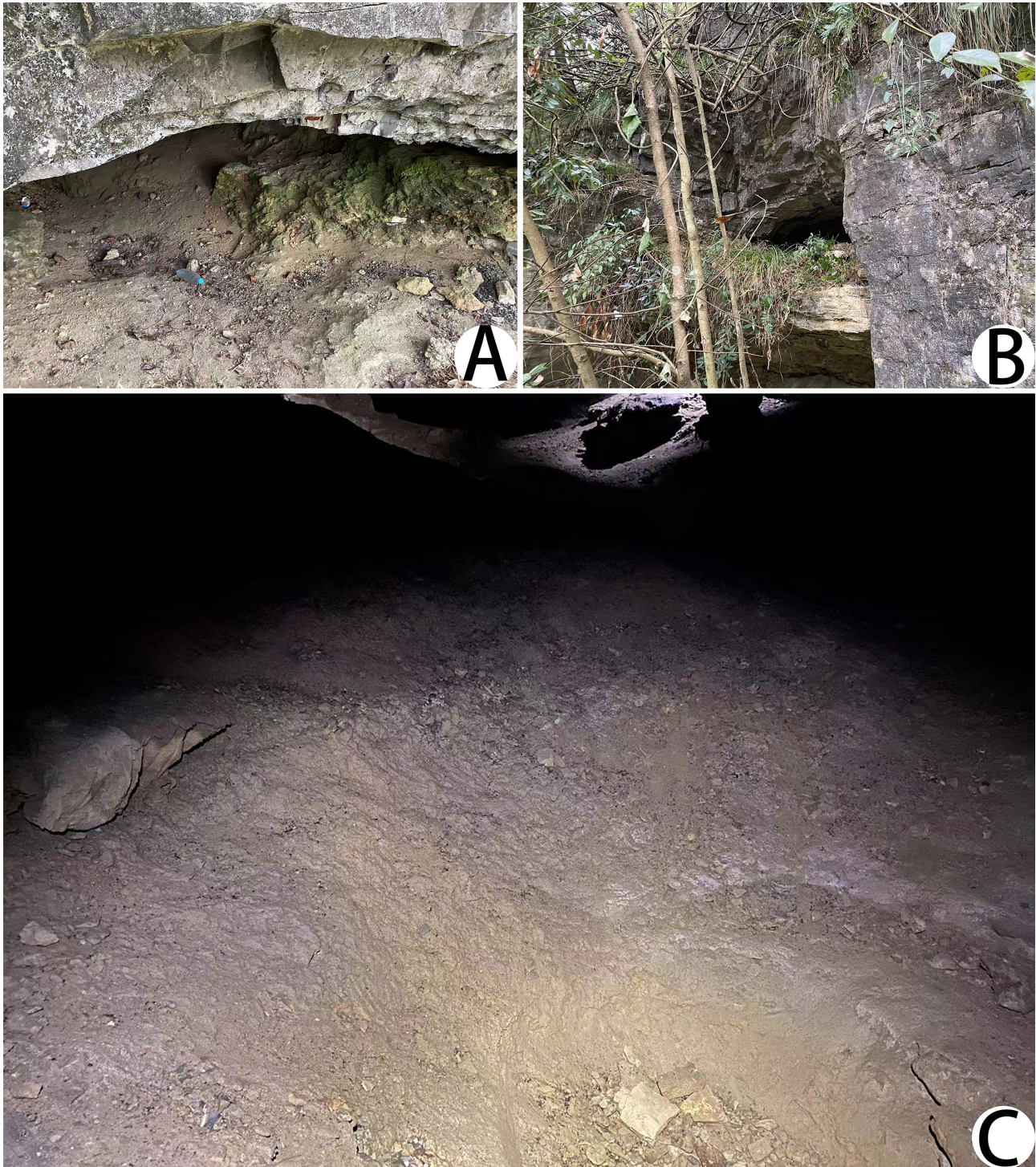
**FIGURE 48.** *Lagynochthonius xiaoensis*, male: A. Left chela (lateral view), with details of teeth and trichobothrial pattern; B. Left chela (dorsal view); C. Leg I (lateral view); D. Leg IV (lateral view).

species; carapace without eyes or eyespots, anterior margin smooth and epistome obtuse and small, round; tergites I–IV each with four setae. Pedipalps slender, chela 6.20 (♂), 6.00–6.85 (♀) times as long as broad; femur 6.00 (♂), 5.73–6.00 (♀) times as long as broad; both chelal fingers without intercalary teeth and a modified accessory tooth (*td*) on prolateral-retrolateral face; chemosensory setae (*sc*) present on dorsum of chelal hand.

**Description.** Adult male (Figs 45A, 46A–F, 47, 48).

**Color** generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.

**Cephalothorax** (Figs 46D, 47A): carapace nearly subquadrate, 0.98 times as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin smooth, without serrations; epistome obtuse and small, round, without eyes or eyespots; with



**FIGURE 49.** Xiaodon Cave 2, type locality of *Lagynochthonius xiaoensis*, A–B. Entrance; C. Areas where *L. xiaoensis* specimens were collected.

18 setae arranged s4s: 4: 4: 2: 2, most setae heavy, 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 the sole pair of setae of posterior row. Manducatory process with two acuminate distal setae, anterior seta more than 1/2 length of medial seta; apex of coxa I with a rounded anteromedial process; coxae II with 8–9 terminally indented coxal spines on each

side, set as an oblique and arc row, central spines slightly longer than the 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, 1.85 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 11 teeth, distal one largest; movable finger with 10 retrorse contiguous small teeth; galea completely vestigial (Fig. 47B). Serrula exterior with 19 and serrula interior with 13 blades. Rallum with eight blades, the distal one longest and recumbent basally, with fine barbules and slightly set apart from the other blades, latter tightly grouped and with long pinnae, some of which are subdivided (Fig. 47C).

**Pedipalp** (Figs 46A–B, 46E, 47E, 48A–B): trochanter 2.00, femur 6.00, patella 2.18, chela 6.20, hand 2.33 times as long as broad; femur 2.75 times as long as patella; movable chelal finger 1.66 times as long as hand and 0.62 times as long as chela. Setae generally long and acuminate. Chelal hand gradually constricted towards fingers, apodeme complex of movable chelal finger strongly 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* situated midway between *st* and *b*; *b* and *t* situated subdistally, *t* situated at the same level as *it* and distal to *b*; *est* situated distal to *b* and close to *it* (Figs. 46A, 48A). Microsetae (chemosensory setae) present on dorsum of chelal hand (Figs. 46B, 48B). Both chelal fingers with a row of teeth, spaced regularly along the margin, teeth smaller distally and proximally: fixed finger with 27 well-spaced, pointed teeth, and a modified accessory tooth on prolateral-retrolateral face (*td*, slightly distal to *dx*); movable finger with 10 well-spaced, pointed teeth, plus 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: 4: 4: 4: 4: 4: 5: 5: 6: 4: T2T: 0. Sternal chaetotaxy IV–XII: 14: 10: 10: 9: 9: 11: 8: -: 2. Genital region: sternite II with 10 setae scattered on median area, genital opening slit-like, sternite III with 30 setae (Fig. 46F).

**Legs** (Fig. 48C–D): fine granulation present on anterodorsal faces of femur IV and patella IV. Leg I: femur 1.89 times as long as patella; tarsus 2.11 times as long as tibia. Leg IV: femoropatella 3.38 times as long as deep; tibia 4.71 times as long as deep; with basal tactile setae on both tarsal segments: basitarsus 3.20 times as long as deep (TS = 0.44), telotarsus 9.75 times as long as deep and 2.44 times as long as basitarsus (TS = 0.31). Setae of leg I (trochanter to tibia) 3: 10: 8: 12, setae of leg IV (trochanter to basitarsus) 2: 3: 6: 9: 9. Arolium not divided, slightly shorter than the simple claws.

