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Monograph

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Acroterius gen. nov. (Araneae: Linyphiidae: Linyphiinae) with twelve new species from Yunnan, China

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Abstract. *Acroterius* gen. nov. is described from Yuannan, together with twelve new species: *A. absentus* gen. et sp. nov. (♂); *A. brevis* gen. et sp. nov. (♂/♀); *A. camur* gen. et sp. nov. (♂/♀); *A. circinatus* gen. et sp. nov. (♂/♀); *A. hamatus* gen. et sp. nov. (♀); *A. inversus* gen. et sp. nov. (♀); *A. latus* gen. et sp. nov. (♂/♀); *A. longidentatus* gen. et sp. nov. (♀); *A. longimultus* gen. et sp. nov. (♂/♀); *A. longiprojectus* gen. et sp. nov. (♀); *A. ovatus* gen. et sp. nov. (♀), and *A. parvus* gen. et sp. nov. (♀). Detailed descriptions of genitalic characters and somatic features by means of photographs and line drawings, as well as comparisons with closely related species, are provided.

Keywords. Copulatory organ, Linyphiinae, Southeast Asia, sheet-web spiders, taxonomy.

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Introduction

Yunnan, the most southwestern province of China, is bordering with Laos, Vietnam, Myanmar and has seven climate zones (north tropical, south tropical, central subtropical, north subtropical, warm temperate, temperate and plateau climate areas). Its average temperature is about 5~24°C. Yunnan Province has a very rich and diverse linyphiid spider fauna as was demonstrated by Irfan *et al*. (2019), who described a new genus *Zhezhoulinyphia* Irfan, Zhou & Peng, 2019, and by Irfan & Peng (2018, 2019a, 2019b), who mentioned three genera new to China along with six new species, i.e., *Herbiphantes acutalis* Irfan & Peng, 2019, *Houshenzinus tengchongensis* Irfan & Peng, 2018, *Kaestneria valentissima* Irfan & Peng, 2018, *Labullinyphia furcata* Irfan & Peng, 2019, *Paikiniana operta* Irfan & Peng, 2018 and *Parbatthorax proiectus* Irfan & Peng, 2019, from Yunnan. Zhao & Li (2017) described *Callosa*

Zhao & Li, 2017, a new troglobitic genus from Yunnan. Eight new genera and 30 new species have been described in the survey of linyphiid spiders from Xishuangbanna, Yunnan (Zhao & Li 2014). Most of the species described from Yunnan Province are not found in other parts of China and will probably be found in the Oriental region.

The fauna of Linyphiinae Blackwall, 1859 from China comprises 69 species belonging to 16 genera (Li & Lin 2016). We here describe a new genus after having checked the available literature and based on morphological characteristics, *Acroterius* gen. nov., which closely resembles the genera *Kaestneria* Wiehle, 1956; *Zhezhoulinyphia* (also reported from Yunnan); *Diplostyla* Emerton, 1882; *Laetesia* Simon, 1908 and *Laperousea* Dalmas, 1917, whereas no phylogenetic evidence of linyphiin spiders from southeast Asia was discovered. More systematic and phylogenetic studies need to be done to confirm the relationship between the closely related genera. Spider collections during 2002–2006 from Yunnan have revealed the presence of *Acroterius* gen. nov. with twelve new species, all described here, with locality maps also provided (Figs 38–39).

Material and methods

Specimens were collected by hand picking and beating shrubs and were kept in 75% ethanol. After dissection, epigyna were cleared in trypsin enzyme solution before examination and photography. The left male palps were used for description and illustration. Specimens were examined and measured with a Leica M205C stereo microscope. Photos were taken with a digital camera Canon PowerShot G12 mounted on an Olympus BX53 and Leica MC170 HD mounted on a Leica M205C and were stacked by Helicon Focus software (3.10. free). Maps were created using ArcMap 10.2, and then modified using Adobe Photoshop CS2 Extended (Figs 38–39). Leg measurements are given in the following order: total length (femur, patella + tibia, metatarsus, tarsus). All measurements are given in millimeters (mm). The terminology used in text and figure legends follows Irfan *et al*. (2019). Specimens are deposited in the collection of the College of Life Sciences, Hunan Normal University (HNU).

Abbreviations

Somatic morphology

AER = anterior eye row
ALE = anterior lateral eye
AME = anterior median eye
AME–ALE = distance between AME and ALE
AME–AME = distance between AMEs
PER = posterior eye row
PLE = posterior lateral eye
PME = posterior median eye
PME–PLE = distance between PME and PLE
PME–PME = distance between PMEs

Male palp

CRL = cymbial retrolateral lobe
DPE = dorsal projection of embolic plate
DSA = distal suprategular apophysis
E = embolus
EM = embolic membrane
lp = lateral projection of paracymbium
mp = median projection of paracymbium
PC = paracymbium
R = radix

RA = radical apophysis
ST = subtegulum
T = tegulum
Tm = trichobothrium
tp = tegular projection
vp = ventral projection of paracymbium

Epigyne

AW = anterior wall of epigynal plate
CD = copulatory duct
CO = copulatory opening
FD = fertilization duct
P = parmula
PAW = posterior projection of anterior wall
PMP = posterior median plate
S = spermatheca

Results

Class Arachnida Cuvier, 1812
Order Araneae Clerck, 1757
Family Linyphiidae Blackwall, 1859
Subfamily Linyphiinae Blackwall, 1859

Acroterius gen. nov.
urn:lsid:zoobank.org:act:EEA7B37A-300B-43D9-87F3-82A380BC686D

Type species

Acroterius brevis gen. et sp. nov.

Diagnosis

Acroterius gen. nov. resembles *Diplostyla*; *Kaestneria* Wiehle, 1956; *Laetesia* Simon, 1908; *Laperousea* Dalmas, 1917 and *Zhezhoulinyphia* in: epigyne with parmula, originates from the posterior margin of posterior median plate with a socket ventrally (Fig. 8A–C; Ivie 1969: figs 105–108; van Helsdingen 1972: fig. 8; Millidge 1988: fig. 173; Irfan & Peng 2018: figs 5c–d, 6c–d; Irfan *et al*. 2019: figs 1–2, 7, 9–10). In the male palp, the distal margin of the radix is semicircular and has teeth as in *Laetesia*, *Laperousea* and *Zhezhoulinyphia* (Figs 6A–C, 7A–B; Millidge 1988: figs 145–146; Irfan *et al*. 2019: figs 4a–b, d, 5c–e, 6a–b); the embolus and embolic membrane arise from the dorsal side of the distal margin of the radix as in *Zhezhoulinyphia* (Figs 6A–C, 7A–B; Irfan *et al*. 2019: figs 4a–b, d, 5c–e, 6a–b). It can be distinguished by the anterior wall of the epigyne which has a posterior projection on each side (Fig. 8A–B), but in species of *Laetesia*, the posterior arm of the anterior wall of the epigynal plate is long, with a copulatory opening on the posterior ventral end (Millidge 1988: figs 173, 187), and the posterior projection of the anterior wall absent in species of *Diplostyla*, *Kaestneria* and *Zhezhoulinyphia* (van Helsdingen 1972: fig. 8; Millidge 1988: fig. 173; Irfan & Peng 2018: figs 5c–d, 6c–d; Irfan *et al*. 2019: figs 1–2, 7, 9–10). The spermathecae are situated near the base of the parmula (Fig. 8A–B) in *Acroterius* gen. nov., but towards the periphery of epigyne in species of *Kaestneria*, *Laetesia* and *Zhezhoulinyphia* (Millidge 1988: figs 187–189; Tao *et al*. 1995: figs 80–81; Irfan *et al*. 2019: figs 1–2, 7, 9–10). The cymbium has a cymbial retrolateral lobe (Figs 6B–D, 7B) as in species of *Zhezhoulinyphia* (Irfan *et al*. 2019: figs 4b, 5b, g, 6b), but it is absent in *Kaestneria* and *Laetesia* (Millidge 1988: figs 143–144; Paquin & Dupérré 2003: figs 1544, 1547). The distal arm of the paracymbium of *Acroterius* gen. nov. has two or three projections and covers most of the proximal part of paracymbium (Figs 6B–C, 7B), the

distal part of the paracymbium of all species of *Kaestneria* and *Laetesia* is simple U- or V-shaped and doesn't cover the proximal part (Millidge 1988: figs 187–189; Paquin & Dupérré 2003: figs 1544, 1547) and there is a large, distal arm longer than wide, tip pendulum-shaped in species of *Zhezhoulinyphia* (Irfan *et al*. 2019: figs 4b, 5f, 6b). The distal end of the distal suprategular apophysis of *Acroterius* gen. nov. and *Kaestneria* is not notched (Figs 6B–C, 7B; Tao *et al*. 1995: figs 77–78) (but notched in species of *Laetesia*, Millidge 1988: fig. 146), and proximally broad with teeth, has a distal part strongly curved into an inversed U-shape, almost touching the distal margin of the paracymbium in species of *Zhezhoulinyphia* (Irfan *et al*. 2019: figs 4b, 5b, g, 6b). The tegulum of *Acroterius* gen. nov. has a small tegular projection ventrally (Figs 6B–C, 7B), which is absent in *Kaestneria* (Paquin & Dupérré 2003: figs 1544, 1547; Zhao & Li 2014: figs 47b, 49b) and *Laetesia* (Millidge 1988: fig. 146). The embolic division of *Acroterius* gen. nov. comprises a distal semicircular part of the radix with a serrated margin anteriorly; the embolus and embolic membrane arise from the terminal part of the radix (Figs 6A–C, 7A–B) as in species of *Zhezhoulinyphia* (Irfan *et al*. 2019: figs 4a–b, 5c–e, 6a–b); the embolus and median membrane arise from the lateral (inner) side of the plate in *Kaestneria* and *Laetesia* (Millidge 1988: figs 145, 149; Zhao & Li 2014: figs 47b, 49b) whereas in *Diplostyla* the embolus arises near the base of the cymbium and extends parallel along the full length of cymbium (Ivie 1969: figs 107–108). In *Acroterius* gen. nov. the proximal end of the radix has a radical apophysis (Figs 6A–C, 7A–B) as in species of *Zhezhoulinyphia* (Irfan *et al*. 2019: figs 4a–b, 5c–e, 6a–b), but it is absent in *Diplostyla*, *Kaestneria* and *Laetesia* (Ivie 1969: figs 107–108; Millidge 1988: figs 145, 149; Zhao & Li 2014: figs 47b, 49b).

Etymology

The generic name is an arbitrary combination of letters. Gender masculine.

Description

Measurements. Large sized, male total length 2.66–3.61; female total length 2.66–4.15.

Head. Cephalic region slightly elevated, yellowish to dark brown; fovea, cervical and radial grooves distinct; sternum longer than wide, green to yellowish to dark brown with spine-like hairs; labium wider than long, dark brown; maxillae long, distal end broader with scopulae. Eye region narrow, AER recurved, PER procurved slightly wider.

Legs. All legs with annuli; patella of each leg with two spines; chaetotaxy: 2–2–2–2; Tm I and Tm IV present.

Abdomen. Oval, dorsally with pattern extending down to the base of spinnerets followed by irregular white patches dorso-laterally, and ventrally pale, greenish to brown with or without irregular white patches (Fig. 4A–B).

Male palp (Figs 1, 3, 6, 7, 10–12, 15–16, 24, 26, 30–31). Patella shorter than tibia, dorsally with a long spine; tibia cone shaped, with two retrolateral trichobothria, with some short and long setae on all surfaces; paracymbium highly sclerotized, proximal part simple, somewhat rectangular, distal arm with two to three projections (characterized as lateral, median and ventral projections); cymbium with retrolateral lobe, covered with long thick spines; tegulum with small projection ventrally; distal suprategular apophysis long, basally covered by embolic division. Radix with distal broad semicircular serrated part giving rise to embolus and embolic membrane, at proximal end with small radical apophysis and dorsal projection of embolic plate; dorsal projection of embolic plate long, slightly overlapping cymbium; embolic membrane curved and approachnig distal semicircular part, in prolateral view; embolus stout, short with pointed end.

Epigyne (Figs 8, 13, 17, 21A–D, 22, 27, 29A–D, 32, 34B–E, 36A–D, 37). Anterior wall of epigyne wider than long; posterior margin of anterior wall with a projection on each side; copulatory openings

situated inside the atrium between the anterior wall and posterior median plate, connected with long, semicircular copulatory ducts joined to the spermathecae. Posterior median plate posteriorly with a parmula of variable length with a socket ventrally. Spermathecae slender, present near the posterior median plate. Fertilization ducts long, present laterally on the posterior median plate, extending mesally.

Distribution

China (Yunnan Province, Figs 38–39).

Acroterius absentus gen. et sp. nov.
urn:lsid:zoobank.org:act:4E49A779-9374-40FB-B842-BEECDAD450A4
Figs 1–4, 38

Differential diagnosis

The new species can be distinguished from all other species of *Acroterius* gen. nov. by the absence of radical apophysis (Figs 1A–C, 3A–B).

Etymology

The species name comes from the Latin adjective '*absens*', meaning 'absent', referring to the radical apophysis absent in male palp.

Type material

Holotype

CHINA • ♂; Yunnan Province, Baoshan City, Nankang Yakou (National 320 Road); 24.43717° N, 98.46054° E; alt. 2186 m, 27 Oct. 2003; Guo Tang leg.; HNU-Tang031027.

Description

Male (holotype)

Measurements and colour. Total length: 3.61. Carapace 1.34 long, 1.14 wide, cephalothorax yellowish to light brown; clypeus 0.56 high (Fig. 4A–B); abdomen 2.27 long, 0.89 wide. Eye sizes and interdistances: AME 0.09, ALE 0.12, PME 0.09, PLE 0.11, AME–AME 0.05, PME–PME 0.08, AME–ALE, 0.12, PME–PLE 0.11, ALE–ALE 0.54, PLE–PLE 0.61, ALE–PLE contiguous.

Chelicerae. With five promarginal and five retromarginal teeth, promargin with deep depression and with small teeth except proximal two long; proximal second tooth much longer and almost touching upper margin of fang, distal three teeth small (Fig. 2A–B).

Length of legs. I = 7.48 (1.89, 2.48, 2.03, 1.08), II = 5.9 (1.83, 1.92, 1.32, 0.83), III = 4.11 (1.41, 1.16, 0.97, 0.57), IV = 5.52 (1.72, 1.69, 1.49, 0.62). Leg formula I–II–IV–III.

Palp (Figs 1A–D, 3A–B). Paracymbium highly sclerotized, distal part with three projections (Figs 1B, 3B), lateral projection small, triangular; median projection broad, tongue-shaped and ventral projection thumb-like (Figs 1B, 3B); the distal suprategular apophysis robust with pointed end (Figs 1A–C, 3A–B); radical apophysis absent (Figs 1A–C, 3A–B). Embolus originating from distal serrated part of radix, stout, short with pointed end (Figs 1A–C, 3A–B).

Female

Unknown.

Distribution

China (Yunnan Province, Fig. 38).

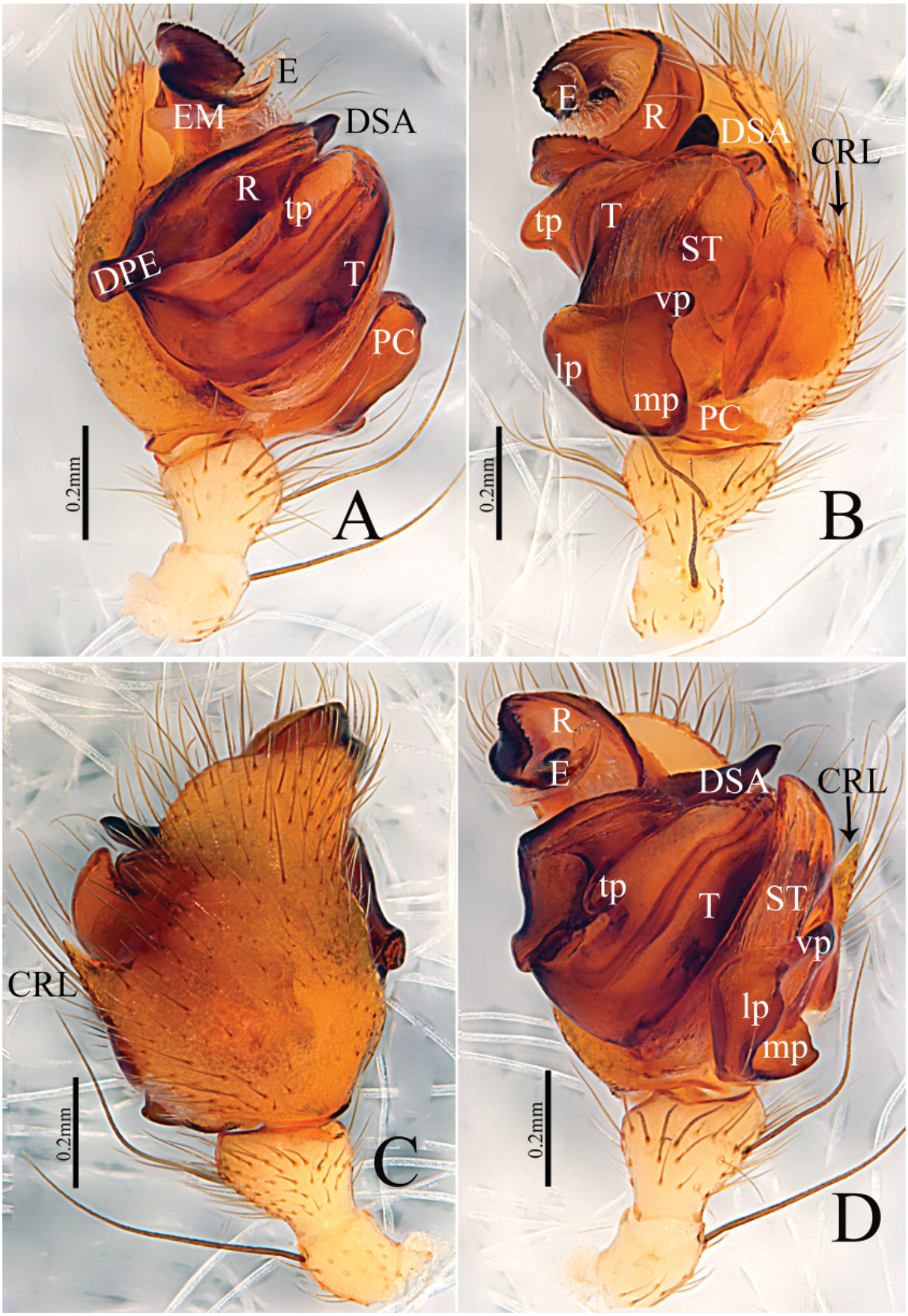


Fig. 1. *Acroterius absentus* gen. et sp. nov., ♂, holotype (HNU-Tang031027), palp. **A**. Prolateral view. **B**. Retrolateral view. **C**. Dorsal view. **D**. Ventral view.

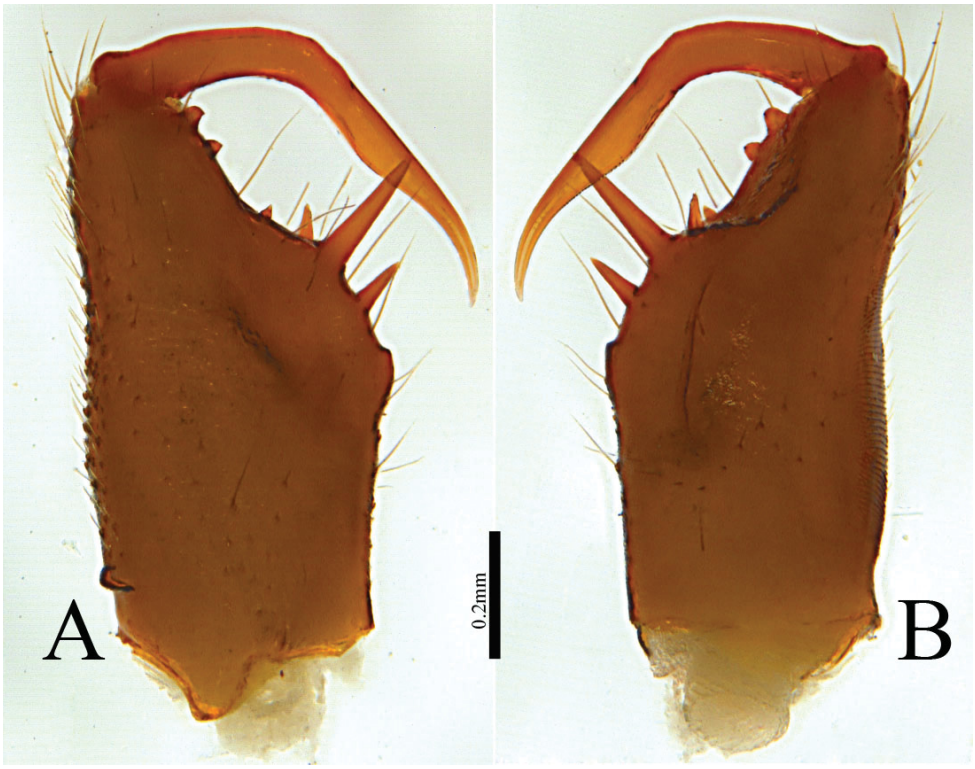


Fig. 2. *Acroterius absentus* gen. et sp. nov., ♂, holotype (HNU-Tang031027). **A**. Chelicera, dorsal view. **B**. Chelicera, ventral view.

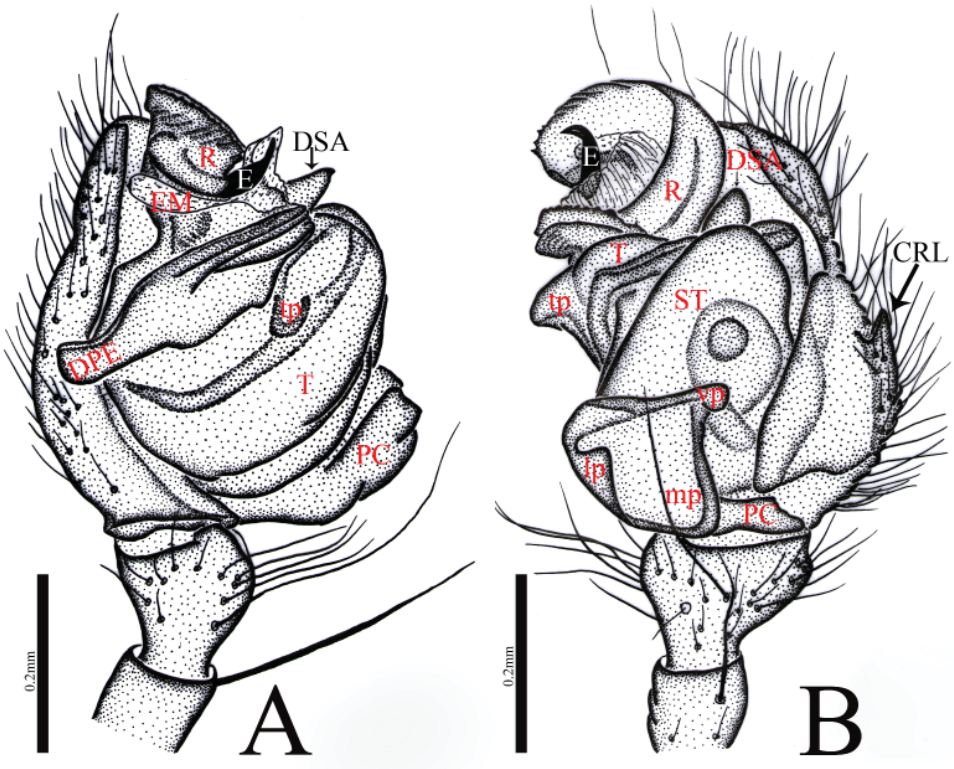


Fig. 3. *Acroterius absentus* gen. et sp. nov., ♂, holotype (HNU-Tang031027), palp. **A**. Prolateral view. **B**. Retrolateral view.

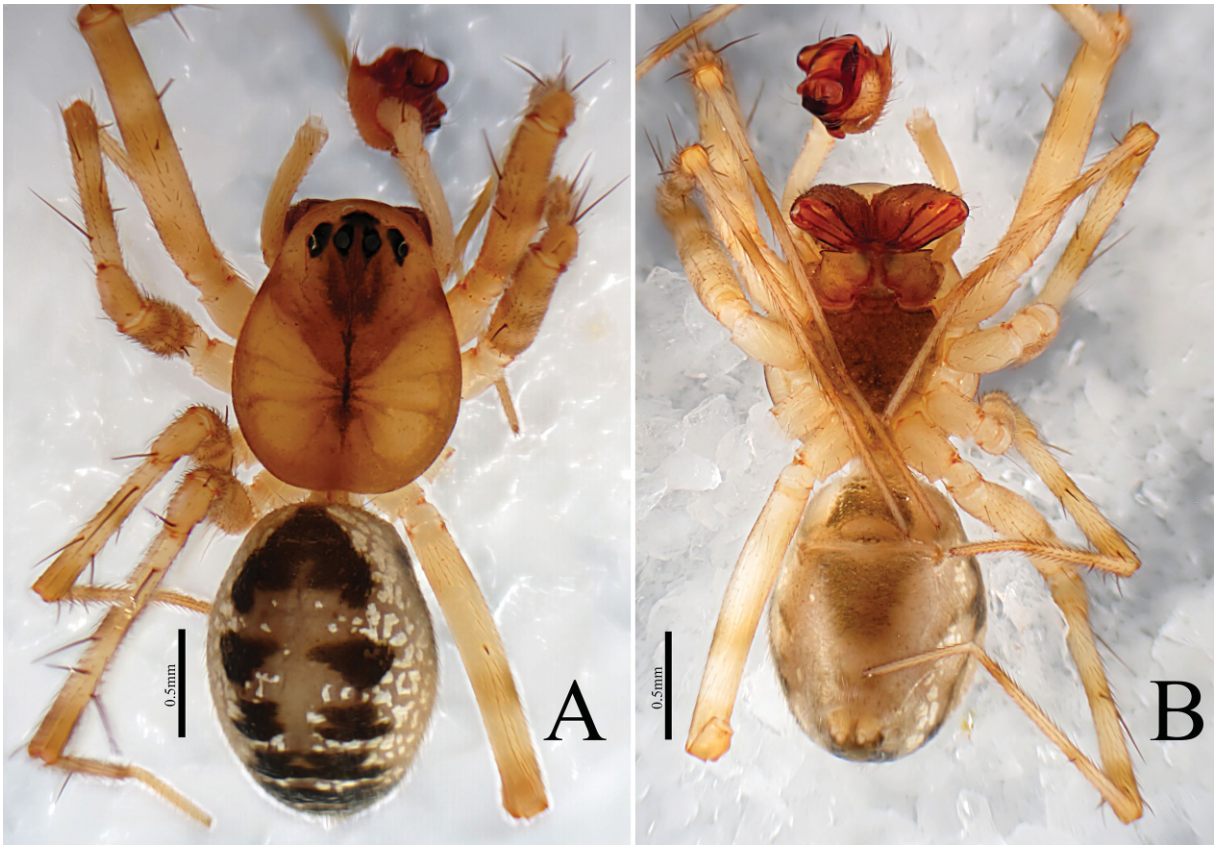


Fig. 4. *Acroterius absentus* gen. et sp. nov., ♂, holotype (HNU-Tang031027). **A**. Habitus, dorsal view. **B**. Habitus, ventral view.

Acroterius brevis gen. et sp. nov.
urn:lsid:zoobank.org:act:F041D21F-15E7-4C22-895A-4AF2565105D4
Figs 5–9, 38

Differential diagnosis

The new species resembles *A. camur* gen. et sp. nov. in distal arm of paracymbium with three projection (Figs 6B, 7B, 10B, 11B), but can be distinguished from *A. camur* gen. et sp. nov. and all other *Acroterius* gen. nov. species by the ventral view, radical apophysis triangular and reaches to base of embolus (Figs 6D, 7A), but thumb-shaped and extends above embolus in *A. camur* gen. et sp. nov. (Figs 10D 12A). Spermathecae L-shaped, present near posterior median plate (Fig. 8A–B), but hook-shaped and separated by one and half-length of spermathecae in *A. camur* gen. et sp. nov. (Fig. 13A–B). Parmula 0.47 long (Fig. 8D), but 0.21 long in *A. camur* gen. et sp. nov. (Fig. 13D).

Etymology

The species name comes from the Latin adjective '*brevis*' meaning 'short', referring to the short radical apophysis in male palp.

Type material

Holotype

CHINA • ♂; Yunnan Province, Fugong County, Lumadeng Township, Yaping Village, Shibali; 27.16515° N, 98.77975° E; alt. 2527 m; 1 May 2004; Guang-xu Peng leg.; HNU-20040501–1.

Paratypes (2 ♀♀)

CHINA • 1 ♀, same collection data as for holotype; HNU-20040501–2 • 1 ♀; Yunnan Province, Fugong County, Yaping, 3 km to Shibali; 27.1775° N, 98.7550° E; alt. 2527 m; 4 May 2004; Heng-mei Yan and Guang-xu Peng leg.; HNU-20040504.

Description

Male (holotype)

Measurements and colour. Total length: 2.66. Carapace 1.40 long, 1.14 wide, cephalothorax dark brown; clypeus 0.56 high (Fig. 9A–B); abdomen 2.03 long, 1.60 wide. Eye sizes and interdistances: AME 0.08, ALE 0.09, PME 0.08, PLE 0.07, AME–AME 0.03, PME–PME 0.06, AME–ALE 0.08, PME–PLE 0.07, ALE–ALE 0.45, PLE–PLE 0.49.

Chelicerae. With four promarginal and four retromarginal teeth; proximal teeth of reteromargin much longer than distal one.

Length of legs. I = 4.89 (1.63, 1.47, 1.16, 0.63), II = 3.74 (1.11, 1.31, 0.83, 0.49), III = 3.17 (0.88, 0.96, 0.82, 0.51), IV = 4.35 (1.26, 1.26, 1.17, 0.66). Leg formula I–IV–II–III.

Palp (Figs 6A–D, 7A–B). Paracymbium highly sclerotized, distal arm with three projections; lateral projection large, curved, beak-shaped; median projection tongue-shaped; ventral projection sclerotized, thumb-shaped with blunt end, overlapping subtegulum (Figs 6B, 7B); distal suprategular apophysis long, robust with distal pointed end (in ventral view) (Figs 6B–D, 7B). Radix with small radical apophysis with pointed end (Figs 6A–D, 7A–B); radical apophysis somewhat triangular with blunt end (Figs 6A, 7A). Embolus stout, short with pointed end (Figs 6A–D, 7A–B).

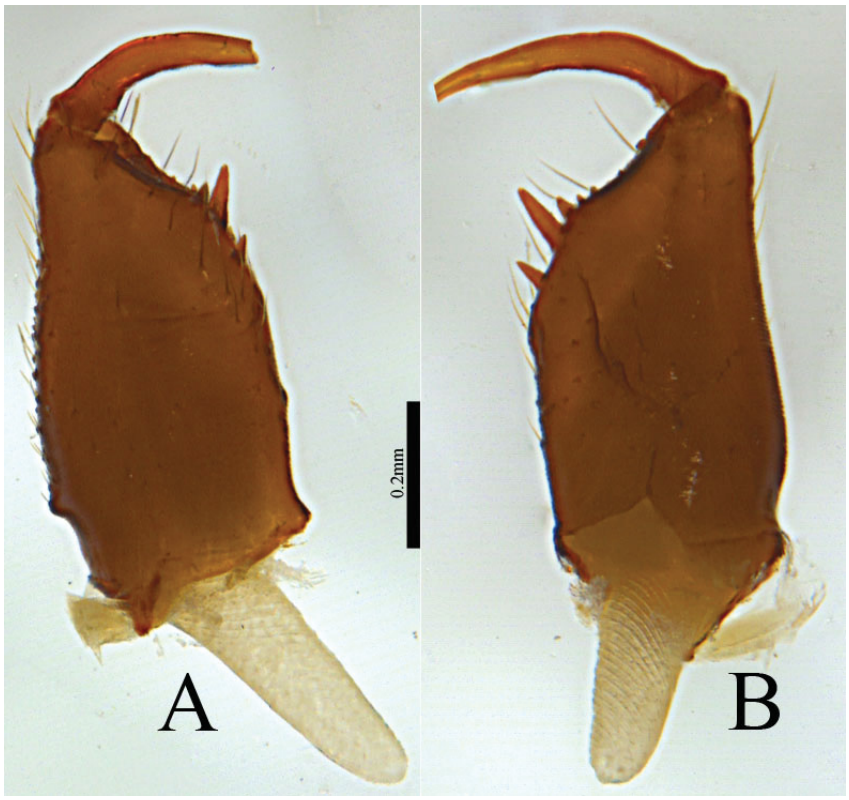


Fig. 5. *Acroterius brevis* gen. et sp. nov., ♂, holotype (HNU-20040501–1). **A**. Chelicera, dorsal view. **B**. Chelicera, ventral view.

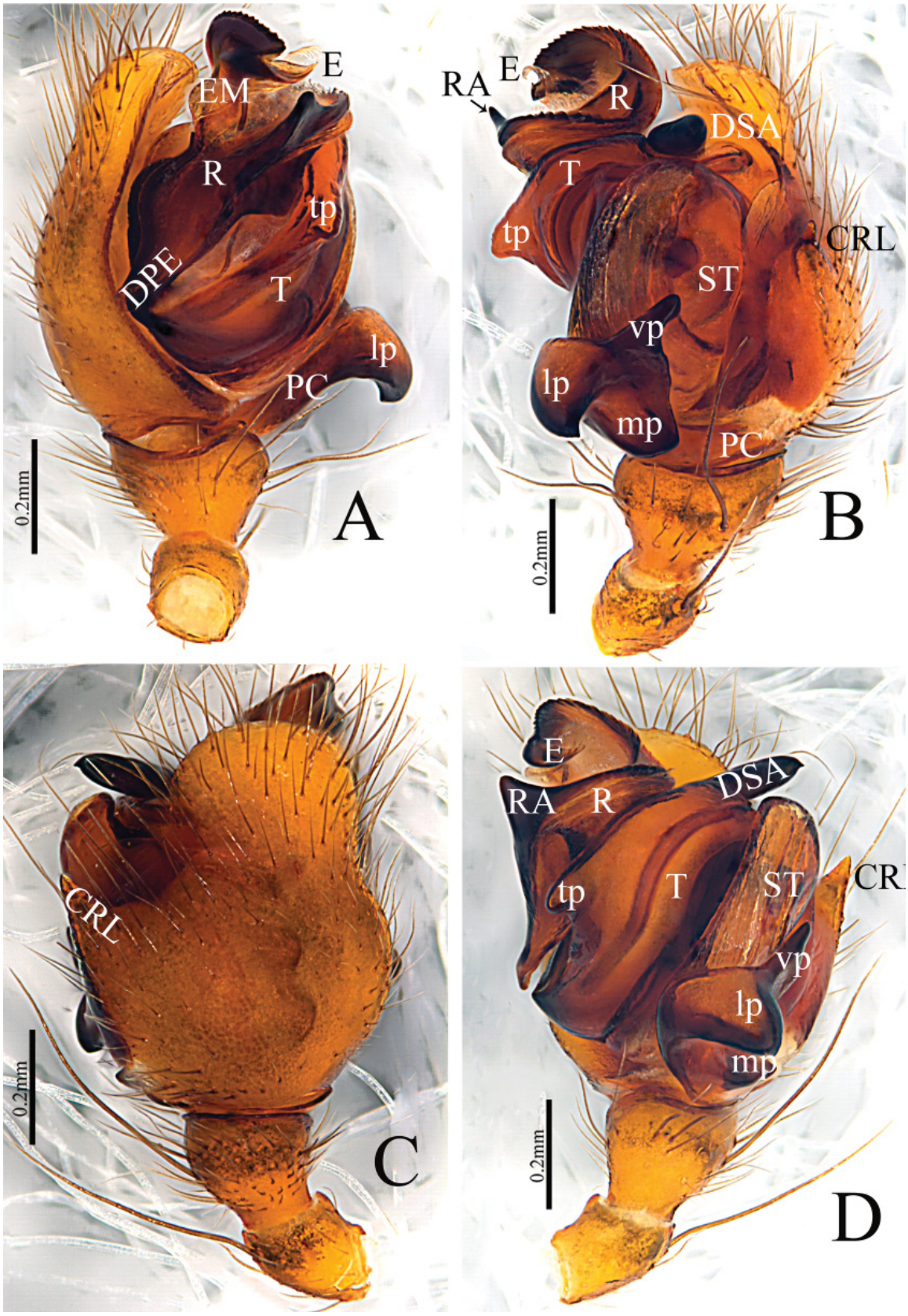


Fig. 6. *Acroterius brevis* gen. et sp. nov., ♂, holotype (HNU-20040501–1), palp. **A**. Prolateral view. **B**. Retrolateral view. **C**. Dorsal view. **D**. Ventral view.