**Adult females** (Figs 45B, 46G). Mostly same as male; tergal chaetotaxy I–XII: 4: 4: 4: 4: 4–5: 4: 4: 5: 5: 5–6: T2T: 0; sternal chaetotaxy IV–XII: 8–10: 9–10: 9: 9: 8–9: 10–11: 8–11: -: 2. Genital region: sternite II with 10 setae scattered on median area, sternite III with a row of eight setae.

**Dimensions** (length/breadth or, in the case of the legs,

length/depth in mm; ratios in parentheses). Male: body length 1.57. Pedipalps: trochanter 0.20/0.10 (2.00), femur 0.66/0.11 (6.00), patella 0.24/0.11 (2.18), chela 0.93/0.15 (6.20), hand 0.35/0.15 (2.33), movable chelal finger length 0.58. Chelicera 0.37/0.20 (1.85), movable finger length 0.22. Carapace 0.40/0.41 (0.98). Leg I: trochanter 0.12/0.08 (1.50), femur 0.34/0.06 (5.67), patella 0.18/0.04 (4.50), tibia 0.18/0.04 (4.50), tarsus 0.38/0.04 (9.50). Leg IV: trochanter 0.17/0.12 (1.42), femoropatella 0.54/0.16 (3.38), tibia 0.33/0.07 (4.71), basitarsus 0.16/0.05 (3.20), telotarsus 0.39/0.04 (9.75).

Females: body length 1.31–1.39. Pedipalps: trochanter 0.19/0.11 (1.73), femur 0.63–0.66/0.11 (5.73–6.00), patella 0.19–0.26/0.12 (1.58–2.17), chela 0.89–0.96/0.13–0.16 (5.94), hand 0.35–0.36/0.13–0.16 (2.25–2.69), movable chelal finger length 0.55–0.60. Chelicera 0.36–0.38/0.20–0.21 (1.80–1.81), movable finger length 0.22–0.23. Carapace 0.39–0.41/0.42 (0.93–0.97). Leg I: trochanter 0.11–0.12/0.07–0.09 (1.33–1.57), femur 0.33–0.36/0.05–0.06 (5.50–7.20), patella 0.18/0.05 (3.60), tibia 0.16–0.17/0.04 (4.00–4.25), tarsus 0.34–0.36/0.04 (8.50–9.00). Leg IV: trochanter 0.14–0.16/0.09–0.11 (1.45–1.56), femoropatella 0.49–0.53/0.16–0.17 (3.06–3.12), tibia 0.34/0.07 (4.86), basitarsus 0.16–0.17/0.06 (2.67–2.83), telotarsus 0.36–0.38/0.04 (9.00–9.50).

**Remarks.** *Lagynochthonius xiaoensis* was described from two female specimens by Hou, Feng & Zhang (2023). In a recent collection trip, some new specimens were collected at the type locality (Pianxiao Cave in Zunyi City, Guizhou Province, China), including one male and two females, which conform to the diagnostic characteristics of *L. xiaoensis*. We provide a revised diagnosis of *L. xiaoensis* in this study based on the holotype and the recently collected specimens.

*Lagynochthonius xiaoensis* most closely resembles *L. minimus* in the absence of intercalary teeth, the presence of four setae on tergites I–IV, the small, obtuse, and rounded epistome, and the absence of eyes or eyespots on the carapace, but differs in following combination of characters: trichobothrium *sb* situated midway between *st* and *b*, and fixed chelal finger with 27 (♂), 24–25 (♀) teeth (vs. trichobothrium *sb* closer to *st* than to *b*, and fixed chelal finger with 34–36 (♂), 35–37 (♀) teeth in *L. minimus*) (Hou *et al.* 2022b).

**Ecology.** All specimens were collected under rocks inside the cave.

**Distribution.** Known only from the type locality (China, Guizhou Province).

### *Lagynochthonius xiaolinensis* Hou, Gao & Zhang, 2022

Chinese name. 硝林拉伪蝎

*Lagynochthonius xiaolinensis* Hou, Gao & Zhang, 2022b: 43–46, figs 31–34.

**Material examined.** ♂ (Ps.-MHBHBU-#2021-41401) (holotype): China, Yunnan Province, Zhenxiang County, Linkou Township, Xiaolin Village, Dayan

Cave, under a stone in twilight zone [27.568444°N, 105.080389°E], 1907 m a.s.l., 29 September 2021, Zegang Feng, Yanmeng Hou, Lu Zhang & Liu Fu leg.

**Diagnosis and description.** For details see Hou, Gao & Zhang (2022b).

**Distribution.** China (Yunnan Province).

***Lagynochthonius xibaiensis* Hou, Gao & Zhang, 2022**

Chinese name. 洗白拉伪蝎

*Lagynochthonius xibaiensis* Hou, Gao & Zhang, 2022b: 48–51, figs 35–37.

**Material examined.** ♀ (Ps.-MHBUS-YN190810-0201) (holotype): China, Yunnan Province, Zhenxiong County, Chishuiyuan Town, Xibai Village, Hama Cave, under a stone in deep zone [27.483314°N, 104.855578°E], 1792 m a.s.l., 10 August 2019, Zegang Feng, Chen Zhang leg.

**Diagnosis and description.** For details see Hou, Gao & Zhang (2022b).

**Distribution.** China (Yunnan Province).

***Lagynochthonius xinjiaoensis* Hou, Gao & Zhang, 2022**

Chinese name. 新角拉伪蝎

*Lagynochthonius xinjiaoensis* Hou, Gao & Zhang, 2022b: 51–56, figs 38–41.

**Material examined.** ♂ (Ps.-MHBUS-HBUARA#2021-43001) (holotype): China, Yunnan Province, Fuyuan County, Laochang Town, Xinjiao Village, Yueliang Cave, under a stone in deep zone [25.213258°N, 104.484239°E], 2017 m a.s.l., 8 October 2021, Zegang Feng, Yanmeng Hou, Lu Zhang & Liu Fu leg.

**Diagnosis and description.** For details see Hou, Gao & Zhang (2022b).

**Distribution.** China (Yunnan Province).

***Lagynochthonius yaowanguensis* Hou, Gao & Zhang, 2022**

Chinese name. 药王谷拉伪蝎

*Lagynochthonius yaowanguensis* Hou, Gao & Zhang, 2022b: 56–61, figs 42–45.

**Material examined.** ♂ (Ps.-MHBUS-HBUARA#2021-27901) (holotype), 1 ♀ (Ps.-MHBUS-HBUARA#2021-27902) (paratype): China, Yunnan Province, Malipo County, Tianbao Town, Laoshanyaowanggu, cave without name (Unnamed Cave 7), under stones and detritus in deep zone [23.010583°N, 104.821547°E], 1221 m a.s.l., 19 April 2021, Zegang Feng leg. 1 ♀ (Ps.-MHBUS-HBUARA#2021-18001) (paratype), the same location as the holotype, 22 July 2021, Zegang Feng, Hongru Xu, Liu Fu & Nana Zhan leg.

**Diagnosis and description.** For details see Hou, Gao & Zhang (2022b).

**Distribution.** China (Yunnan Province).

***Lagynochthonius zhakouensis* sp. nov.**

Chinese name. 渣口拉伪蝎

Figs 50–53

**Type material.** Holotype ♂ (Ps.-MHBUS-SC2022073001): China, Sichuan Province, Luzhou City, Xuyong County, Zhengdon Town, Zhakou Cave [28.06668357°N, 105.54505348°E], 805 m a.s.l., 30 July 2022, Zegang Feng, Liu Fu, Long Hao & Jiaqi Zhao leg. Paratypes: 1 ♀ (Ps.-MHBUS-SC2022073002), all with the same data as the holotype.