Female (HNU-20040501–2, Fig. 9C–D)

Measurements and colour. Total length: 2.97. Carapace 0.94 long, 0.83 wide, cephalothorax dark brown; fovea, cervical and radial grooves distinct; clypeus 0.27 high (Fig. 9C–D); abdomen 1.8 long, 1.05 wide. Eye sizes and interdistances: AME 0.06, ALE 0.09, PME 0.08, PLE 0.07, AME–AME 0.06, PME–PME 0.07, AME–ALE 0.07, PME–PLE 0.07, ALE–ALE 0.41, PLE–PLE 0.45, ALE–PLE contiguous.

Length of legs. I = 4.40 (1.23, 1.39, 1.03, 0.75), II = 3.92 (1.15, 1.28, 0.91, 0.58), III = 3.07 (0.94, 0.93, 0.71, 0.49), IV = 4.11 (1.13, 1.35, 0.96, 0.67). Leg formula I–IV–II–III. Tm I and Tm IV present. Patella of each leg with two spines. Tibial dorsal spine formula: 2–2–2–2.

Epigyne. Parmula 0.47 long, 0.41 wide at base (Fig. 8A–C); the posterior margin of the anterior wall of epigynal plate with a beak-shaped projection on each side (Fig. 8A–C). Spermathecae slender, L-shaped (Fig. 8D).

Distribution

China (Yunnan Province, Fig. 38).

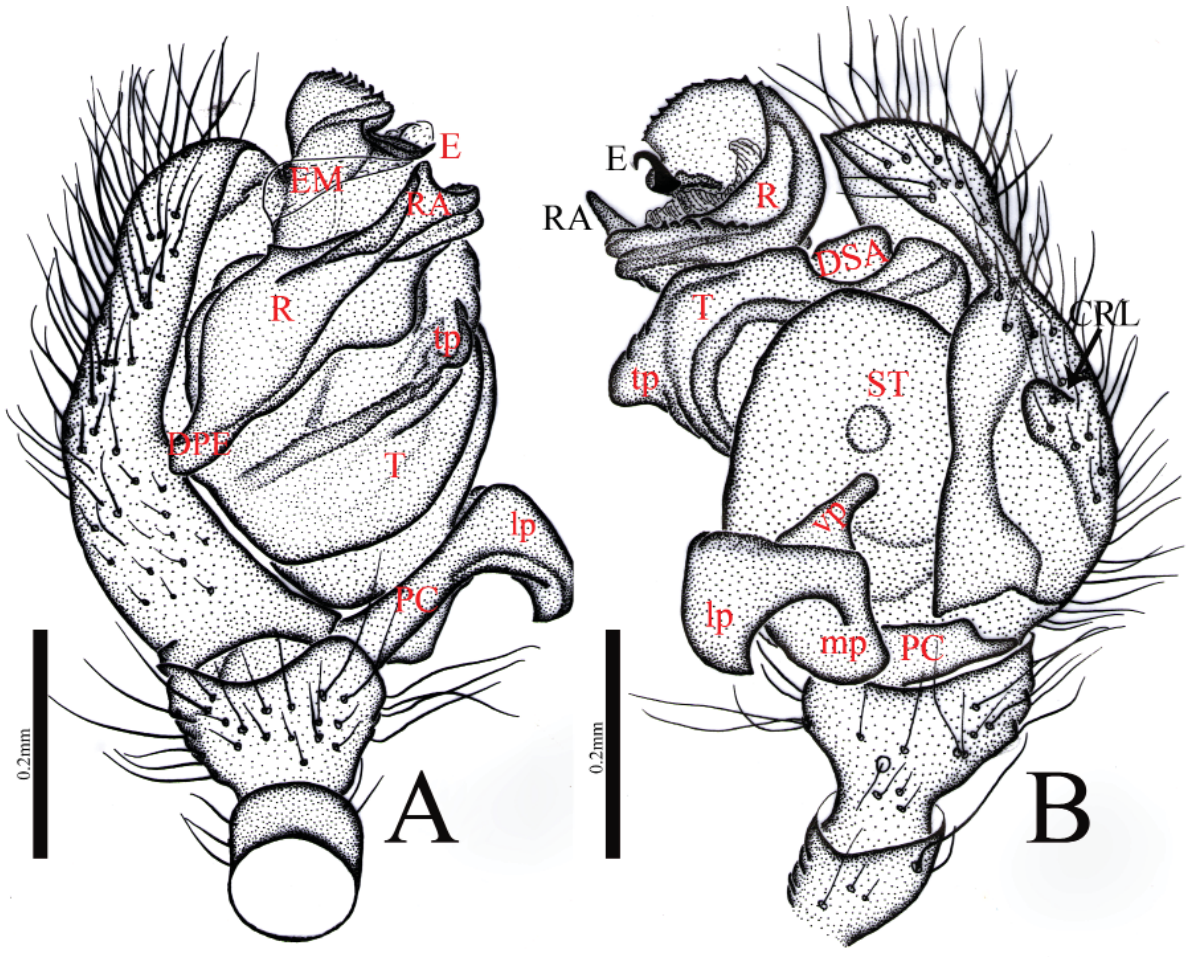


Fig. 7. *Acroterius brevis* gen. et sp. nov., ♂, holotype (HNU-20040501–1), palp. **A**. Prolateral view. **B**. Retrolateral view.

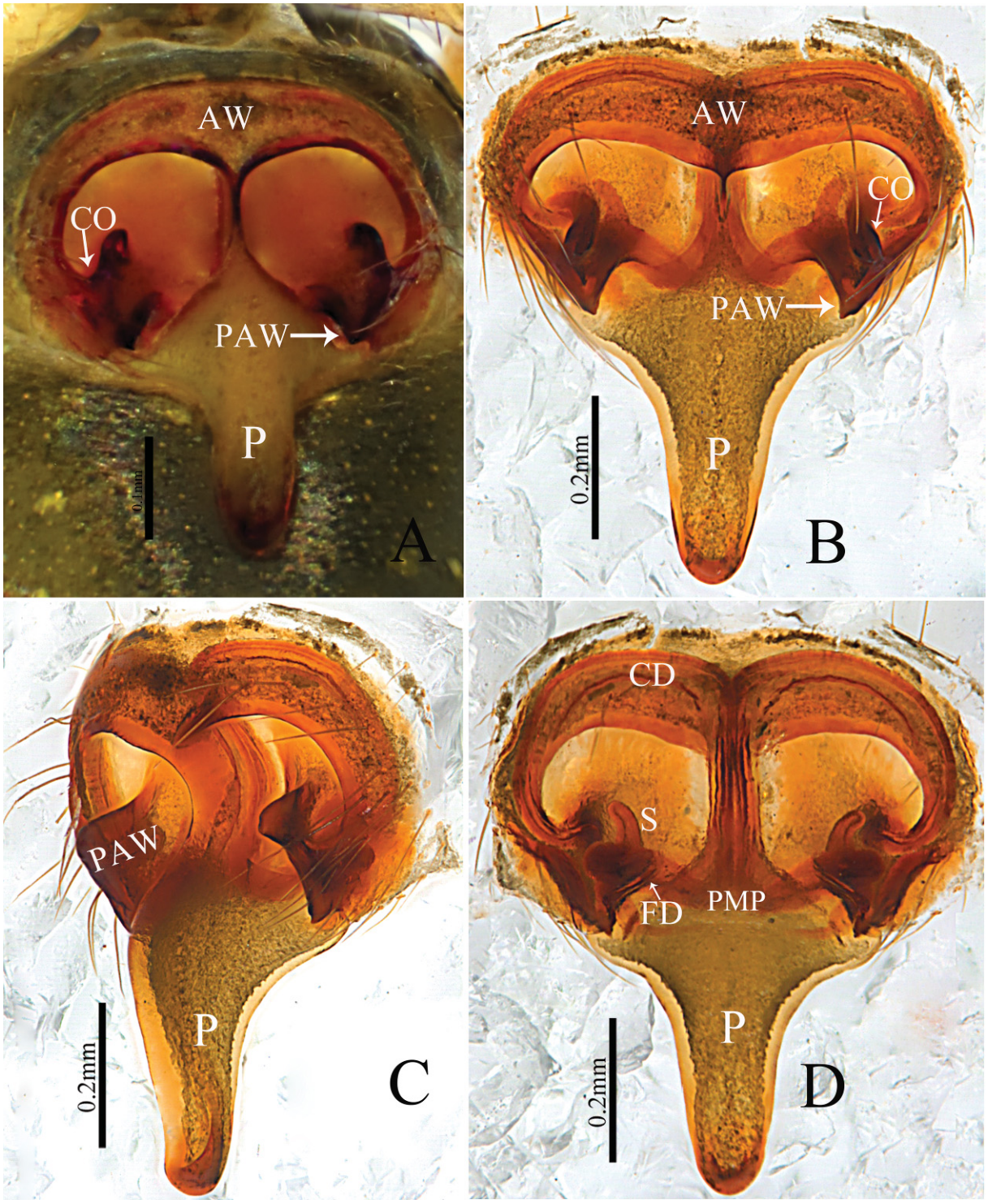


Fig. 8. *Acroterius brevis* gen. et sp. nov., ♀, paratype (HNU-20040501–2). **A–B**. Epigyne, ventral view. **C**. Epigyne, lateral view. **D**. Vulva, dorsal view.

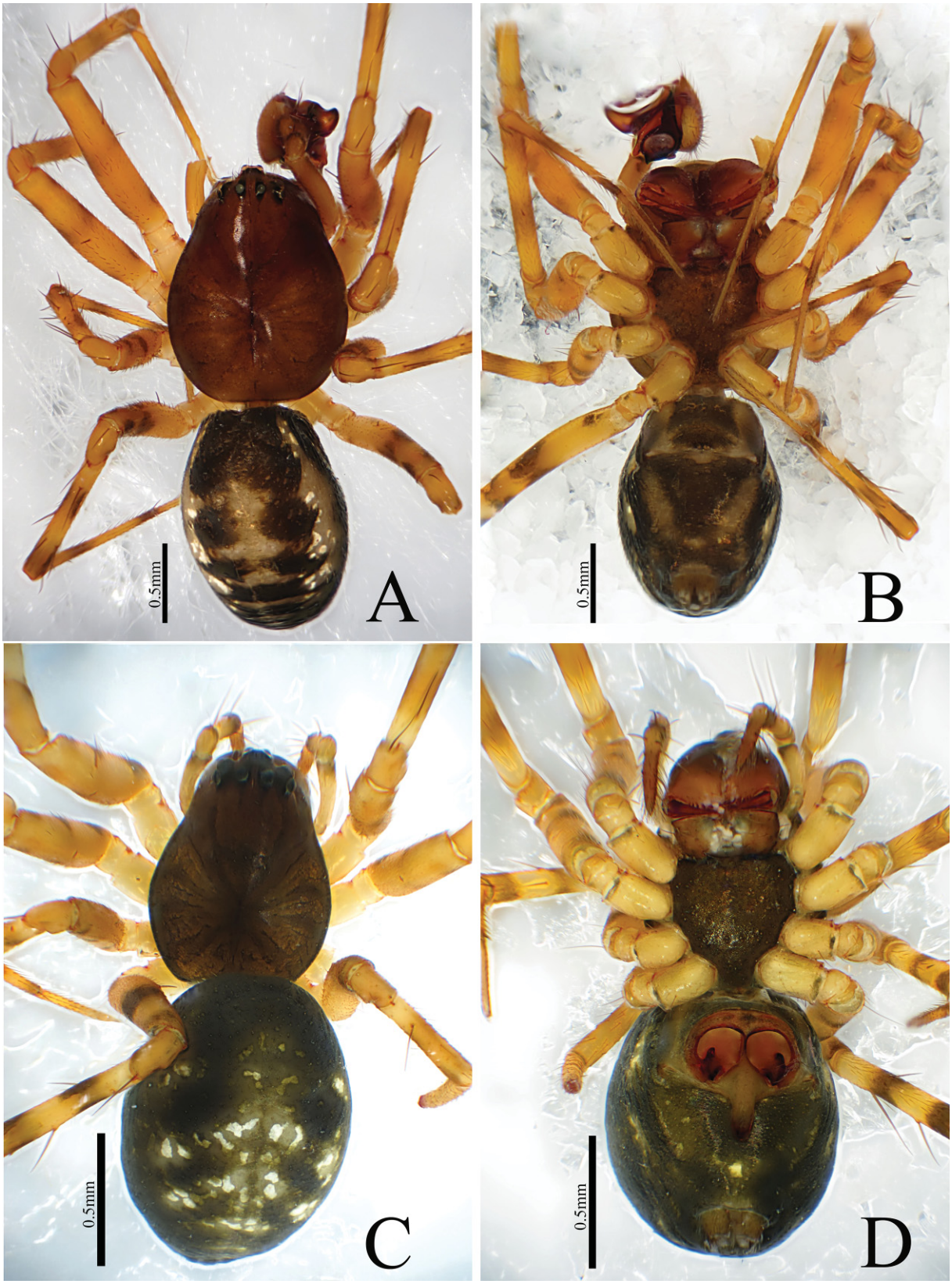


Fig. 9. *Acroterius brevis* gen. et sp. nov. **A–B**. ♂, holotype (HNU-20040501–1). **C–D**. ♀, paratype (HNU-20040501–2). **A**, **C**. Habitus, dorsal view. **B**, **D**. Habitus, ventral view.

Acroterius camur gen. et sp. nov.
urn:lsid:zoobank.org:act:B86B9669-F527-44A7-BAF0-40B777161195
Figs 10–14, 38

Differential diagnosis

The new species resembles *Acroterius brevis* gen. et sp. nov. (Figs 6A–D, 7A–B) in having similar embolus in the male palp and a short parmula in the epigyne (Figs 10A–D, 11A–D, 12A–B) as in *A. inversus* gen. et sp. nov. and *A. longidentatus* gen. et sp. nov.; it can be distinguished by the distal arm of paracymbium with three projections and similar embolus, the radical thumb-shaped apophysis extends above the embolus in ventral view (Figs 10D, 12A), but is triangular and reaches to the base of the embolus in *A. brevis* gen. et sp. nov. (Figs 6D, 7A). Spermathecae hook-shaped, separated by one and half-length of spermathecae (Fig. 13A–B), but L-shaped and present near the posterior median plate in *A. brevis* gen. et sp. nov. (Fig. 8A–D). Parmula somewhat triangular (Fig. 13A–D), but tongue-shaped in *A. brevis* gen. et sp. nov. (Fig. 8A–C), anteriorly rectangular and posteriorly spoon-shaped in *A. inversus* gen. et sp. nov. (Fig. 22A–C), finger-shaped in *A. longidentatus* gen. et sp. nov. (Fig. 29A–C).

Etymology

The species name comes from the Latin adjective '*camur*', meaning 'curved' and referring to the curved distal suprategular apophysis in the male palp.

Type material

Holotype

CHINA • 1 ♂; Yunnan Province, Gongshan County, Bingzhongluo Township, Niwaluo He, just below Nujiang Road; 28.02499° N, 98.62564° E; alt. 1610 m; 8 Oct. 2002; D.H. Kavanaugh, P.E. Marek and Hong-bin Liang leg.; HNU-DHK–2002–038.

Paratypes (3 ♂♂, 23 ♀♀)

CHINA – **Yunnan Province** • 2 ♂♂, 17 ♀♀; same collection data as for holotype; HNU-DHK–2002–038 • 1 ♀; Cikai Township, Dabadi, North bank of Pula river; 27.78333° N, 98.51667° E; alt. 3030 m; 28 Sep. 2002; Heng–mei Yan leg.; HNU-Yan020928 • 1 ♀; Cikai Township, Dabadi to Gongshan, along Pula river downward; 27.7945833° N, 98.5071389° E; alt. 3025–3990 m; 4 Oct. 2002; Heng–mei Yan leg.; HNU-Yan021004 • 1 ♀; Lushui County, Waluoyaku; 25.78333° N, 98.78333° E; alt. 1070 m; 14 Oct. 2002; Heng–mei Yan leg.; HNU-Yan021014 • 2 ♀♀; Tengchong County, Wuhe Township, Tongjia 12-dauzhuang Village, Longchuanjiang River (Longjiang bridge); 24.89284° N, 98.67439° E; alt. 1210 m; 24 May 2005; Heng-mei Yan and Ke-ji Guo leg.; HNU-GKJ020 • 1 ♂; Nujiang Prefecture, Nujiang State Nature Reserve, No. 12 bridge Camp area, 16.3 km W of Gongshan; 27.71503° N, 98.50244° E; alt. 2775 m; 15–19 Jul. 2000; Heng-mei Yan, D.H. Kavanaugh, Charles Griswold, Hong-bin Liang, Darrell Ubick and Da-zhi Dong leg.; HNU-00–QD • 1 ♀; Nujiang Prefecture, Nujiang State Nature Reserve, Dulong/Gongshan Yakou area, 21 km W of Gongshan; 27.69655° N, 98.45389° E; alt. 3300–3680 m; 16–17 Jul. 2000; Heng-mei Yan, D.H. Kavanaugh, Charles Griswold, Hong-bin Liang, Darrell Ubick and Da-zhi Dong leg.; HNU-00–BY.

Description

Male (holotype)

Measurements and colour. Total length: 2.95. Carapace 1.41 long, 1.14 wide, cephalothorax brown; clypeus 0.56 high (Fig. 14A–B); abdomen 1.54 long, 1.02 wide (Fig. 14A–B). Eye sizes and interdistances: AME 0.06, ALE 0.07, PME 0.07, PLE 0.07, AME–AME 0.04, PME–PME 0.06, AME–ALE 0.08, PME–PLE 0.07, ALE–ALE 0.42, PLE–PLE 0.46.