**Etymology.** Named after the type locality, Zhakou Cave.

**Diagnosis.** (♂♀). Small sized hypogean species; carapace with two eyespots, anterior margin smooth and epistome absent; tergites I–II each with two setae, tergites III–IV each with four setae. Rallum with eight blades. Pedipalps slender, chela 5.69 (♂), 4.32 (♀) times as long as broad; femur 7.40 (♂), 7.80 (♀) times as long as broad; both chelal fingers without intercalary teeth and a modified accessory tooth (*td*) on prolateral-retrolateral face; chemosensory setae (*sc*) present on dorsum of chelal hand.

**Description.** Adult male (holotype) (Figs 50A, 51A–G, 52, 53).

**Color** generally pale yellow, chelicerae, carapace, pedipalps and tergites slightly darker black, soft parts pale.

**Cephalothorax** (Figs 51D, 52A): carapace nearly subquadrate, 1.00 times as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin smooth, without serrations; epistome absent, with two eyespots; with 18 setae arranged s4s: 4: 4: 2: 2; with three pairs of lyrifissures, first and second pair situated middle and flank to the 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 1/2 length of medial seta; apex of coxa I with a rounded anteromedial process; coxae II with 7–8 terminally indented coxal spines on each side, set as an oblique and arc row, central spines slightly longer than the others (Fig. 52D); intercoxal tubercle absent; chaetotaxy of coxae: P 3, I 3, II 4, III 5, IV 5.

**Chelicera** (Figs 51C, 52B): almost as long as carapace, 1.65 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 7 teeth, distal one largest; movable finger with 12 retrorse contiguous small teeth; galea completely vestigial (Fig. 52B). Serrula exterior with 24 and serrula interior with 13 blades. Rallum with

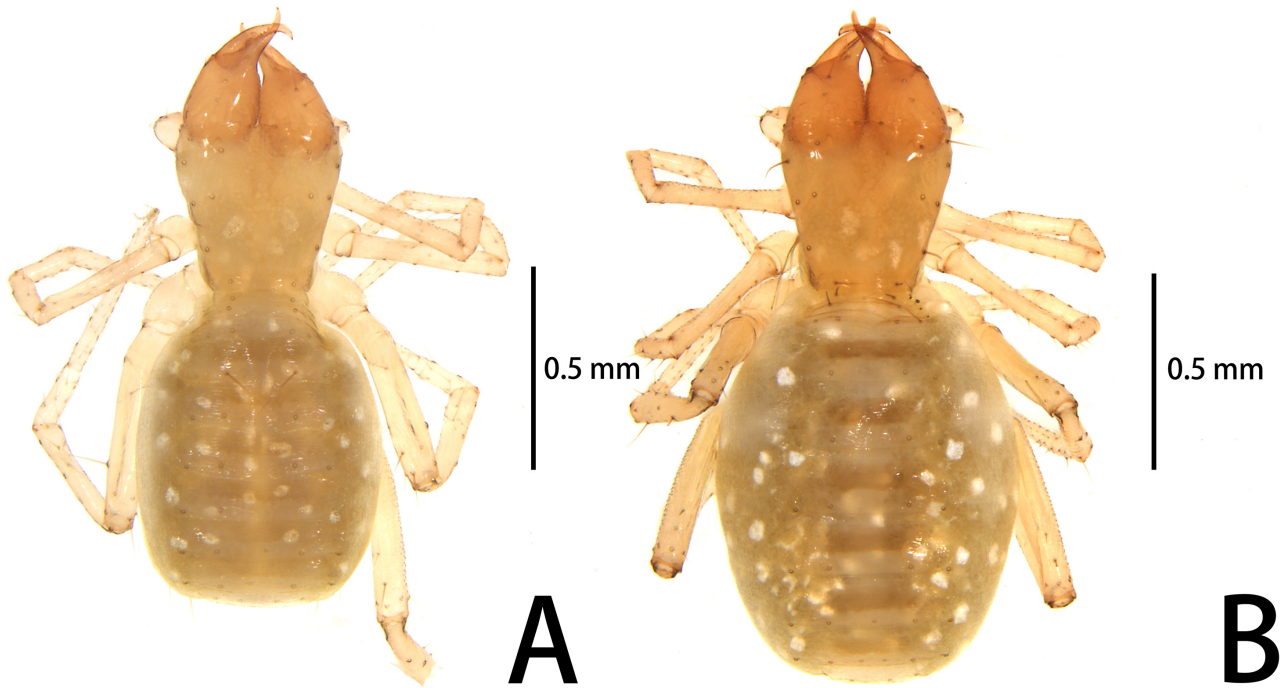


FIGURE 50. *Lagynochthonius zhakouensis* sp. nov., A. Holotype male (dorsal view); B. Paratype female (dorsal view).

eight blades, the distal one longest and recumbent basally, with fine barbules and slightly set apart from the other blades, latter tightly grouped and with long pinnae, some of which are subdivided (Fig. 52C).

**Pedipalp** (Figs 51A–B, 51E, 52E, 53A–B): trochanter 2.00, femur 7.40, patella 2.36, chela 5.69, hand 2.44 times as long as broad; femur 2.85 times as long as patella; movable chelal finger 1.51 times as long as hand and 0.65 times as long as chela. Setae generally long and acuminate. Chelal hand gradually constricted towards fingers, apodeme complex of movable chelal finger strongly 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, *t* slightly distal to *it* and distal to *b*; *est* situated distal to *b* and close to *it* (Figs. 51A, 53A). Microsetae (chemosensory setae) present on dorsum of chelal hand (Figs. 51B, 53B). Both chelal fingers with a row of teeth, spaced regularly along the margin, teeth smaller distally and proximally: fixed finger with 25 well-spaced, pointed teeth, and a modified accessory tooth on prolateral-retrolateral face (*td*, slightly distal to *dx*); movable finger with 9 well-spaced, pointed teeth, plus 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: 2: 2: 4: 4: 4: 4: 4: 5: 5: 4: T2T: 0. Sternal chaetotaxy IV–XII: 8: 10: 10: 9: 9: 11: 9: -: 2. Genital region: sternite

II with 8 setae scattered on median area, genital opening slit-like, sternite III with 24 setae (Fig. 51G).