Chelicerae. With five promarginal and five retromarginal teeth (Fig. 14B); proximal two teeth of reteromargin much longer than distal one.

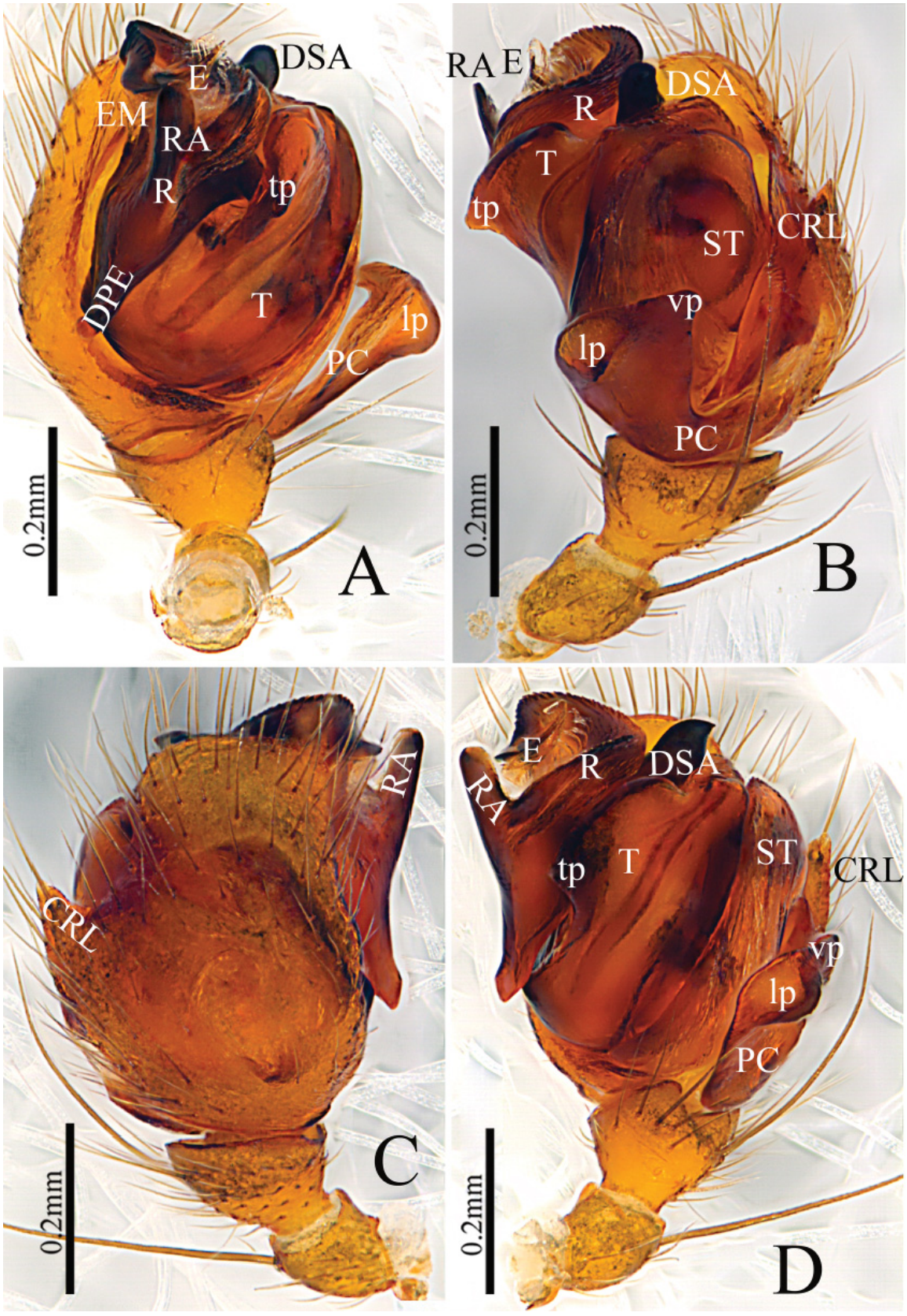


Fig. 10. *Acroterius camur* gen. et sp. nov., ♂, holotype (HNU-DHK–2002–038), palp. **A**. Prolateral view. **B**. Retrolateral view. **C**. Dorsal view. **D**. Ventral view.

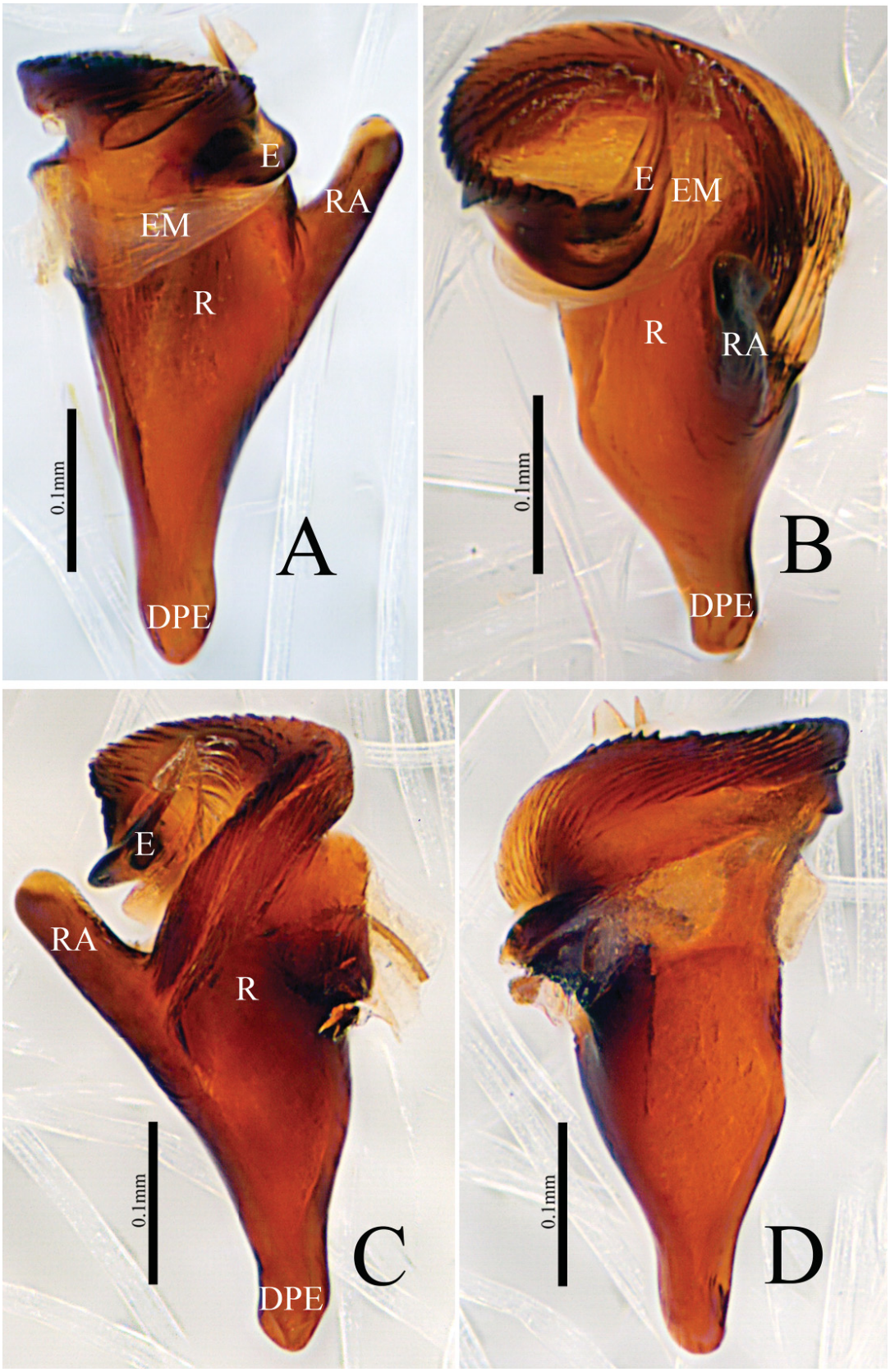


Fig. 11. *Acroterius camur* gen. et sp. nov., ♂, holotype (HNU-DHK–2002–038). **A–B**. Embolic division, ventral view. **C**. Embolic division, prolateral view. **D**. Embolic division, dorsal view.

Length of legs. I = 6.11 (1.65, 1.92, 1.59, 0.95), II = 5.43 (1.62, 1.58, 1.38, 0.85), III = 4.13 (1.19, 1.26, 1.05, 0.63), IV = 5.61 (1.58, 1.79, 1.32, 0.92). Leg formula I–IV–II–III.

Palp (Figs 10A–D, 11A–D, 12A–B). Paracymbium highly sclerotized, distal arm with two projections; lateral projection small, somewhat triangular; ventral projection small with blunt end (Figs 10B, 12B); distal suprategular apophysis long, robust, distal part slightly curved with pointed end (Figs 10A–C, 12A–B). Radical apophysis thumb-shaped with blunt end extending above the embolus in ventral view (Figs 10A–D, 11A–D, 12A–B). Embolus stout, short with pointed end (Figs 10A–D, 11A–D, 12A–B).

Female (HNU-DHK–2002–038)

Measurements and colour. Total length: 2.66. Carapace 1.17 long, 1.01 wide, cephalothorax brown; clypeus 0.24 high (Fig. 14C–D); abdomen 1.49 long, 1.21 wide (Fig. 14C–D). Eye sizes and interdistances: AME 0.05, ALE 0.09, PME 0.08, PLE 0.07, AME–AME 0.04, PME–PME 0.06, AME–ALE 0.06, PME–PLE 0.05, ALE–ALE 0.41, PLE–PLE 0.46, ALE–PLE contiguous.

Chelicerae. With five promarginal and six retromarginal teeth; proximal teeth of reteromargin are much longer than distal one.

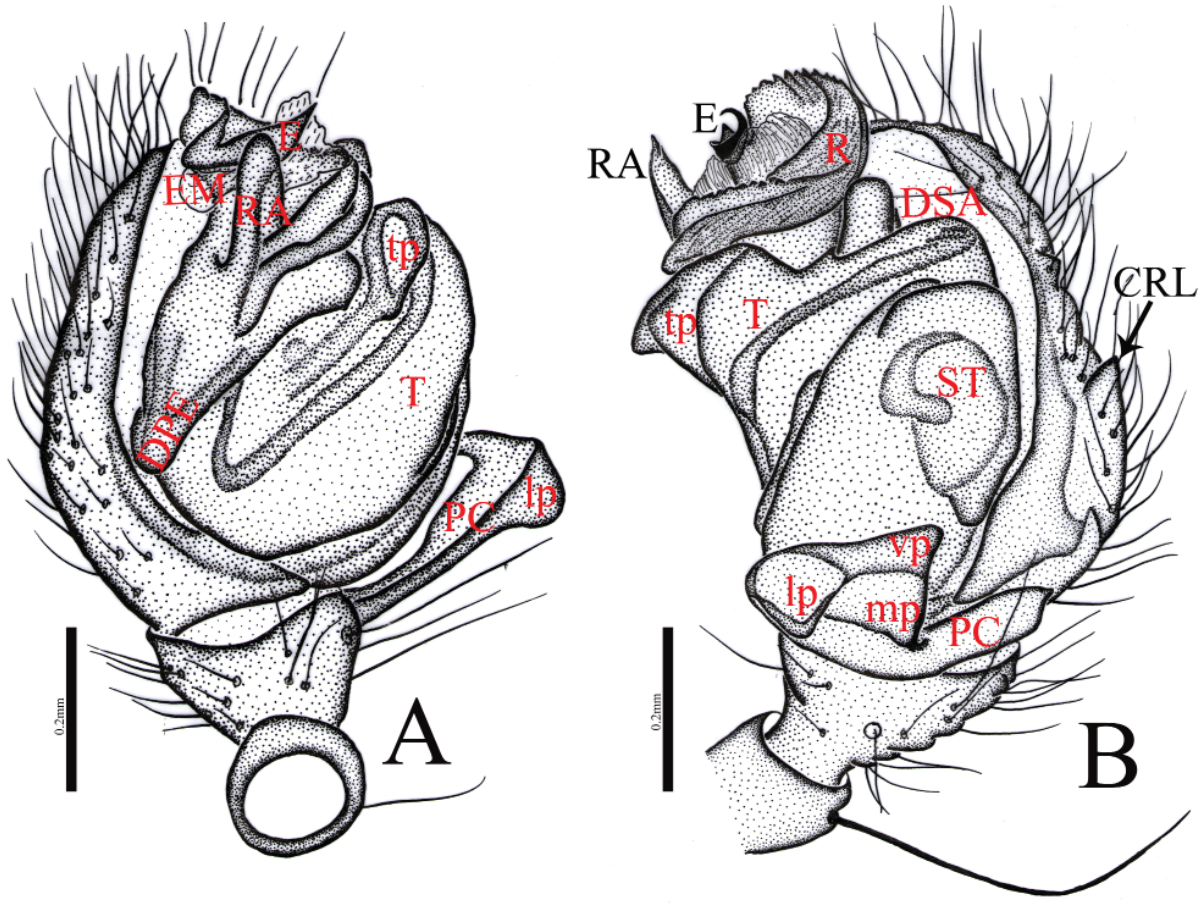


Fig. 12. *Acroterius camur* gen. et sp. nov., ♂, holotype (HNU-DHK–2002–038), palp. **A**. Prolateral view. **B**. Retrolateral view.

Length of legs. I = 4.73 (1.31, 1.54, 1.06, 0.82), II = 4.13 (1.28, 1.23, 1, 0.62), III = 3.45 (0.99, 1.07, 0.91, 0.48), IV = 4.41 (1.29, 1.32, 1.02, 0.78). Leg formula I–IV–II–III.

Epigyne. Parmula 0.21 long, 0.41 wide at base (Fig. 13A–B); the posterior margin of anterior wall of epigynal plate with a projection horizontal to anterior wall of epigynal plate margin in orientation (Fig. 13A–B). Spermathecae slender, distal part hook-shaped (Fig. 13D).

Distribution

China (Yunnan Province, Fig. 38).

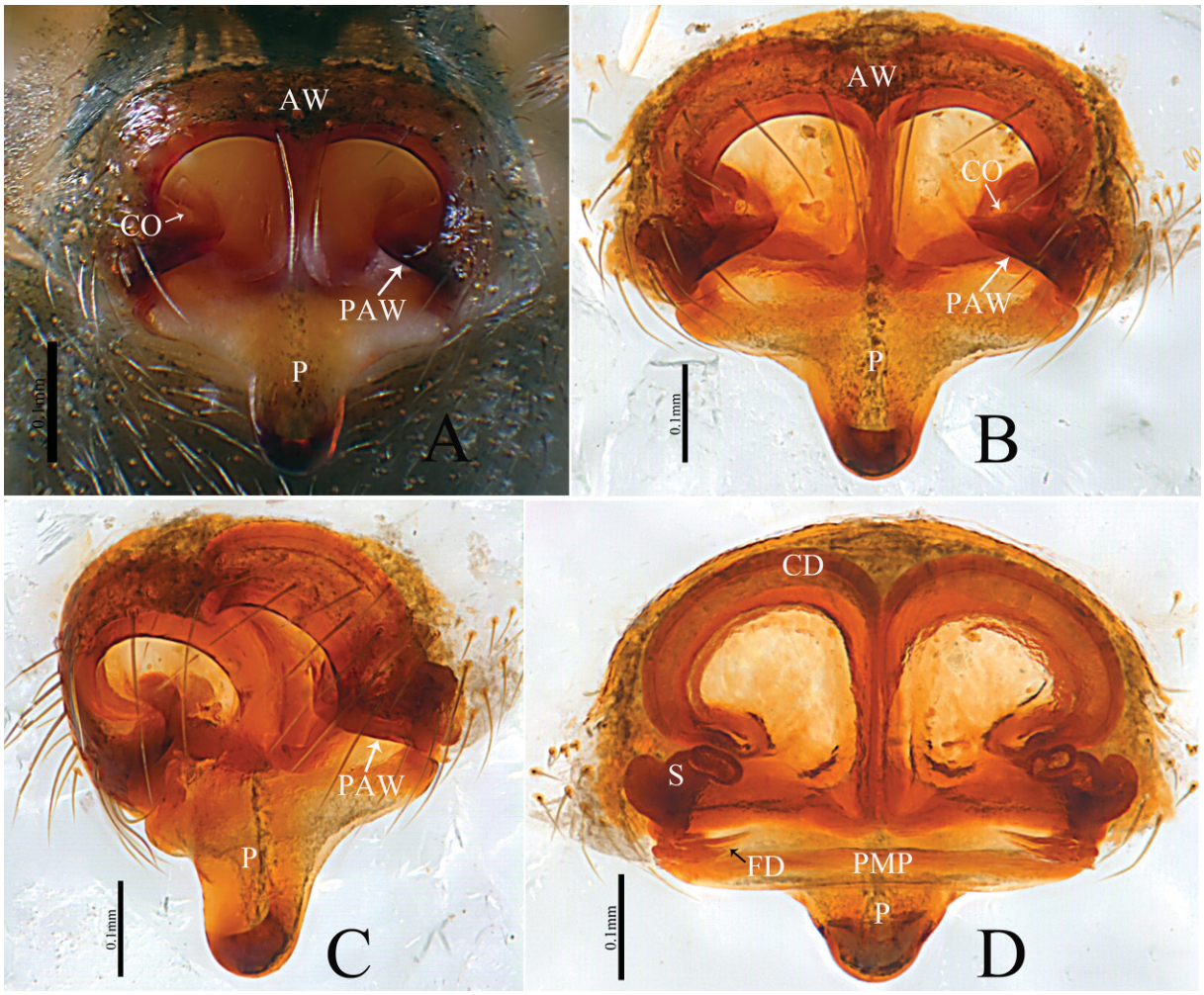


Fig. 13. *Acroterius camur* gen. et sp. nov., ♀, paratype (HNU-DHK–2002–038). **A–B**. Epigyne, ventral view. **C**. Epigyne, lateral view. **D**. Vulva, dorsal view.