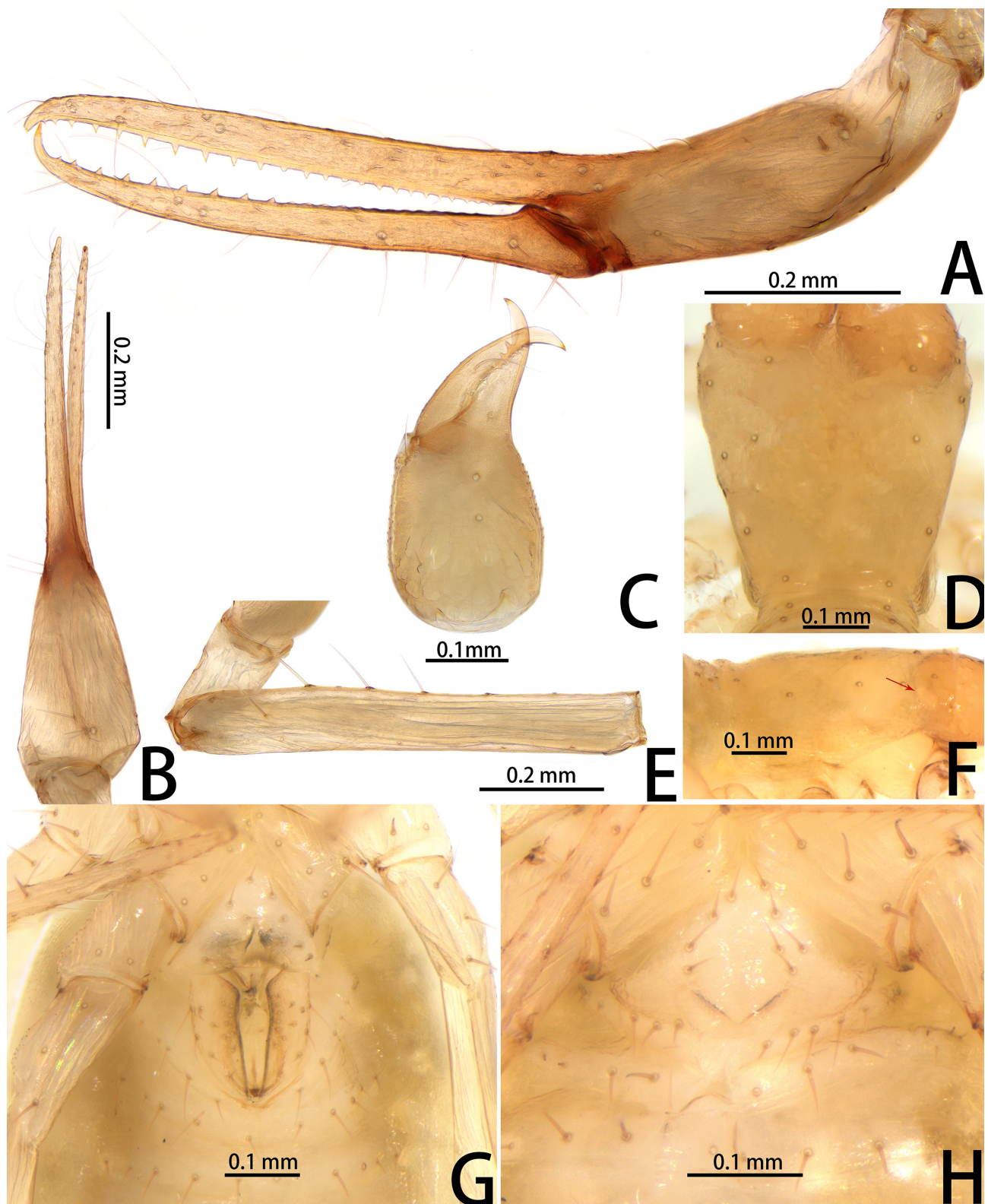
**Legs** (Fig. 53C–D): fine granulation present on anterodorsal faces of femur IV and patella IV. Leg I: femur 2.00 times as long as patella; tarsus 2.44 times as long as tibia. Leg IV: femoropatella 3.59 times as long as deep; tibia 6.14 times as long as deep; with basal tactile setae on both tarsal segments: basitarsus 3.00 times as long as deep (TS = 0.38), telotarsus 9.60 times as long as deep and 2.67 times as long as basitarsus (TS = 0.38). Setae of leg I (trochanter to tibia) 3: 10: 5: 10, setae of leg IV (trochanter to basitarsus) 1: 1: 5: 6: 9. Arolium not divided, slightly shorter than the simple claws.

**Adult female** (paratype) (Figs 50B, 51H). Mostly same as male; tergal chaetotaxy I–XII: 2: 2: 4: 4: 4: 4: 4: 5: 6: 4: T2T: 0; sternal chaetotaxy IV–XII: 8: 8: 10: 9: 8: 9: 9: -: 2. Genital region: sternite II with nine setae scattered on median area, sternite III with a row of 10 setae.

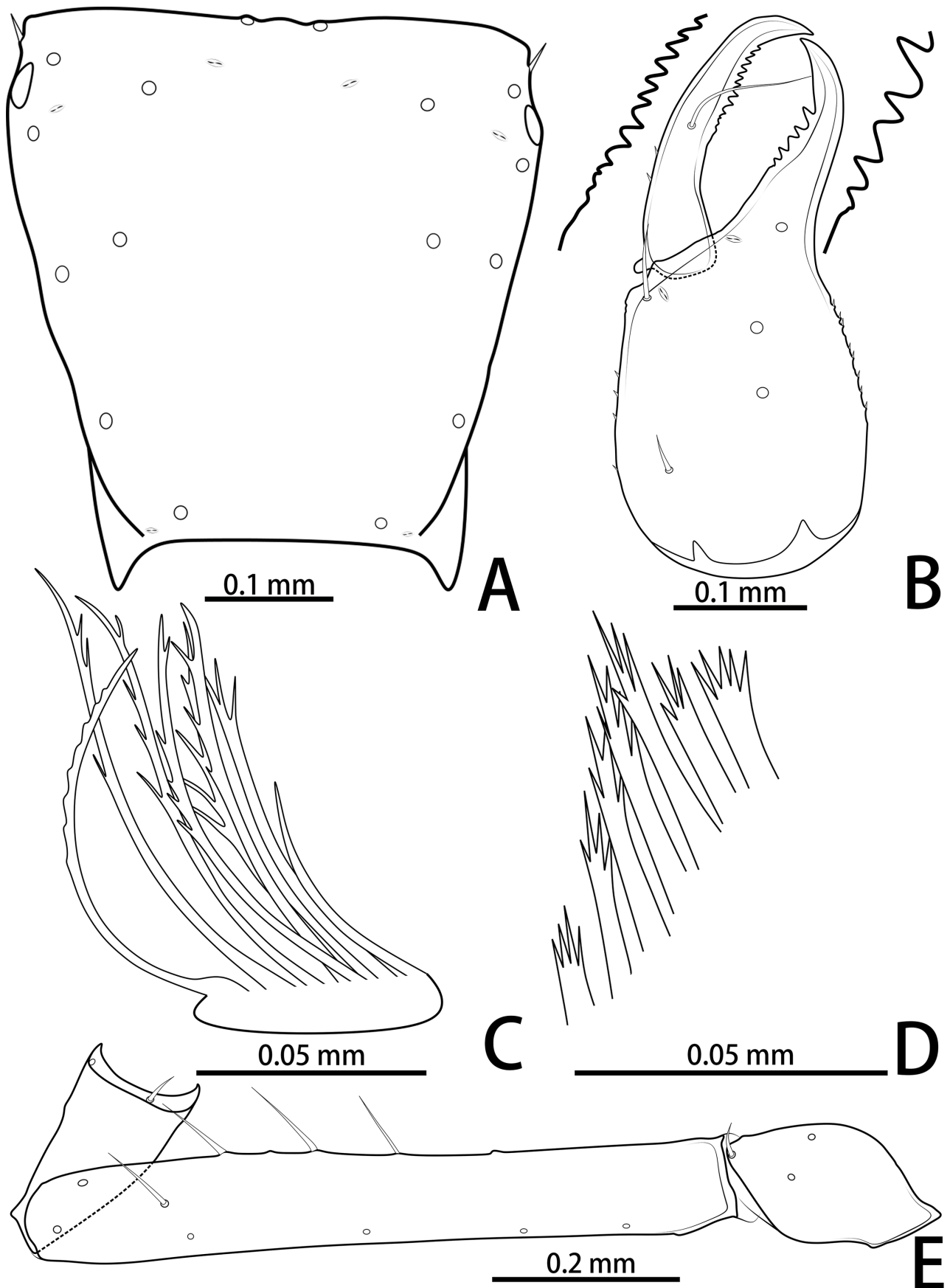
**Dimensions** (length/breadth or, in the case of the legs, length/depth in mm; ratios in parentheses). Male: body length 1.21. Pedipalps: trochanter 0.20/0.10 (2.00), femur 0.74/0.10 (7.40), patella 0.26/0.11 (2.36), chela 0.91/0.16 (5.69), hand 0.39/0.16 (2.44), movable chelal finger length 0.59. Chelicera 0.33/0.20 (1.65), movable finger length 0.20. Carapace 0.41/0.41 (1.00). Leg I: trochanter 0.13/0.09 (1.44), femur 0.40/0.06 (6.67), patella 0.20/0.05 (4.00), tibia 0.18/0.05 (3.60), tarsus 0.44/0.04 (11.00). Leg IV: trochanter 0.20/0.11 (1.82), femoropatella 0.61/0.17 (3.57), tibia 0.43/0.07 (6.14), basitarsus 0.18/0.06 (3.00), telotarsus 0.48/0.05 (9.60).