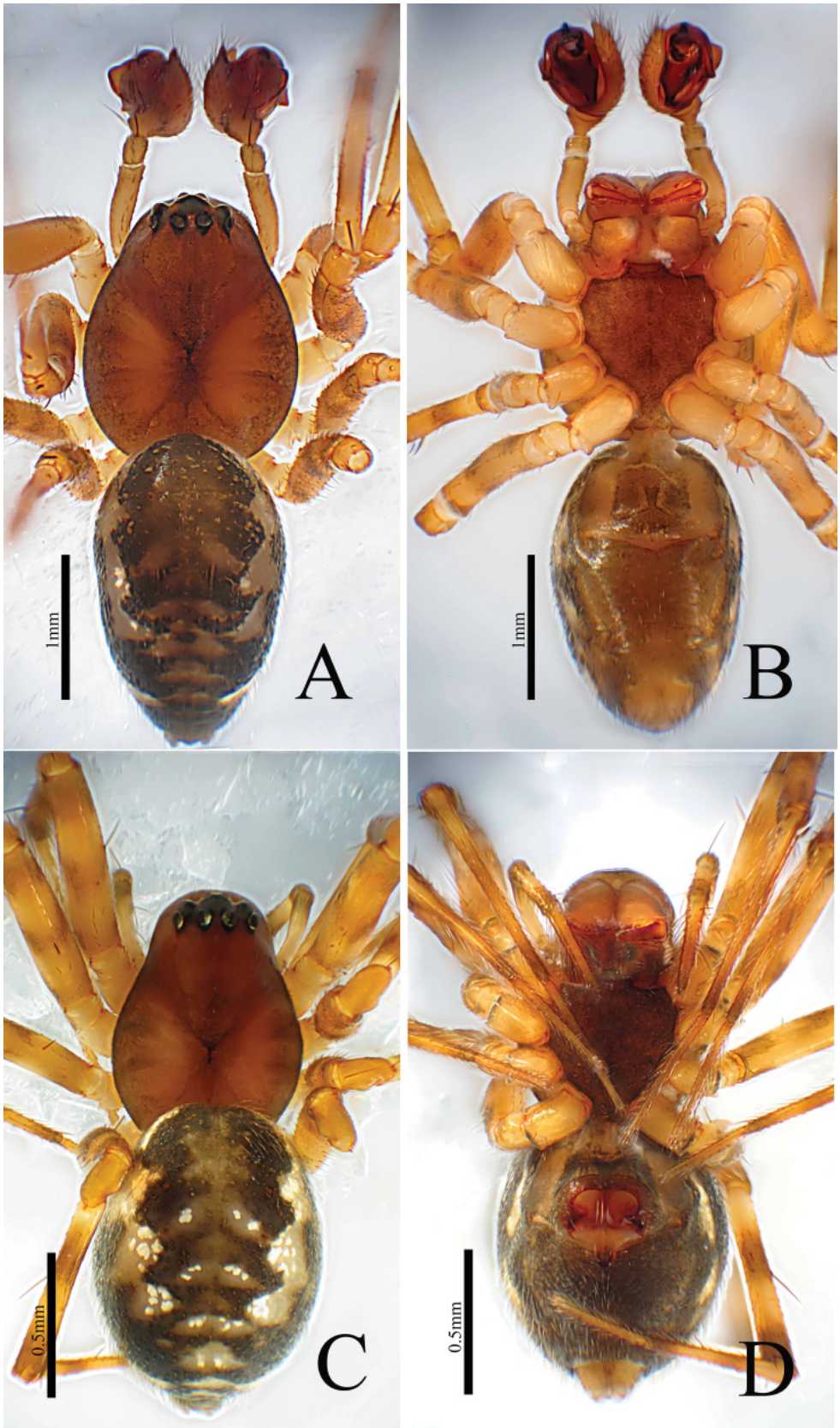


Fig. 14. *Acroterius camur* gen. et sp. nov. **A–B**. ♂, holotype (HNU-DHK–2002–038). **C–D**. ♀, paratype (HNU-DHK–2002–038). **A**, **C**. Habitus, dorsal view. **B**, **D**. Habitus, ventral view.

Acroterius circinatus gen. et sp. nov.
urn:lsid:zoobank.org:act:826A098B-3362-42BB-95F7-3E3E0C763F04
Figs 15–18, 39

Differential diagnosis

The new species resembles *Acroterius brevis* gen. et sp. nov. (Figs 6A–D, 7A–B, 8A–D) in having a long distal suprategular apophysis and radix with broad circular serrated part, which give rise to the embolus at its distal end in the male palp, parmula with socket on ventral surface and copulatory ducts forming a semicircular loop before joining the spermathecae in epigyne (Figs 15A–D, 16A–B, 17A–D); it can be distinguished by the median projection of the distal arm of paracymbium wider than long (Figs 15B, 16B), but longer than wide in *A. brevis* gen. et sp. nov. (Figs 6B, 7B). The embolus basally broad, disk-shaped, robust and almost touches the semicircular serrated part of the radix (Figs 15A–D, 16A–B), but stout, thread–like and pointing away from the semicircular serrated part of the radix in *A. brevis* gen. et sp. nov. (Figs 6A–D, 7A–B). Radical apophysis thumb-shaped, curved (Figs 15B, 16B), but somewhat triangular in *A. brevis* gen. et sp. nov. (Figs 6B, 7B). The spermathecae situated dorso–mesally (Fig. 17D), but situated dorso–laterally in *A. brevis* gen. et sp. nov. (Fig. 8D).

Etymology

The species name comes from the Latin adjective '*circinatus*', meaning 'circular' and referring to the circinate-shaped copulatory ducts in the ventral view of the epigyne.

Type material

Holotype

CHINA • ♂; Yunnan Province, Longyang County, Bawan Township, Sancha He, Luoshuidong area; 24.92597° N, 98.75806° E; alt. 2300 m; 3 Jun. 2005; Charles Griswold leg.; HNU-CGY137.

Paratypes (9 ♂♂, 5 ♀♀)

CHINA – **Yunnan Province, Longyang County** • 7 ♂♂; same collection data as for holotype; HNU-CGY137 • 2 ♂♂; Bawan Township, Sanchahe, Luoshuidong area; 24.94755° N, 98.75564° E; alt. 2300 m; 3 Jun. 2005; Heng-mei Yan, Ke-ji Guo and Hong-bin Liang leg.; HNU-GKJ039 • 3 ♀♀; Bawan Dist., Nankang Yakou; 24.83178° N, 98.76472° E; alt. 2180 m; 25 May 2005; Charles Griswold and D.H. Kavanaugh leg.; HNU-2005–029A • 2 ♀♀; Bawan Township, Dasheyao Yakou; 24.93167° N, 98.75368° E; alt. 2488 m; on top of mountain; 30 May 2005; Heng-mei Yan and Ke-ji Guo leg.; HNU-CGY32.

Description

Male (holotype)

Measurements and colour. Total length: 3.25. Carapace 1.56 long, 1.24 wide, cephalic region strongly elevated, yellowish; fovea, cervical and radial grooves distinct; clypeus 0.41 high (Figs 18A–C); abdomen 1.69 long, 1.21 wide (Fig. 18A–C). Eye sizes and interdistances: AME 0.08, ALE 0.09, PME 0.08, PLE 0.09, AME–AME 0.04, PME–PME 0.05, AME–ALE 0.9, PME–PLE 0.12, ALE–ALE 0.44, PLE–PLE 0.48, ALE–PLE contiguous.

Chelicerae. With five promarginal and five retromarginal teeth.

Length of legs. I = 6.57 (1.71, 2.03, 1.88, 0.95), II = 5.78 (1.62, 1.81, 1.51, 0.84), III = 4.43 (1.29, 1.33, 1.13, 0.68), IV = 5.63 (1.64, 1.68, 1.49, 0.82). Leg formula I–II–IV–III.

Palp (Figs 15A–D, 16A–B). Paracymbium highly sclerotized, distal part with three projections, lateral projection large, slightly curved, tongue-shaped with blunt end in ventral view; median projection

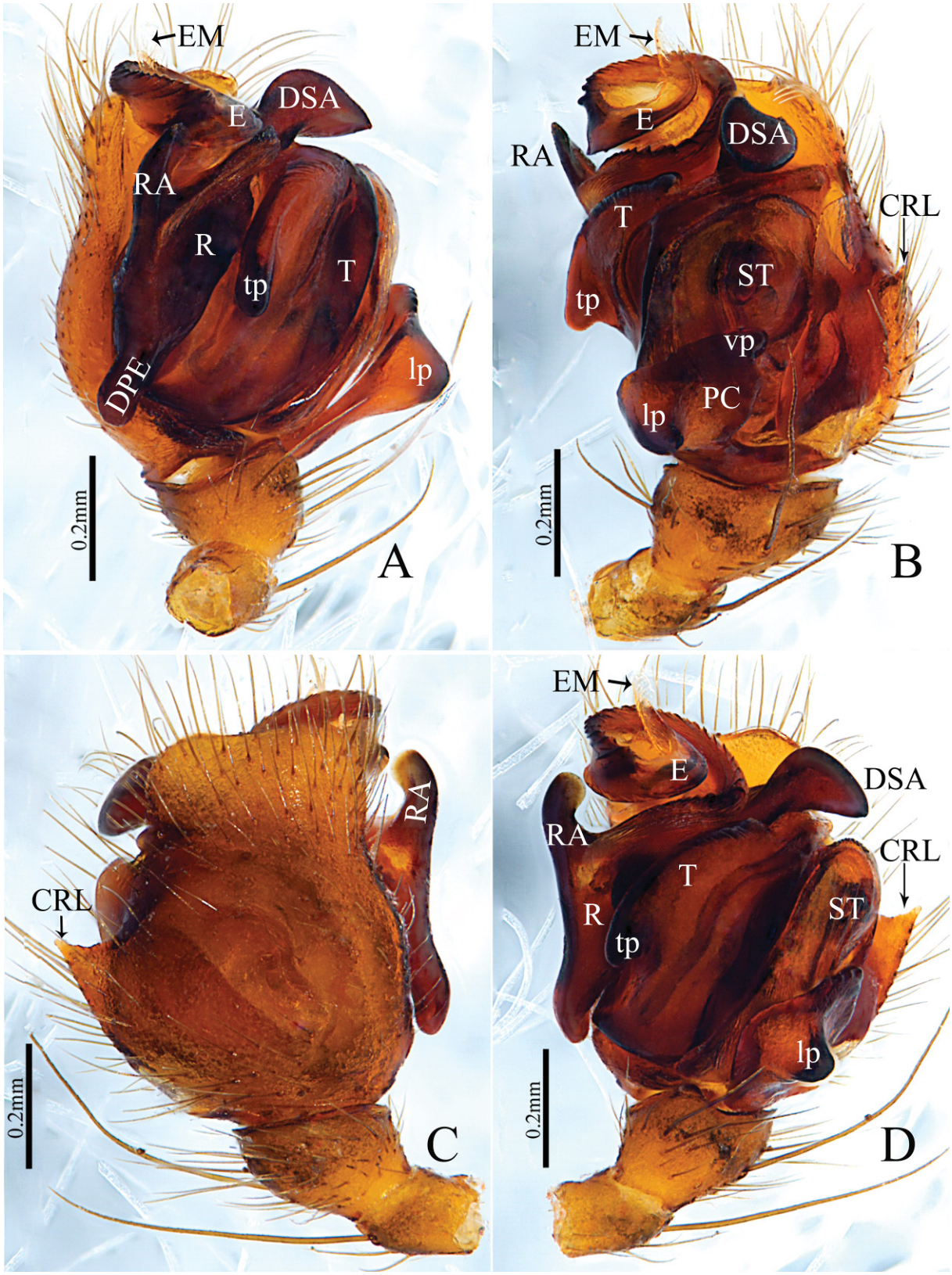


Fig. 15. *Acroterius circinatus* gen. et sp. nov., ♂, holotype (HNU-CGY137), palp. **A**. Prolateral view. **B**. Retrolateral view. **C**. Dorsal view. **D**. Ventral view.

wider than long; ventral projection sclerotized, small with blunt end, strongly overlapping subtegulum (Figs 15B, 16B); distal suprategular apophysis long, distal part curved and pointing towards tegulum (Figs 15A–D, 16A–B). Radical apophysis slightly curved with blunt end, protruding upward above base of embolus (Figs 15A–D, 16A–B); embolic membrane protruding above distal semicircular part, in prolateral view (Figs 15A, 16A). Embolus highly sclerotized, robust, disk-shaped, almost touching semicircular serrated part of radix with pointed end (Figs 15A–D, 16A–B).

Female (HNU-CGY137)

Measurements and colour. Total length: 3.38. Carapace 1.42 long, 1.12 wide, yellowish; fovea, cervical and radial grooves distinct; clypeus 0.19 high (Fig. 18D–F); abdomen 1.96 long, 1.61 wide (Fig. 18D–F). Eye sizes and interdistances: AME 0.07, ALE 0.09, PME 0.09, PLE 0.09, AME–AME 0.05, PME–PME 0.06, AME–ALE 0.07, PME–PLE 0.11, ALE–ALE 0.45, PLE–PLE 0.51, ALE–PLE contiguous.

Chelicerae. With six promarginal and seven retromarginal teeth; reteromarginal teeth gradually decrease in length towards the distal end.

Length of legs. I = 5.32 (1.37, 1.69, 1.32, 0.94), II = 4.75 (1.36, 1.42, 1.15, 0.82), III = 3.43 (1.04, 1.04, 0.79, 0.56), IV = 4.58 (1.26, 1.44, 1.12, 0.76). Leg formula I–II–IV–III.

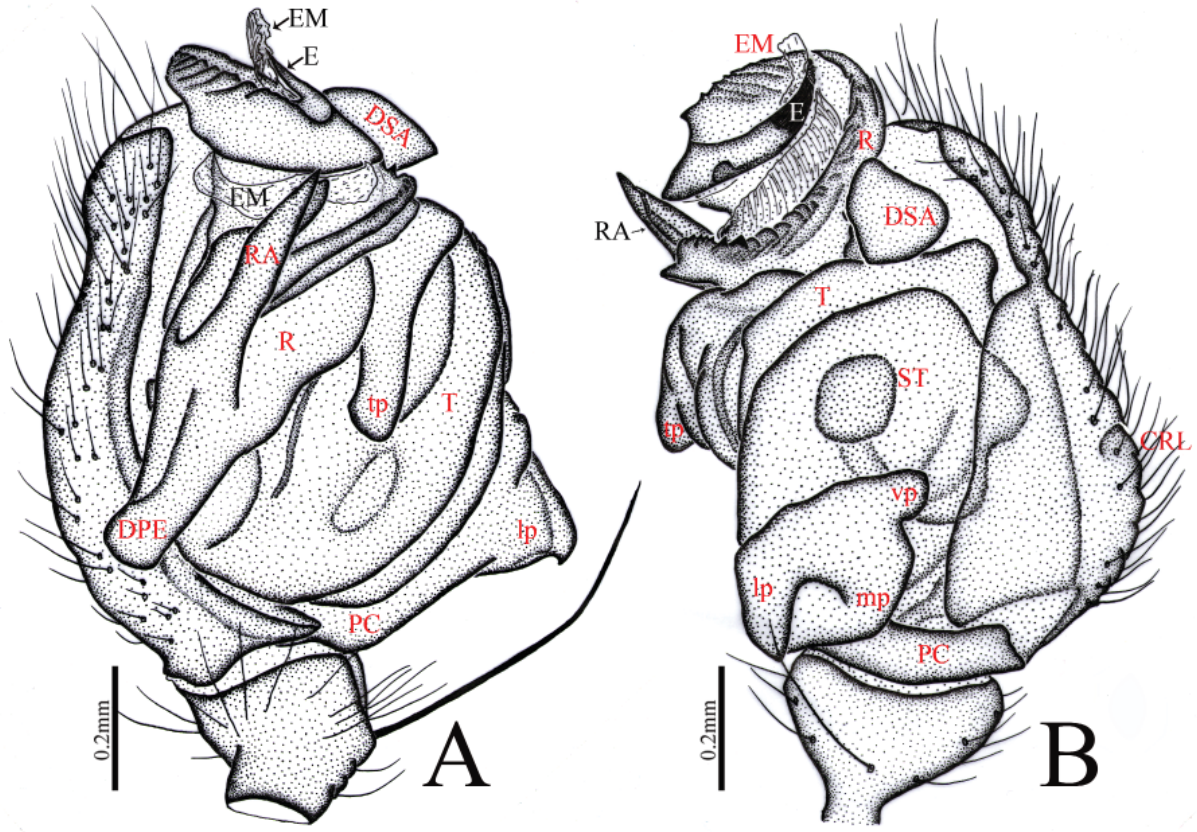


Fig. 16. *Acroterius circinatus* gen. et sp. nov., ♂, holotype (HNU-CGY137), palp. **A**. Prolateral view. **B**. Retrolateral view.

Epigyne. Parmula 0.55 long, 0.24 wide at base (Fig. 17A–B); posterior projection of anterior wall of epigynal plate circular, forming circinate appearance (Fig. 17A–B). Spermathecae slender, situated dorso-mesally near median septum pointing toward lateral walls (Fig. 17D).

Distribution

China (Yunnan Province, Fig. 39).