Female: body length 1.31. Pedipalps: trochanter 0.22/0.11 (2.00), femur 0.78/0.10 (7.80), patella 0.30/0.10 (3.00), chela 1.08/0.25 (4.32), hand 0.46/0.25 (1.84), movable chelal finger length 0.61. Chelicera 0.36/0.22

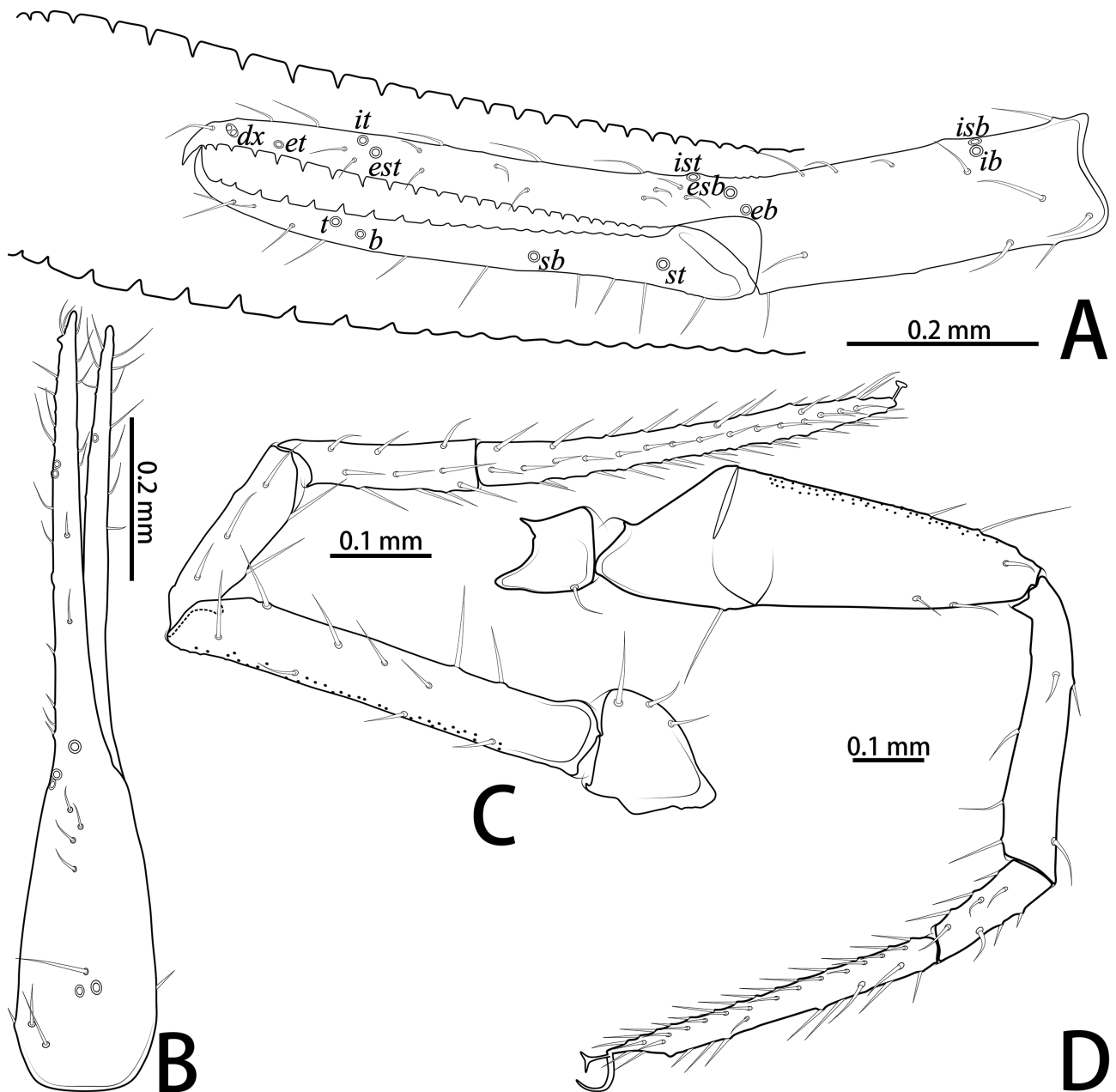




**FIGURE 51.** *Lagynochthonius zhakouensis* sp. nov., holotype male (A–G), paratype female (H): A. Left chela (lateral view); B. Left chela (dorsal view); C. Left chelicera (dorsal view); D. Carapace (dorsal view); E. Left pedipalp (minus chela, dorsal view); F. Carapace (lateral view), indicate eyespot (red arrow); G. Male genital area (ventral view); H. Female genital area (ventral view).



**FIGURE 52.** *Lagynochthonius zhakouensis* sp. nov., holotype male: 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).



**FIGURE 53.** *Lagynochthonius zhakouensis* sp. nov., holotype male: 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).

(1.64), movable finger length 0.23. Carapace 0.43/0.44 (0.98). Leg I: trochanter 0.20/0.11 (1.82), femur 0.45/0.06 (7.50), patella 0.21/0.06 (3.50), tibia 0.20/0.05 (4.00), tarsus 0.47/0.04 (11.75). Leg IV: trochanter 0.18/0.11 (1.64), femoropatella 0.60/0.19 (3.16), tibia 0.45/0.08 (5.63), basitarsus 0.21/0.06 (3.50), telotarsus 0.46/0.05 (9.20).

**Remarks.** *Lagynochthonius zhakouensis* sp. nov. most closely resembles *L. longquanensis* sp. nov. in the absence of intercalary teeth, the presence of two setae on tergites I–II each, the presence of four setae on tergites III–IV, the absence of epistome, and the presence of two eyespots on the carapace but differs in the following characters: longer chela femur (0.78 mm (♀) vs 0.61 mm (♀) in *L. longquanensis* sp. nov.) and thinner chela femur

(7.80 (♀) times longer than broad vs 5.54 (♀) times longer than broad in *L. longquanensis* sp. nov.) and longer chela (1.08 mm (♀) vs 0.88 mm (♀) in *L. longquanensis* sp. nov.).

**Distribution.** Known only from the type locality, Zhakou Cave (China, Sichuan Province).

***Lagynochthonius zhaoae* sp. nov.**

Chinese name. 赵氏拉伪蝎

Figs 54–58

**Typematerial.** Holotype ♀ (Ps.-MHBU-GX2023113001): China, Guangxi Zhuang Autonomous Region, Guilin City, Xingan County, cave without name (Unnamed Cave



FIGURE 54. *Lagynochthonius zhaoae* sp. nov., holotype female (dorsal view).

8) [25.581534°N, 110.62378374°E], 229 m a.s.l., 30 November 2023, Jiaqi Zhao, Songtao Shi, Tao Zheng & Jianzhou Sun leg.