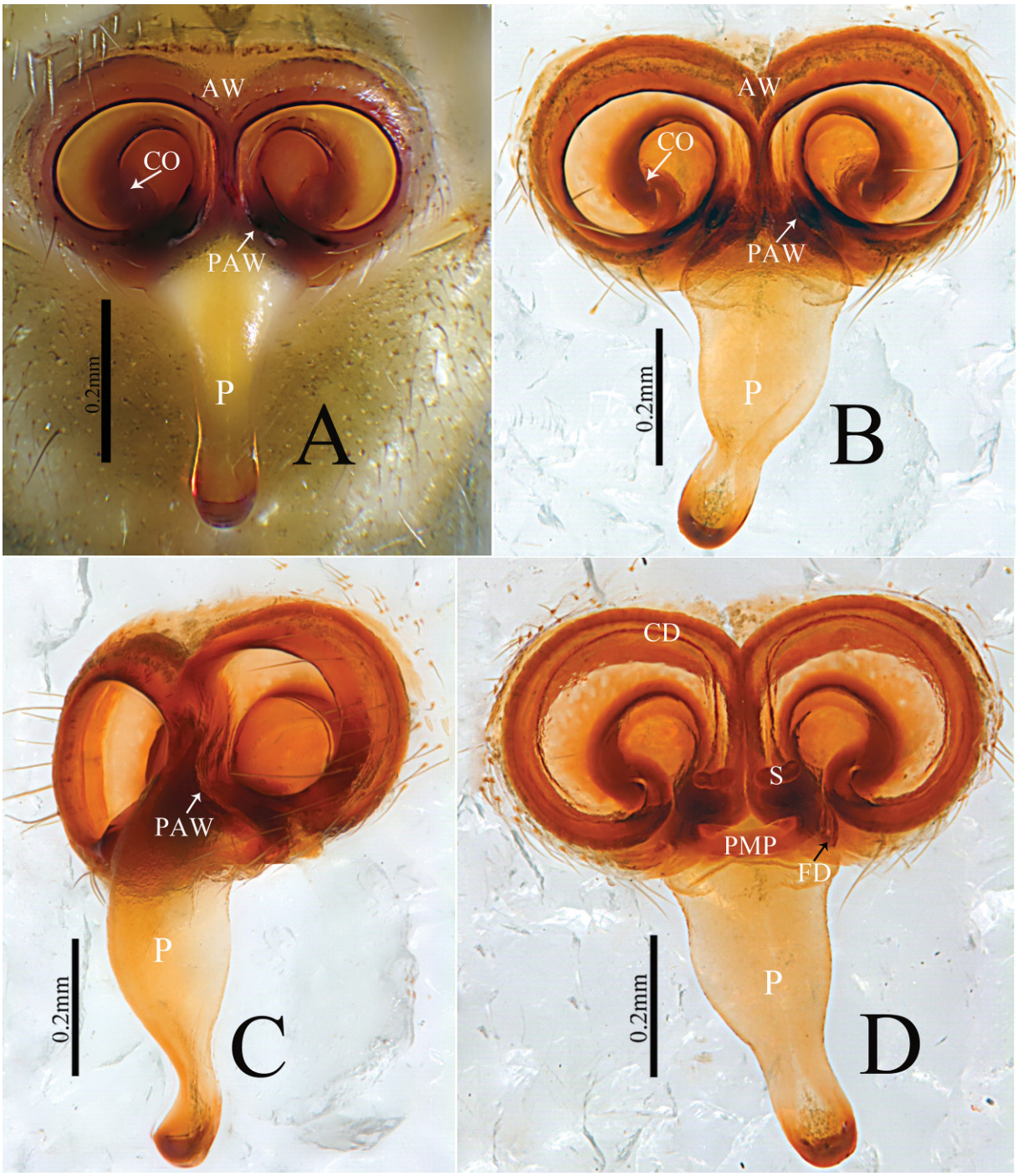


Fig. 17. *Acroterius circinatus* gen. et sp. nov., ♀, paratype (HNU-CGY137). **A–B**. Epigyne, ventral view. **C**. Epigyne, lateral view. **D**. Vulva, dorsal view.



Fig. 18. *Acroterius circinatus* gen. et sp. nov. **A–C**. ♂, holotype (HNU-CGY137). **D–F**. ♀, paratype (HNU-CGY137). **A**, **D**. Habitus, dorsal view. **B**, **E**. Habitus, lateral view. **C**, **F**. Habitus, ventral view.

Acroterius hamatus gen. et sp. nov.
urn:lsid:zoobank.org:act:754D348A-8F5C-47DA-9940-FDCEDD520F56
Figs 19–21, 38

Differential diagnosis

The new species resembles *Acroterius brevis* gen. et sp. nov. (Fig. 8A–D) in having the posterior median plate extending posteriorly with a parmula, but can be distinguished by: in dorsal view, parmula two times the width of parmula base, with distal part distinctly expanded (Fig. 19D), slightly longer than the

width of parmula base (Fig. 19A–D), but distal part not expanded in *A. brevis* gen. et sp. nov. In lateral view, anterior wall of epigynal plate projection wider than long (Figs 19C; 21C), but longer than wide in *A. brevis* gen. et sp. nov. (Fig. 8C).

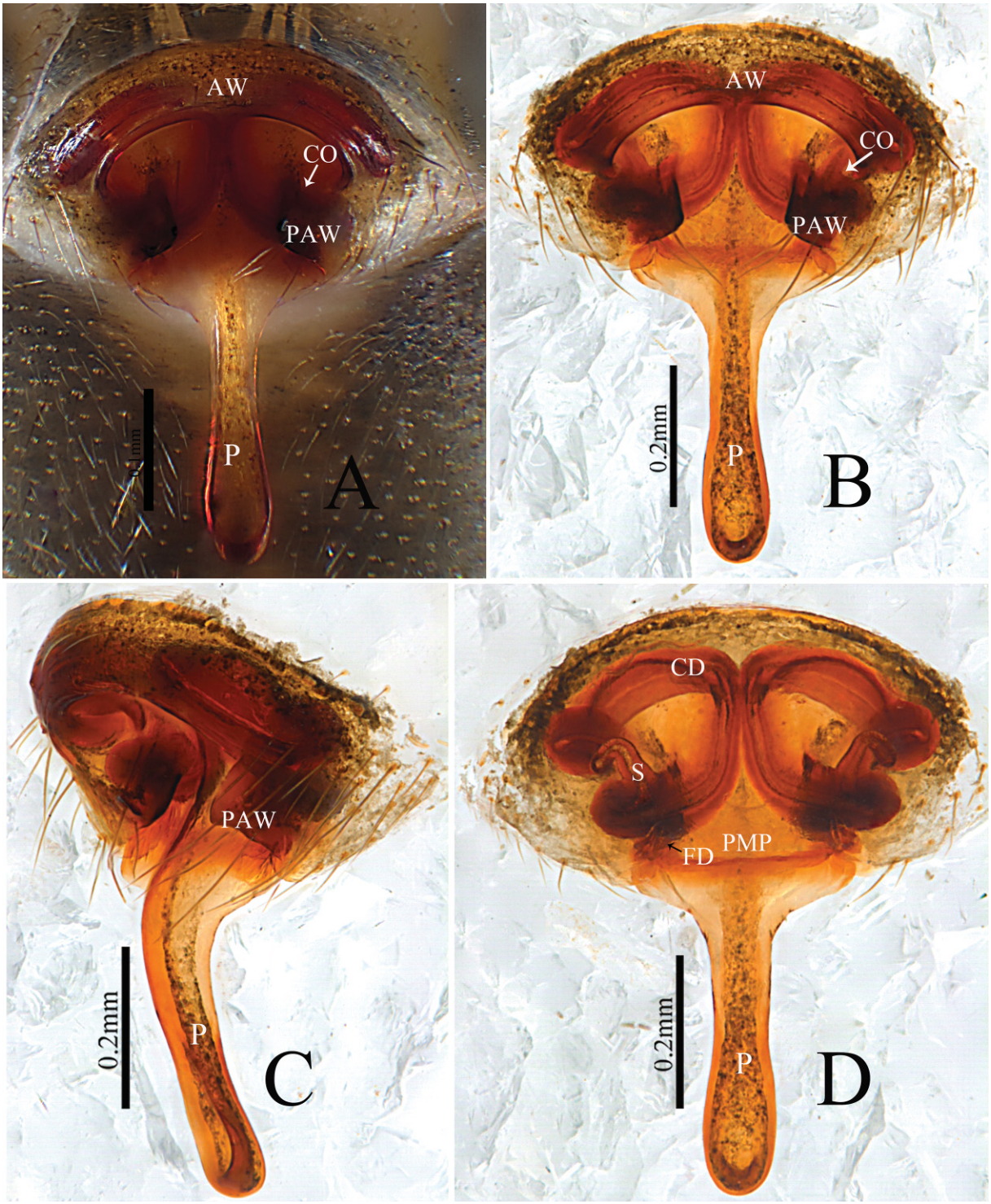


Fig. 19. *Acroterius hamatus* gen. et sp. nov., ♀, holotype (HNU-Tang–04–04). **A–B**. Epigyne, ventral view. **C**. Epigyne, lateral view. **D**. Vulva, dorsal view.

Etymology

The species name comes from the Latin adjective '*hamatus*', meaning 'hook' and referring to the hook-shaped spermathecae in the epigyne.

Type material

Holotype

CHINA • ♀; Yunnan Province, Gongshan County, Dulongjiang Township, Kongdang Village; 27.87961° N, 98.33878° E; alt. 1527 m; 25 Oct. 2004; Guo Tang leg.; HNU-Tang–04–04.

Paratypes (5 ♀♀)

CHINA – **Yunnan Province, Gongshan County** • 4 ♀♀; 77 km of new road to Donglongjiang; 27.91034° N, 98.41081° E; alt. 2183 m; 8–9 Nov. 2004; Guo Tang leg.; HNU-Tang–04–09 • 1 ♀; Dulongjiang Township, S/N of Dizhengdang Village along Silalong He; 28.07654° N, 98.32603° E; alt. 1890 m; 28 Oct. 2004; D.H. Kavanaugh leg.; HNU-DHK–2004–059.

Description

Female (holotype)

Measurements and colour. Total length: 3.43. Carapace 1.41 long, 1.17 wide, cephalothorax brown; clypeus 0.41 high (Fig. 20A–B); abdomen 2.01 long, 1.41 wide. Eye sizes and interdistances:



Fig. 20. *Acroterius hamatus* gen. et sp. nov., ♀, holotype (HNU-Tang–04–04). **A**. Habitus, dorsal view. **B**. Habitus, ventral view.

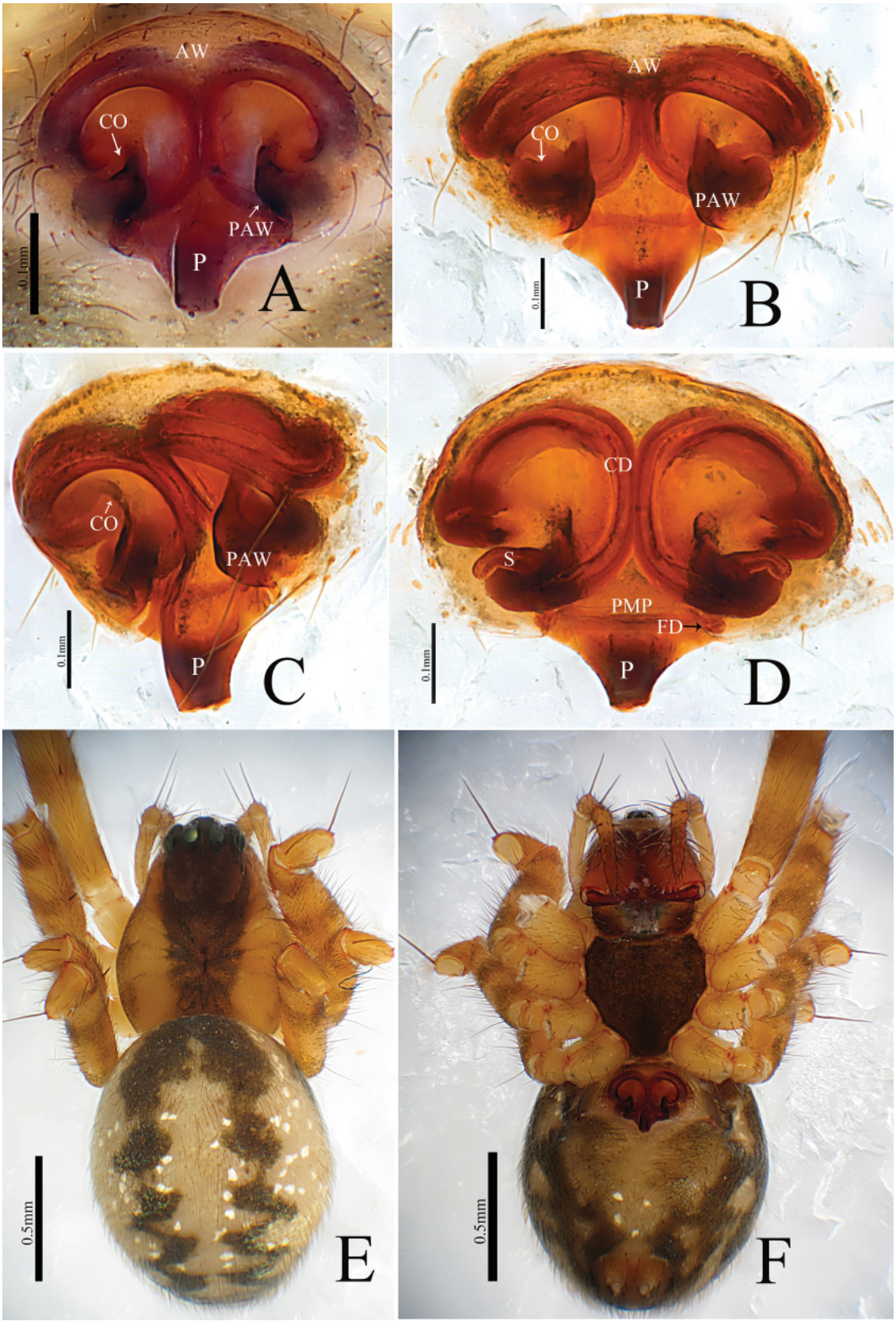


Fig. 21. *Acroterius hamatus* gen. et sp. nov., ♀, paratype (HNU-Tang–04–09). **A–B**. Epigyne, ventral view. **C**. Epigyne, lateral view. **D**. Vulva, dorsal view. **E**. Habitus, dorsal view. **F**. Habitus ventral view.

AME 0.06, ALE 0.08, PME 0.07, PLE 0.07, AME–AME 0.04, PME–PME 0.07, AME–ALE 0.09, PME–PLE 0.08, ALE–ALE 0.49, PLE–PLE 0.53, ALE–PLE contiguous.

Chelicerae. With six promarginal and six retromarginal teeth; reteromarginal teeth long and highly sclerotized protruding beyond fangs.

Length of legs. I = 5.39 (1.74, 1.40, 1.31, 0.94), II = 4.99 (1.42, 1.54, 1.17, 0.83), III = 3.95 (1.18, 1.25, 0.9, 0.62), IV = 4.94 (1.44, 1.53, 1.18, 0.79). Leg formula I–II–IV–III.

Epigyne. Parmula 0.53 long, 0.28 wide at base (Fig. 19A–C); posterior margin of anterior wall of epigynal plate with projection wider than long on each side (Fig. 19A–B). Spermathecae slender, distal part slightly curved, pointing towards posterior margin of epigyne (Fig. 19D).

Variation in the epigyne (HNU-Tang–04–09, Fig. 21A–F). We noticed in the four out of five female paratypes that the epigynal parmulas are broken at the same point due to unknown reasons. All the other somatic and genitalic characters are found to be similar (Fig. 21A–D).

Male

Unknown.

Distribution

China (Yunnan Province, Fig. 38).

Acroterius inversus gen. et sp. nov.
urn:lsid:zoobank.org:act:42879150-7E48-4E0F-8C7B-004DDB375847
Figs 22–23, 38

Differential diagnosis

The new species resembles *Acroterius camur* gen. et sp. nov. (Fig. 13A–D) in having the similar short parmula in epigyne as in *A. brevis* gen. et sp. nov. and *A. longidentatus* gen. et sp. nov. (Fig. 22A–D); it can be distinguished by: spermathecae sinuous (Fig. 22D), but hook-shaped in *A. camur* gen. et sp. nov. (Fig. 13D). Parmula anteriorly rectangular and posteriorly spoon-shaped (Fig. 22A–C), but tongue-shaped in *A. brevis* gen. et sp. nov. (Fig. 8A–C), somewhat triangular in *A. camur* gen. et sp. nov. (Fig. 13A–C), finger-shaped in *A. longidentatus* gen. et sp. nov. (Fig. 29A–C).

Etymology

The species name comes from the Latin adjective '*inversus*', meaning 'inverted' and referring to the inverted L-shaped spermathecae in the epigyne.

Type material

Holotype

CHINA • ♀; Yunnan Province, Lonyang County, Bawan Township, Nankang Yakou; 24.83178° N, 98.76472° E; alt. 2180 m; 25 May 2005; Charles Griswold leg.; HNU-CGY115.

Paratypes (4 ♀♀)

CHINA – **Yunnan Province** • 2 ♀♀; Lonyang County, Baoshan City, Nankang Yakou (National 320 Road); 24.43717° N, 98.46054° E; alt. 2186 m; 30 Oct. 2003; Guo Tang leg.; HNU-Tang031031 • 1 ♀; Lushui County, Pianma Township, Chanyan He, 9.3 km to Pianma; 25.99363° N, 98.66651° E;

alt. 2470 m; mixed broadleaf deciduous and evergreen forest; 13–14 May 2005; Charles Griswold leg.; HNU-CGY105 • 1 ♀; Longling County, Longjiang Township, Xiaoheishan Nature Reserve; 24.82888° N, 98.76001° E; alt. 2020 m; broadleaf forest; 26 May 2005; Charles Griswold leg.; HNU-CGY124.

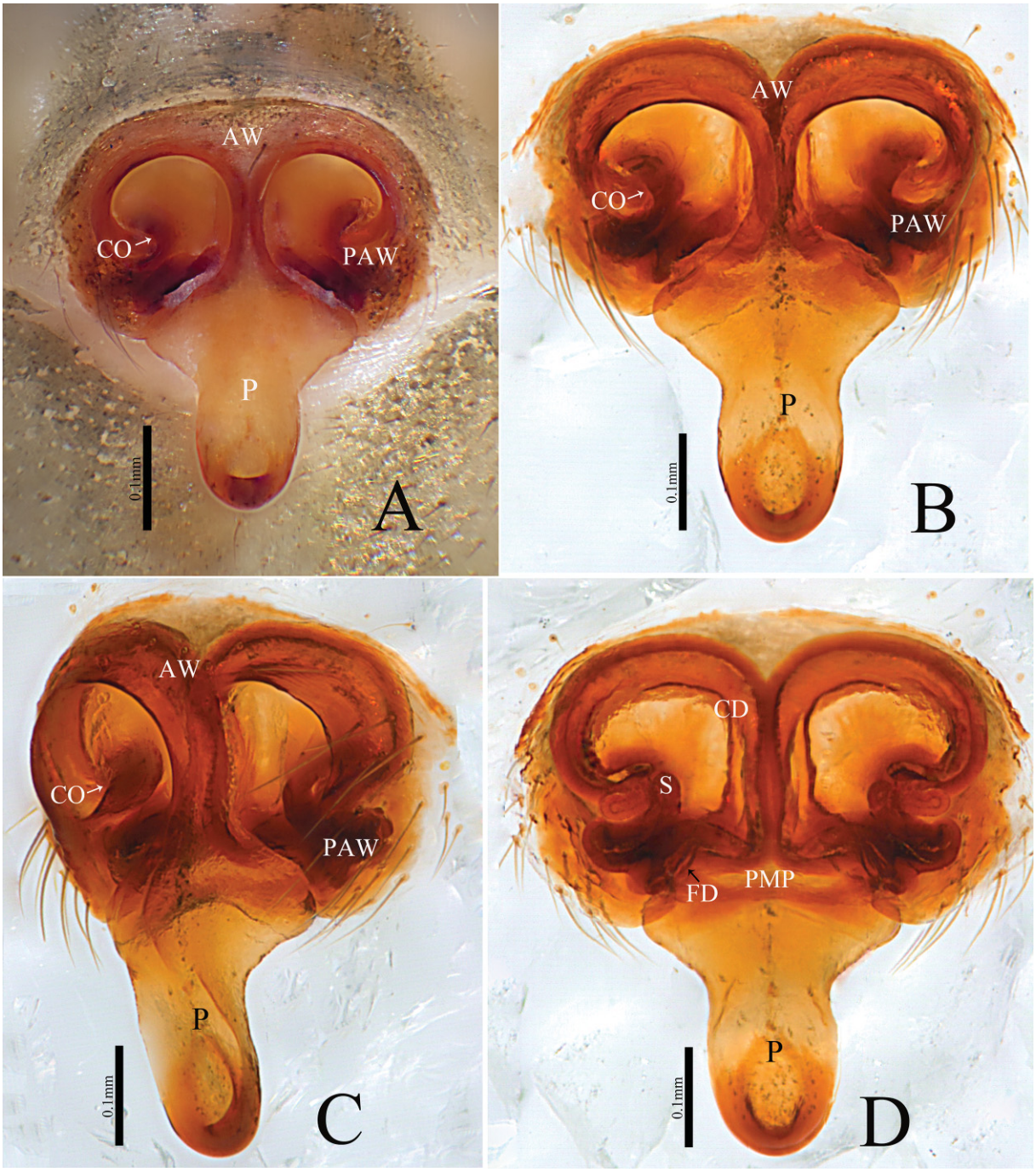


Fig. 22. *Acroterius inversus* gen. et sp. nov., ♀, holotype (HNU-CGY115). **A–B**. Epigyne, ventral view. **C**. Epigyne, lateral view. **D**. Vulva, dorsal view.

Description

Female (holotype)

Measurements and colour. Total length: 3.33. Carapace 1.10 long, 1.08 wide, cephalic region slightly elevated, yellowish to light brown; fovea, cervical and radial grooves distinct; clypeus 0.26 high (Fig. 23A–B); abdomen 2.22 long, 1.81 wide (Fig. 23A–B). Eye sizes and interdistances: AME 0.07, ALE 0.09, PME 0.08, PLE 0.07, AME–AME 0.04, PME–PME 0.06, AME–ALE 0.05, PME–PLE 0.11, ALE–ALE 0.44, PLE–PLE 0.48, ALE–PLE contiguous.

Chelicerae. With six promarginal and six retromarginal teeth.

Length of legs. I = 5.04 (1.41, 1.62, 1.22, 0.79), II = 4.54 (1.37, 1.41, 1.05, 0.71), III = 3.37 (1.12, 0.93, 0.81, 0.51), IV = 4.61 (1.38, 1.42, 1.12, 0.69). Leg formula I–IV–II–III.

Epigyne. Posterior median plate extends posteriorly with short parmula with spoon-like deep socket ventrally (Fig. 22A–B); parmula 0.35 long, 0.25 wide at base (Fig. 22A–B); posterior margin of anterior wall of epigynal plate wider than long, with somewhat circle-like projection (Fig. 22A–B); copulatory openings situated inside atrium between anterior wall and posterior median plate (Fig. 22A–B),

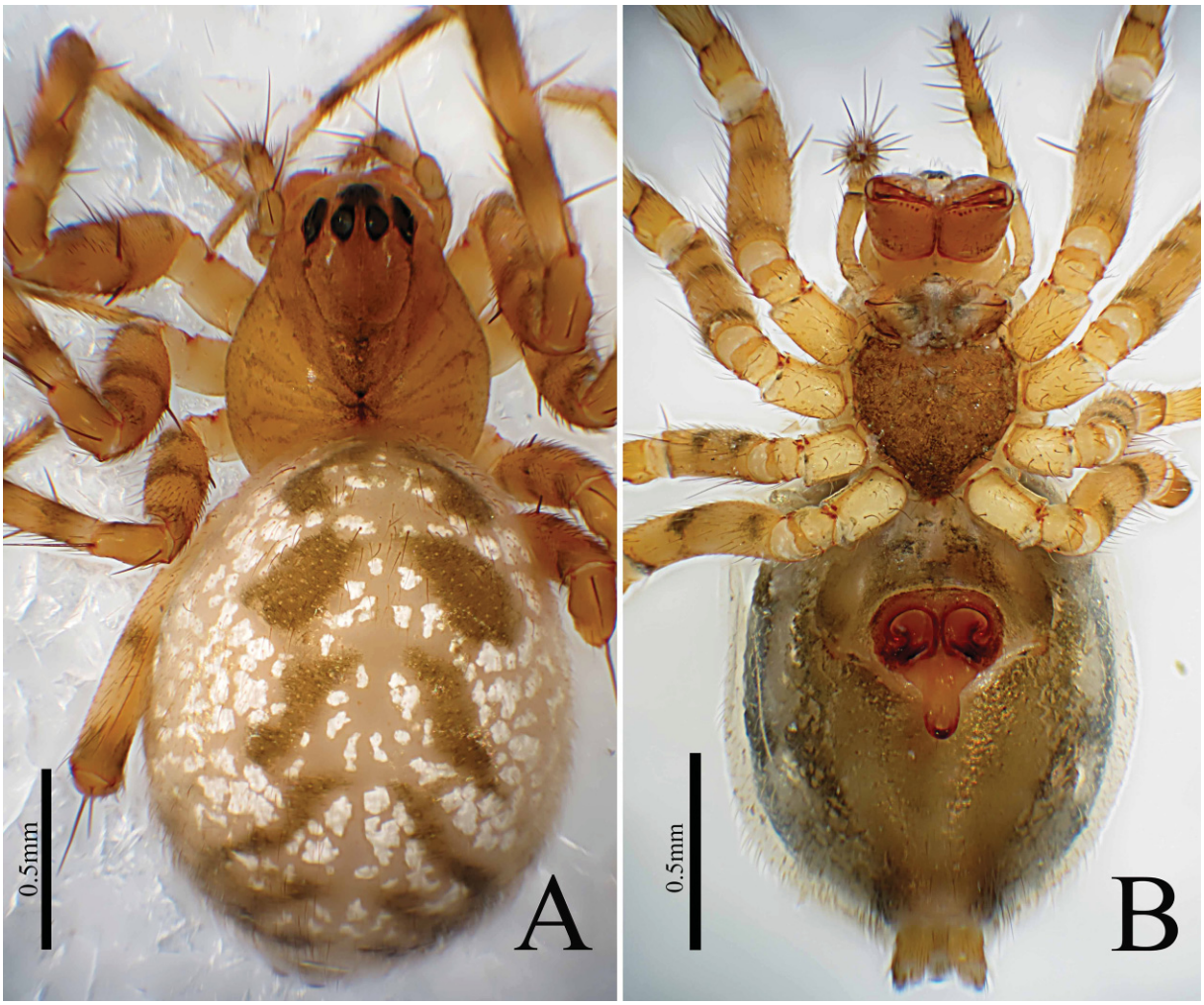


Fig. 23. *Acroterius inversus* gen. et sp. nov., ♀, holotype (HNU-CGY115). **A**. Habitus, dorsal view. **B**. Habitus, ventral view.

connected with long, semicircular copulatory ducts joined to spermathecae (Fig. 22D). Spermathecae slender, sinuous, forming almost complete wave (Fig. 22D). Fertilization ducts present laterally on posterior median plate (Fig. 22D).

Male
Unknown.

Distribution

China (Yunnan Province, Fig. 38).

Acroterius latus gen. et sp. nov.
urn:lsid:zoobank.org:act:896C3469-C7F5-4931-ADBF-B423F6513F4A
Figs 24–28, 38

Differential diagnosis

The new species resembles *Acroterius longimultus* gen. et sp. nov. (Figs 30A–D, 31A–B) in having the distal arm of paracymbium with two projections in the male palp and the long parmula with a median incision in the epigyne (Figs 24A–D, 26A–B); it can be distinguished by: the distal suprategular apophysis short, retained below the apex of cymbium in retrolateral view (Fig. 24B), but long, sword-shaped, protruding beyond the apex of cymbium in *A. longimultus* gen. et sp. nov. (Fig. 30B). The dorsal projection of embolic plate doesn't touch the base of cymbium in prolateral view (Figs 24A, 26A), but almost touches the base of cymbium in *A. longimultus* gen. et sp. nov. (Figs 30A, 31A). The lateral projection of the distal arm of the paracymbium is finger-shaped, almost touches the posterior margin of the tibia (Figs 24B, D, 26B), but is tongue-shaped and away from the posterior margin of the tibia in *A. longimultus* gen. et sp. nov. (Figs 30B, D, 31B). The posterior projection of the anterior wall of the epigynal plate is wider than long and doesn't protrude beyond the epigastric furrow (Fig. 27A–B), but is longer than wide and protruding beyond the epigastric furrow in *A. longimultus* gen. et sp. nov. (Fig. 32A–B). The distal part of the spermathecae is hook-shaped (Fig. 27D), but inverted L-shaped in *A. longimultus* gen. et sp. nov. (Fig. 32D).

Etymology

The species name comes from the Latin adjective '*latus*' meaning 'broad', referring to the radical apophysis with a broad distal end in the male palp.

Type material

Holotype
CHINA • ♂; Yunnan Province, Lonyang County, Bawan Distr., Nankang Yakou; 24.83178° N, 98.76472° E; alt. 2180 m; 25 May 2005; Charles Griswold and D.H. Kavanaugh leg.; HNU-CGY123.

Paratypes (3 ♀♀)
CHINA – **Yunnan Province** • 1 ♀; same collection data as for holotype; HNU-CGY123 • 1 ♀; Fugong County, 2 km down Shibali; 27.16284° N, 98.78989° E; alt. 2420 m; 2 May 2004; Guang–xu Peng leg.; HNU-20040502 • 1 ♀; Fugong County, Lishadi Township, Shibali; 27.10520° N, 98.77980° E; alt. 2530 m; 10 Aug. 2005; Guo Tang leg.; HNU-Tang–05–02.

Description

Male (holotype)
Measurements and colour. Total length: 3.55. Carapace 1.84 long, 1.47 wide, cephalic region slightly elevated, dark brown, with longitudinal band starting from base of posterior lateral eyes extending

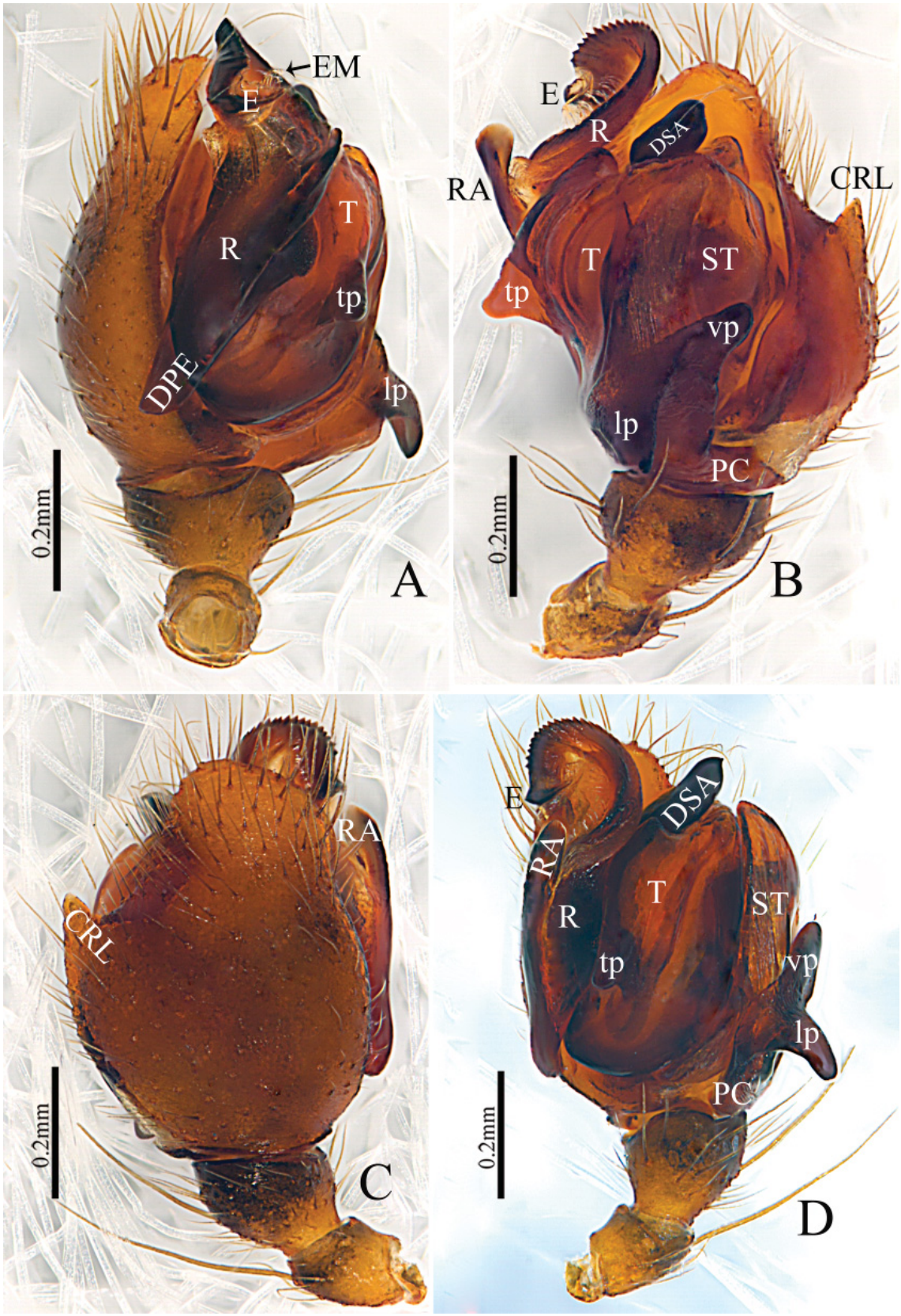


Fig. 24. *Acroterius latus* gen. et sp. nov., ♂, holotype (HNU-CGY123), palp. **A**. Prolateral view. **B**. Retrolateral view. **C**. Dorsal view. **D**. Ventral view.

to base of cephalothorax followed by fovea, cervical and radial grooves distinct; clypeus 0.34 high (Fig. 28A–B); abdomen 1.71 long, 1.29 wide. Eye sizes and interdistances: AME 0.06, ALE 0.09, PME 0.07, PLE 0.07, AME–AME 0.07, PME–PME 0.09, AME–ALE 0.11, PME–PLE 0.13, ALE–ALE 0.51, PLE–PLE 0.55, ALE–PLE contiguous.

Chelicerae. With six promarginal and five retromarginal teeth; distal three teeth of promargin very small (Fig. 25B).

Length of legs. I = 6.59 (1.79, 1.99, 1.67, 1.14), II = 4.88 (1.66, 1.69, 1.32, 1), III = 3.95 (1.34, 1.39, 0.76, 0.46), IV = 5.98 (1.74, 1.82, 1.46, 0.96). Leg formula I–IV–II–III.

Palp (Figs 24A–D, 26A–B). Paracymbium highly sclerotized, distal arm with two projections (Figs 24B, 26B), lateral projection finger-like in ventral view and almost touches posterior margin of paracymbium in retrolateral view; ventral projection thumb-like with blunt end; distal suprategular apophysis slightly protruding above cymbium in ventral view (Figs 24D, 26B). Radical apophysis relatively large, tongue-shaped, slightly curved with blunt end in ventral view (Figs 24A–D, 26A–B). Embolus stout, short with pointed end (Figs 24A–C, 26A–B).

Female (HNU-CGY123)

Measurements and colour. Total length: 3.03. Carapace 1.26 long, 1.01 wide, cephalic region slightly elevated, dark brown, with a longitudinal band starting from base of posterior lateral eyes extending to base of cephalothorax; fovea, cervical and radial grooves distinct; clypeus 0.25 high (Fig. 28C–D);

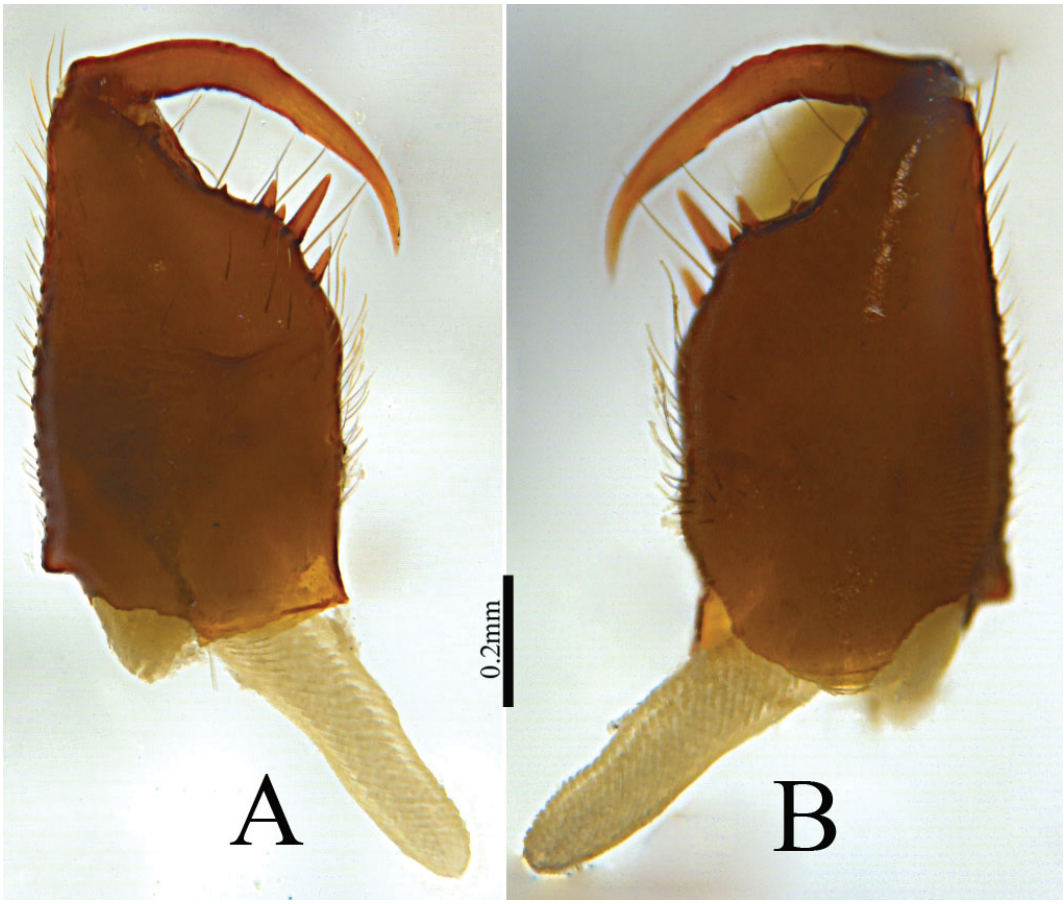


Fig. 25. *Acroterius latus* gen. et sp. nov., ♂, holotype (HNU-CGY123). **A**. Chelicera, dorsal view. **B**. Chelicera, ventral view.

abdomen 1.75 long, 1.33 wide. Eye sizes and interdistances: AME 0.07, ALE 0.09, PME 0.07, PLE 0.08, AME–AME 0.05, PME–PME 0.10, AME–ALE 0.08, PME–PLE 0.07, ALE–ALE 0.43, PLE–PLE 0.47, ALE–PLE contiguous.