**Etymology.** This species is named for Jiaqi Zhao, who participated in field work and collected some of the specimens.

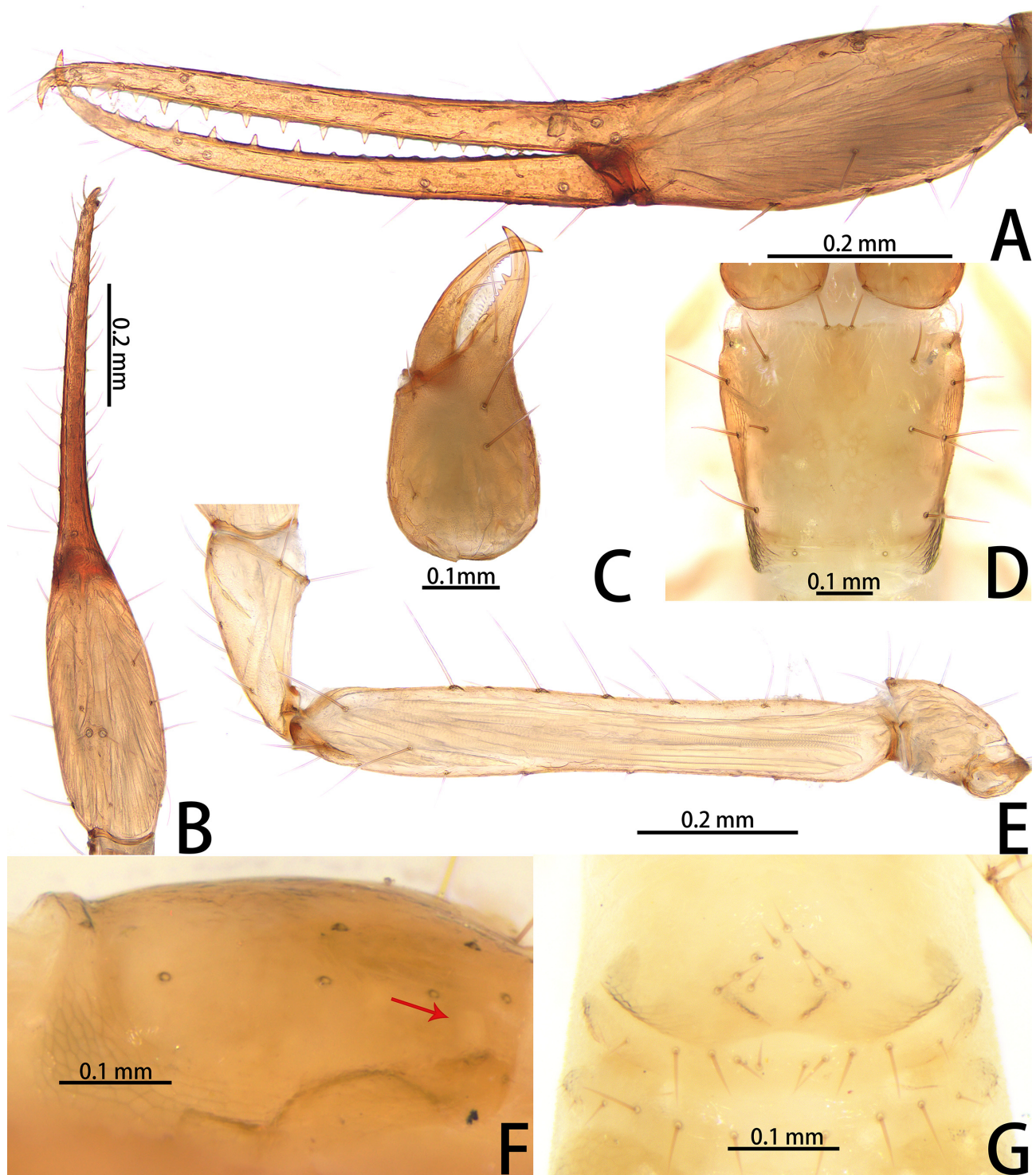
**Diagnosis.** (♀). small sized hypogean species; galea slightly bumped; carapace with two eyespots, anterior margin smooth and epistome small and triangular; tergites I–II each with two setae, tergites III–IV each with four setae. Pedipalps slender, chela 5.78 times as long as broad; femur 6.82 times as long as broad; both chelal fingers without intercalary teeth and a modified accessory tooth (*td*) on prolateral-retrolateral face; chemosensory setae (*sc*) present on dorsum of chelal hand.

**Description.** Adult female (Figs 54, 55, 56, 57).

**Color** generally pale yellow, chelicerae, carapace,

pedipalps and tergites slightly darker black, soft parts pale.

**Cephalothorax** (Figs 55D, 56A): carapace nearly subquadrate, 0.93 times as long as broad, weakly constricted basally; posterior region with squamous sculpturing laterally, other area smooth, without furrows; anterior margin smooth, without serrations; epistome strongly point, with two eyespots; with 18 setae arranged s4s: 4: 4: 2: 2, most setae heavy, 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 the sole pair of setae of posterior row. Manducatory process with two acuminate distal setae, anterior seta more than 1/2 length of medial seta; apex of coxa I with a rounded anteromedial process; coxae II with 11 terminally indented coxal spines on each side, set as an

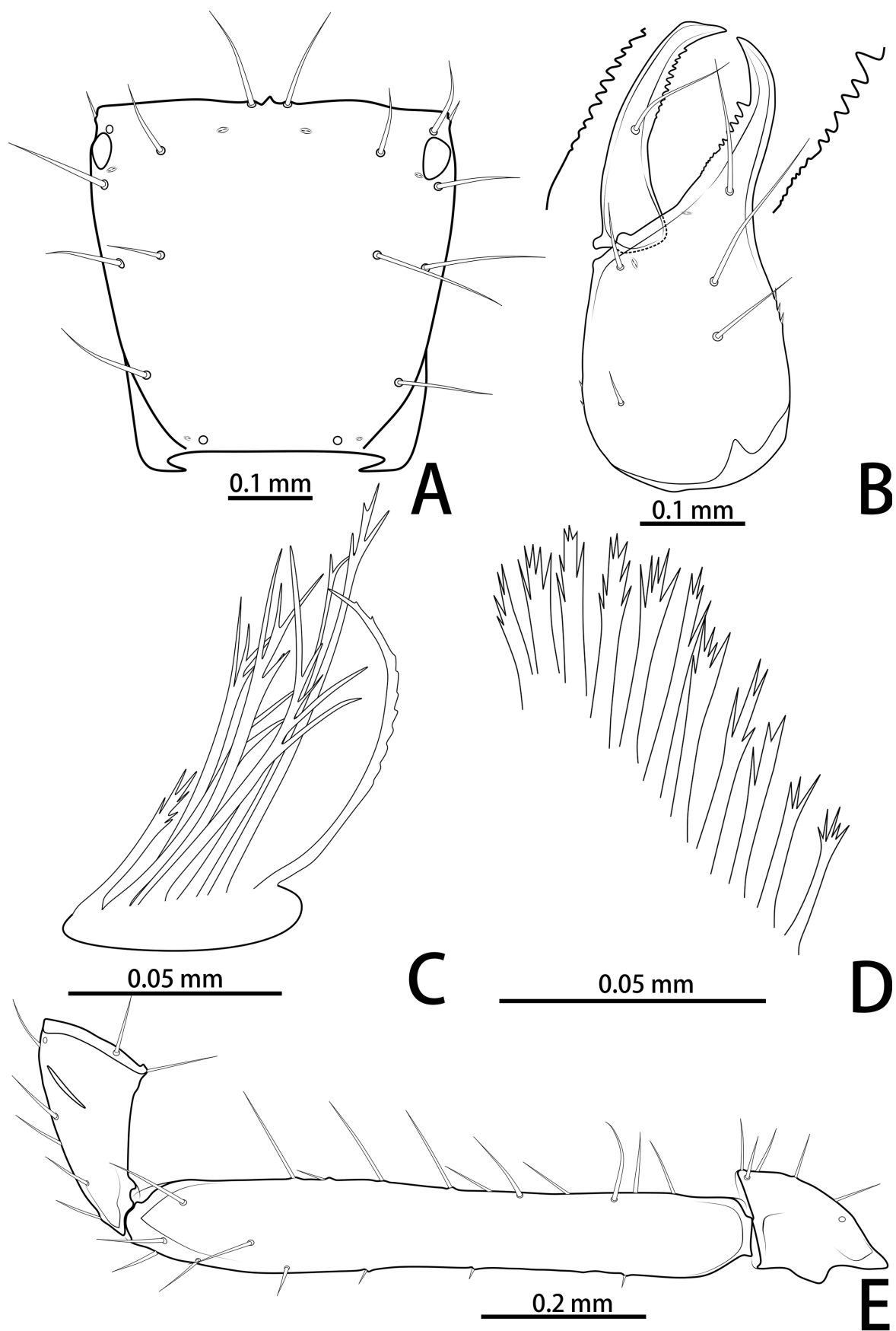


**FIGURE 55.** *Lagynochthonius zhaoae* sp. nov., holotype female: A. Left chela (lateral view); B. Left chela (dorsal view); C. Left chelicera (dorsal view); D. Carapace (dorsal view); E. Left pedipalp (minus chela, dorsal view); F. Carapace (lateral view), indicate eyespot (red arrow); G. Female genital area (ventral view).

oblique and arc row, central spines slightly longer than the others (Fig. 55D); intercoxal tubercle absent; chaetotaxy of coxae: P 3, I 3, II 4, III 5, IV 5.

**Chelicera** (Figs 55C, 56B): almost as long as carapace, 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 13 teeth, distal one largest; movable finger with 10 retrorse contiguous small teeth; galea represented by a very slight bump on movable finger (Fig. 56B). Serrula exterior with 18 and serrula interior with 14 blades. Rallum with eight blades, the distal one longest and recumbent basally, with fine barbules and slightly set



**FIGURE 56.** *Lagynochthonius zhaoae* sp. nov., holotype female: 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).

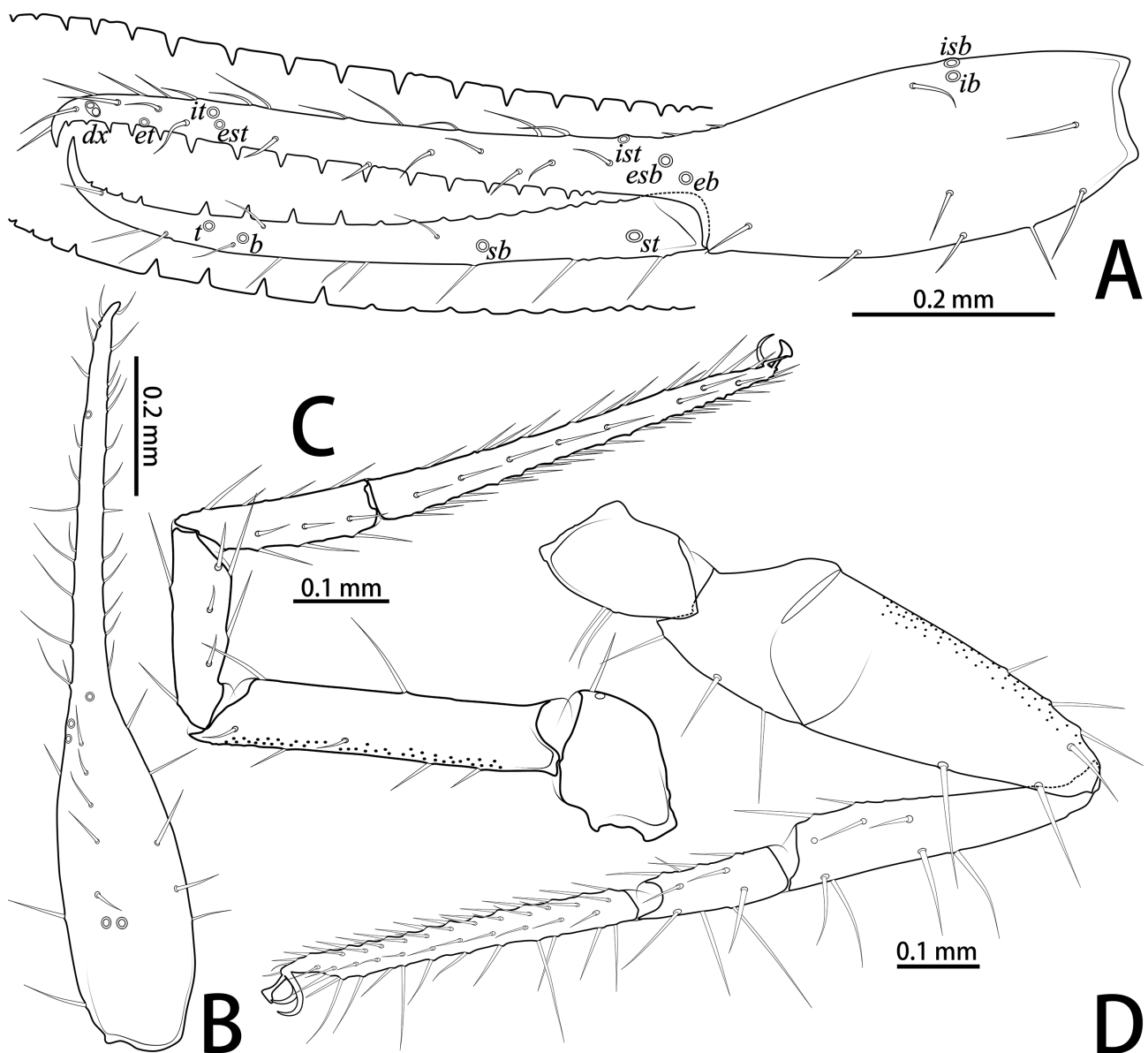


FIGURE 57. *Lagynochthonius zhaoae* sp. nov., holotype female: A. Left chela (lateral view), with details of teeth and trichobothrial pattern; B. Left chela (dorsal view); C. Leg I (lateral view); D. Leg IV (lateral view).

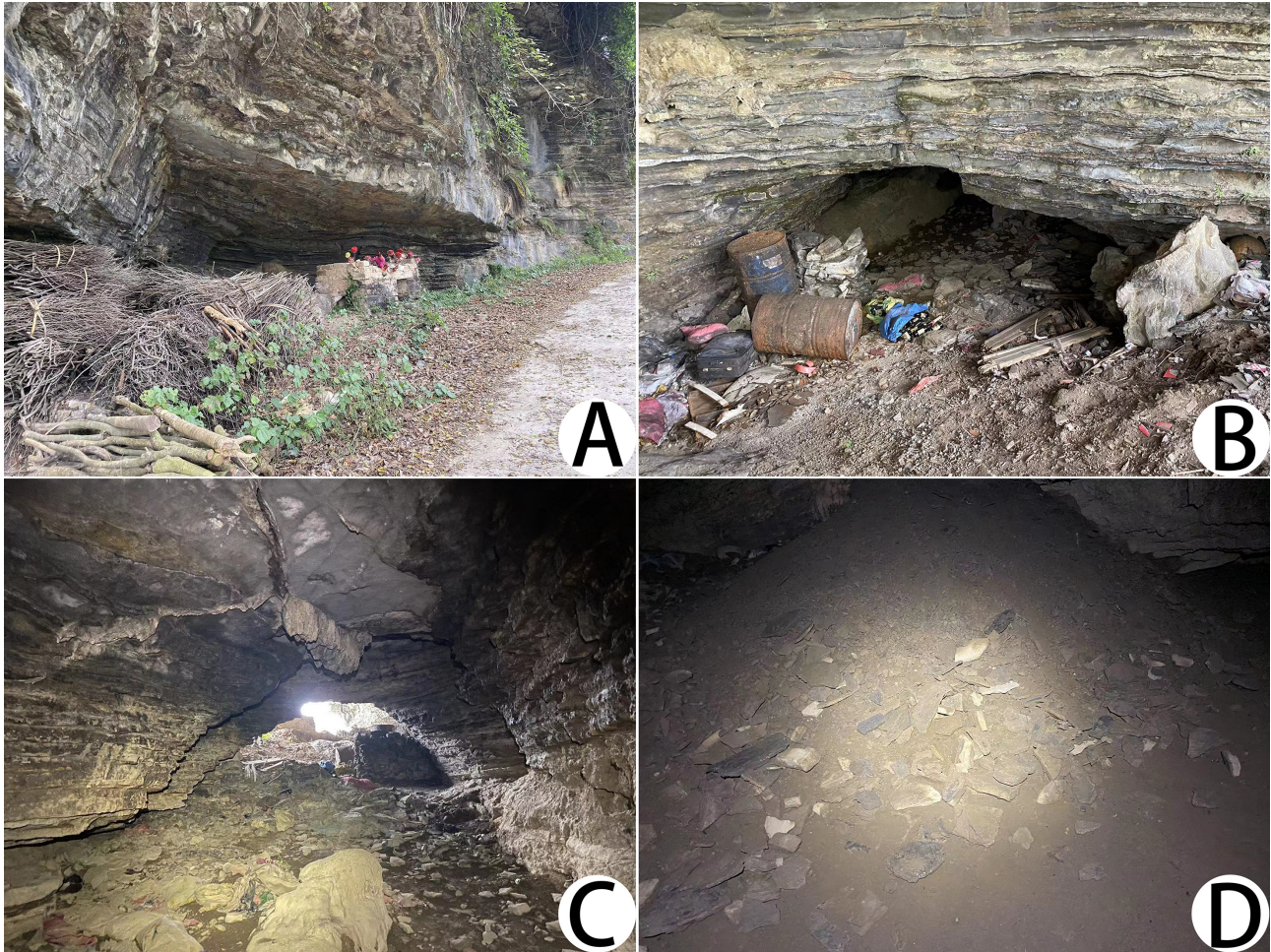
apart from the other blades, latter tightly grouped and with long pinnae, some of which are subdivided (Fig. 56C).

**Pedipalp** (Figs 55A–B, 55E, 56E, 57A–B): trochanter 2.00, femur 6.82, patella 2.54, chela 5.783, hand 2.39 times as long as broad; femur 2.68 times as long as patella; movable chelal finger 1.44 times as long as hand and 0.60 times as long as chela. Setae generally long and acuminate. Chelal hand gradually constricted towards fingers, apodeme complex of movable chelal finger strongly 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, *t*

slightly distal to *it* and distal to *b*; *est* situated distal to *b* and close to *it* (Figs. 55A, 57A). Microsetae (chemosensory setae) present on dorsum of chelal hand (Figs. 55B, 57B). Both chelal fingers with a row of teeth, spaced regularly along the margin, teeth smaller distally and proximally: fixed finger with 18 well-spaced, pointed teeth, and a modified accessory tooth on prolateral-retrolateral face (*td*, slightly distal to *dx*); movable finger with 8 well-spaced, pointed teeth, plus 10 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: 5: 5: 7: 7: 4: T2T: 0. Sternal chaetotaxy IV–XII: 10: 10: 9: 9: 10: 9: 9: -: 2. Genital region: sternite II with 10 setae scattered on median area, sternite III with a row of 10 setae. (Fig. 55F).

**Legs** (Fig. 57C–D): fine granulation present on



**FIGURE 58.** Unnamed Cave 8, Type locality of *Lagynochthonius zhaoae* sp. nov., A–B. Entrance; C. Inside the cave entrance; D. Areas where *L. zhaoae* sp. nov. specimens were collected.

anterodorsal faces of femur IV and patella IV. Leg I: femur 1.80 times as long as patella; tarsus 2.10 times as long as tibia. Leg IV: femoropatella 3.11 times as long as deep; tibia 4.88 times as long as deep; with basal tactile setae on both tarsal segments: basitarsus 3.00 times as long as deep (TS = 0.33), telotarsus 10.75 times as long as deep and 2.39 times as long as basitarsus (TS = 0.28). Setae of leg I (trochanter to tibia) 2: 7: 7: 10, setae of leg IV (trochanter to basitarsus) 2: 3: 6: 9: 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 1.47. Pedipalps: trochanter 0.22/0.11 (2.00), femur 0.75/0.11 (6.82), patella 0.28/0.11 (2.54), chela 1.04/0.18 (5.7), hand 0.43/0.18 (2.39), movable chelal finger length 0.62. Chelicera 0.39/0.21 (1.86), movable finger length 0.23. Carapace 0.41/0.44 (0.93). Leg I: trochanter 0.13/0.09 (1.82), femur 0.36/0.07 (5.14), patella 0.20/0.06 (3.33), tibia 0.20/0.05 (4.00), tarsus 0.42/0.04 (10.50). Leg IV: trochanter 0.19/0.11 (1.73), femoropatella 0.56/0.18 (3.11), tibia 0.39/0.08 (4.88), basitarsus 0.18/0.06 (3.00), telotarsus 0.43/0.04 (10.75).

**Remarks.** *Lagynochthonius zhaoae* sp. nov. closely resembles *L. zhakouensis* sp. nov. in the absence of

intercalary teeth, the presence of two setae on tergites I–II, the presence of four setae on tergites III–IV, and the presence of two eyespots on the carapace, but differs in the following characters: thinner chela femur (6.82 (♀) times longer than broad vs 7.80 (♀) times longer than broad in *L. zhakouensis* sp. nov.) and small and triangular epistome (vs. epistome absent in *L. zhakouensis* sp. nov.).

**Ecology.** The specimen was collected under mud inside the cave.

**Distribution.** Known only from the type locality (China, Guangxi Zhuang Autonomous Region).

***Lagynochthonius zhijinensis* Hou, Feng & Zhang, 2023**

Chinese name. 织金拉伪蝎

*Lagynochthonius zhijinensis* Hou, Feng & Zhang, 2023a: 55–59, figs 44–47.

**Material examined.** ♂ (Ps.-MHBV-GZZJ-19-04-01) (holotype), 1 ♀ (Ps.-MSWU-GZZJ-19-04-02) (paratype): China, Guizhou Province, Zhijin County, Chengguan Town, Yangliu Village, Long Cave, under stones in the



deep zone [26.679342°N, 105.787861°E], 1345 m a.s.l., 2 October 2019, Zegang Feng & Lingchen Zhao leg.

**Diagnosis and description.** For details see Hou, Feng & Zhang (2023a).

**Distribution.** China (Guizhou Province).

## Discussion

The number of hypogean species in the genus *Lagynochthonius* has been increased to 34 in China, and they can be categorized into two types: those with strongly degenerated eyes (including eyespots) and those that are completely eyeless. The emergence of these two types might provide excellent material for better elucidating the adaptive evolution in cave environment.

## The condition of the eyes

The current state of the eyes in *Lagynochthonius* includes the following conditions: four well-developed eyes; anterior pair of eyes well developed, posterior pair of eyes slightly reduced; four strongly reduced eyes; only two eyespots; and without eyes or eyespots.

Here, an explanation is provided for the "eyespot" and "strongly degenerated eye." The eyespot is an eye without lens, appearing milky white, while a strongly degenerated eye refers to an eye that still has a small amount of lens, but compared to the four developed eyes and without eyes or eyespots, it seems to be in a "transitional period", hence it is referred to as a strongly degenerated eye.

## Eyes and their cave adaptation

Before our study, only two *Lagynochthonius* species (*L. crassus* and *L. latipectus*) were known to have only two eyespots (Hou *et al.* 2022b, 2023a), but more species with two eyespots or four strongly reduced eyes have been recently reported, which may be related to local distribution (*L. crassus* and *L. latipectus* in Guizhou, *L. baiguensis* **sp. nov.** and *L. zhaoae* **sp. nov.** in Guangxi, *L. infirmus* **sp. nov.**, *L. longquanensis* **sp. nov.** and *L. zhakouensis* **sp. nov.** in Sichuan) (Dai *et al.* 2023; Wu *et al.* 2023). Hypogean spiders have been reported to still have degenerated eyes that can sense light sources (Wang *et al.* 2023). In the genus *Lagynochthonius*, the presence of species with more two eyespots and also species with four strongly degenerated eyes may indicate that adaptation to cave environments is closely related to the degeneration of the eyes.

Moreover, numerous presumed troglobitic groups have now been shown have not been evolved directly from epigeal ancestors. Instead, they are from species that had already adapted to the unique layers of the substratum known as the "Mesovoid Shallow Substratum" (MSS) (Juberthie 1980; Racovită 2006) or the "Shallow Subsurface Habitat" (Culver 2007). Perhaps the location near the cave entrance could also relate an environment similar to MSS or "Shallow Subsurface Habitat".

## Acknowledgements

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