Chelicerae. In dorsal view, chelicerae with depression at proximal end slightly below reteromargin with six promarginal and seven retromarginal teeth; reteromarginal teeth gradually decreasing in length towards base of fang (Fig. 25A–B).

Length of legs. I = 4.30 (1.29, 1.48, 0.89, 0.64), II = 4.05 (1.26, 1.34, 0.86, 0.59), III = 2.27 (1.02, 1.06, 0.69, 0.52), IV = 4.39 (1.23, 1.34, 1.03, 0.79). Leg formula I–IV–II–III.

Epigyne. Parmula 0.45 long, 0.14 wide at base (Fig. 27A–B); posterior projection of anterior wall of epigynal plate margin of epigyne wider than long, not protruding beyond epigastric furrow (Fig. 27A–B). Spermathecae slender, distal part of spermathecae hook-shaped, slightly curved, pointing towards lateral wall of epigyne (Fig. 27D).

Distribution

China (Yunnan Province, Fig. 38).

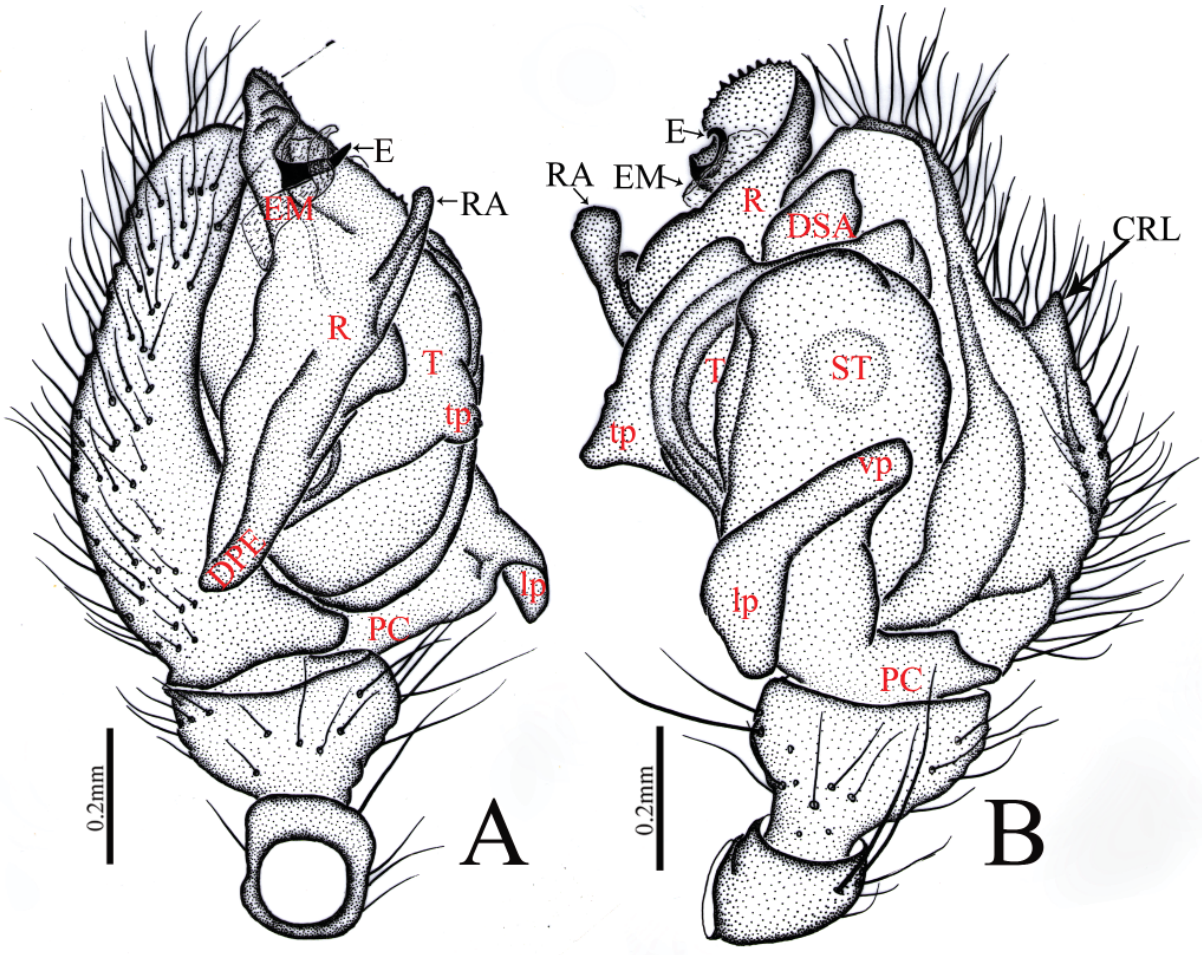


Fig. 26. *Acroterius latus* gen. et sp. nov., ♂, holotype (HNU-CGY123), palp. **A**. Prolateral view. **B**. Retrolateral view.

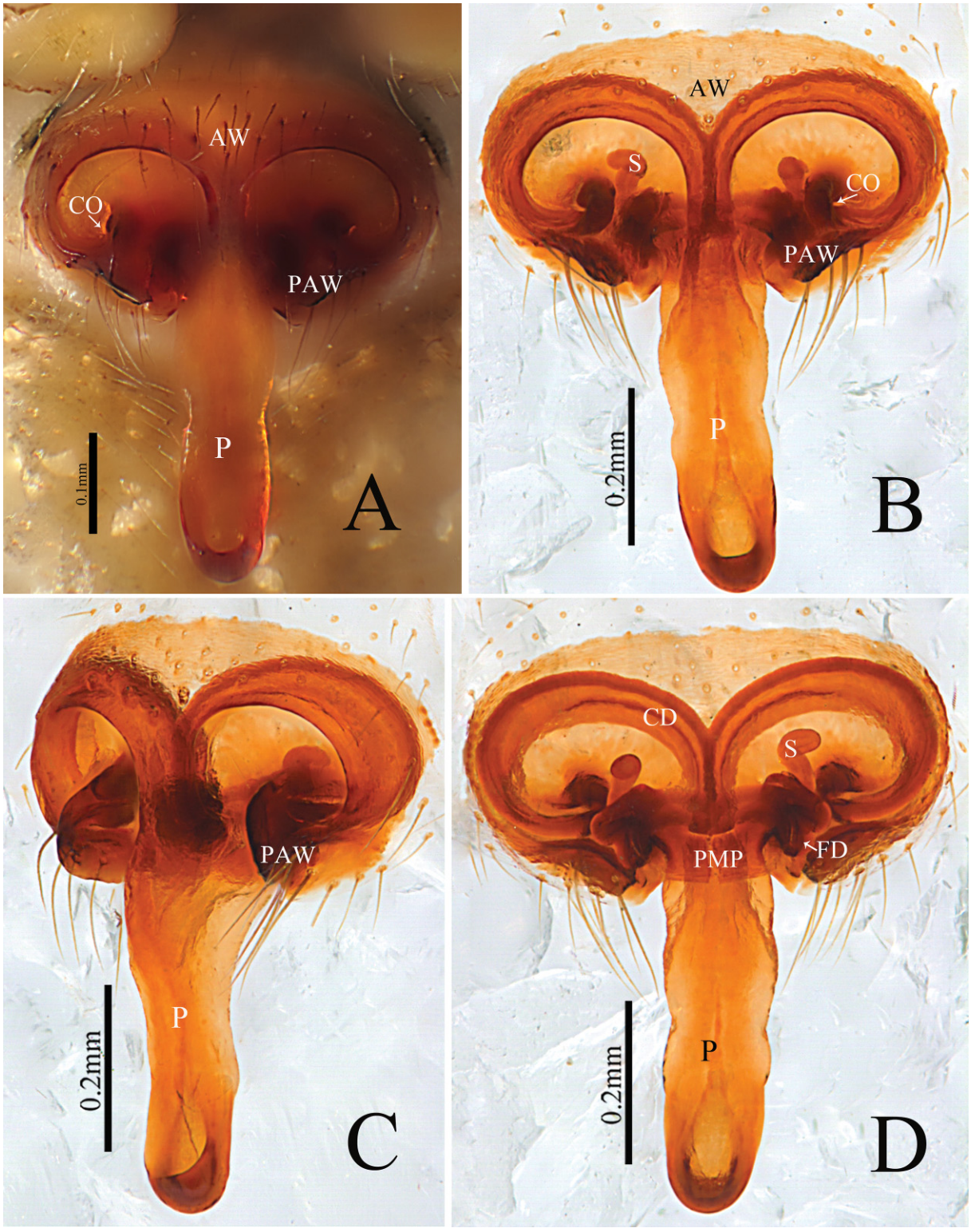


Fig. 27. *Acroterius latus* gen. et sp. nov., ♀, paratype (HNU-CGY123). **A–B**. Epigyne, ventral view. **C**. Epigyne, lateral view. **D**. Vulva, dorsal view.

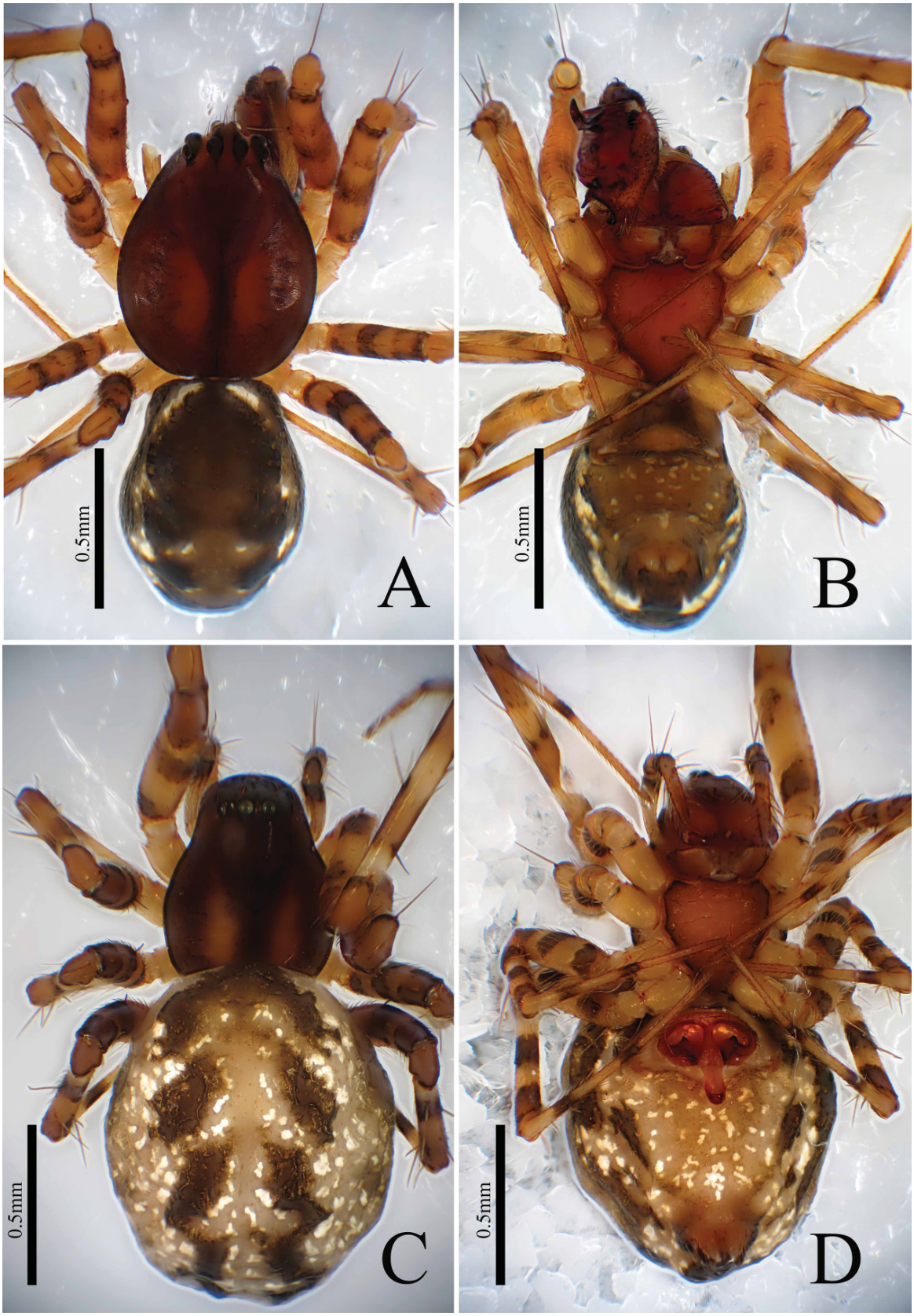


Fig. 28. *Acroterius latus* gen. et sp. nov. **A–B**. ♂, holotype (HNU-CGY123). **C–D**. ♀, paratype (HNU-CGY123). **A**, **C**. Habitus, dorsal view. **B**, **D**. Habitus, ventral view.

Acroterius longidentatus gen. et sp. nov.
urn:lsid:zoobank.org:act:F372CAB7-6C3F-403D-809D-4FDA72FB7B10
Figs 29, 39

Differential diagnosis

The new species resembles *Acroterius brevis* gen. et sp. nov. (Fig. 8A–D) in having a similar short parmula as in *A. camur* gen. et sp. nov. and *A. longidentatus* gen. et sp. nov. and the C-shaped distal part of spermathecae in epigyne (Fig. 29A–D); it can be distinguished by: the posterior projection of the anterior wall of the epigynal plate C-shaped in ventral view, somewhat triangular in lateral view and retained below the lateral margin of anterior wall of the epigyne in the new species (Fig. 29A–C), but beak-shaped in ventral view, protruding above the lateral margin in *A. brevis* gen. et sp. nov. (Fig. 8A–C). The spermathecae are situated near the median septum (Fig. 29D), but situated away from the median septum in *A. brevis* gen. et sp. nov. (Fig. 8D). Parmula finger-shaped (Fig. 29A–C), but tongue-shaped in *A. brevis* gen. et sp. nov. (Fig. 8A–C), anteriorly rectangular and posteriorly spoon-shaped in *A. inversus* gen. et sp. nov. (Fig. 22A–C) and somewhat triangular in *A. camur* gen. et sp. nov. (Fig. 13A–C).

Etymology

The species name comes from the Latin adjective '*longus*' + '*dentatus*', meaning 'long' + 'teeth' and referring to the long and highly sclerotized teeth on the retrolateral margin of the chelicerae in the female.

Type material

Holotype

CHINA • ♀; Yunnan Province, Longling County, Longjiang Township, Xiaoheishan Nature Reserve; 24.82888° N, 98.76001° E; alt. 2020 m; broadleaf forest; 28 May 2005; Charles Griswold and D.H. Kavanaugh leg.; HNU-2002–033A.

Paratypes (5 ♀♀)

CHINA – **Yunnan Province** • 4 ♀♀; same collection data as for holotype; HNU-2002–033A • 1 ♀; Longling County, Longjiang Township, Xiaoheishan Nature Reserve; 24.83671° N, 98.76185° E; alt. 2067 m; hand collecting; 28 May 2005; Heng-mei Yan and Guo Ke-ji leg.; HNU-GKJ029.

Description

Female (holotype)

Measurements and colour. Total length: 3.73. Carapace 1.27 long, 1.18 wide, cephalic region slightly elevated, yellowish brown, with distinct pattern starting from the base of posterior median eyes; fovea, cervical and radial grooves distinct; clypeus 0.27 high (Fig. 29E–F); abdomen 2.47 long, 1.81 wide. Eye sizes and interdistances: AME 0.07, ALE 0.11, PME 0.08, PLE 0.08, AME–AME 0.05, PME–PME 0.08, AME–ALE 0.11, PME–PLE 0.09, ALE–ALE 0.51, PLE–PLE 0.55, ALE–PLE contiguous.

Chelicerae. With six promarginal and six retromarginal teeth; reteromarginal teeth long and highly sclerotized.

Length of legs. I = 6.13 (1.67, 1.95, 1.55, 0.96), II = 5.50 (1.45, 1.75, 1.51, 0.79), III = 3.50 (0.98, 1.07, 0.91, 0.54), IV = 5.02 (1.23, 1.61, 1.36, 0.82). Leg formula I–II–IV–III.

Epigyne. Parmula 0.36 long, 0.23 wide at base (Fig. 29B); the posterior projection of anterior wall of epigynal plate circular in ventral view; somewhat triangular and retained below lateral wall of epigynal plate in lateral view (Fig. 29A–C). Spermathecae slender, distal part C-shaped and situated near median septum (Fig. 29D).

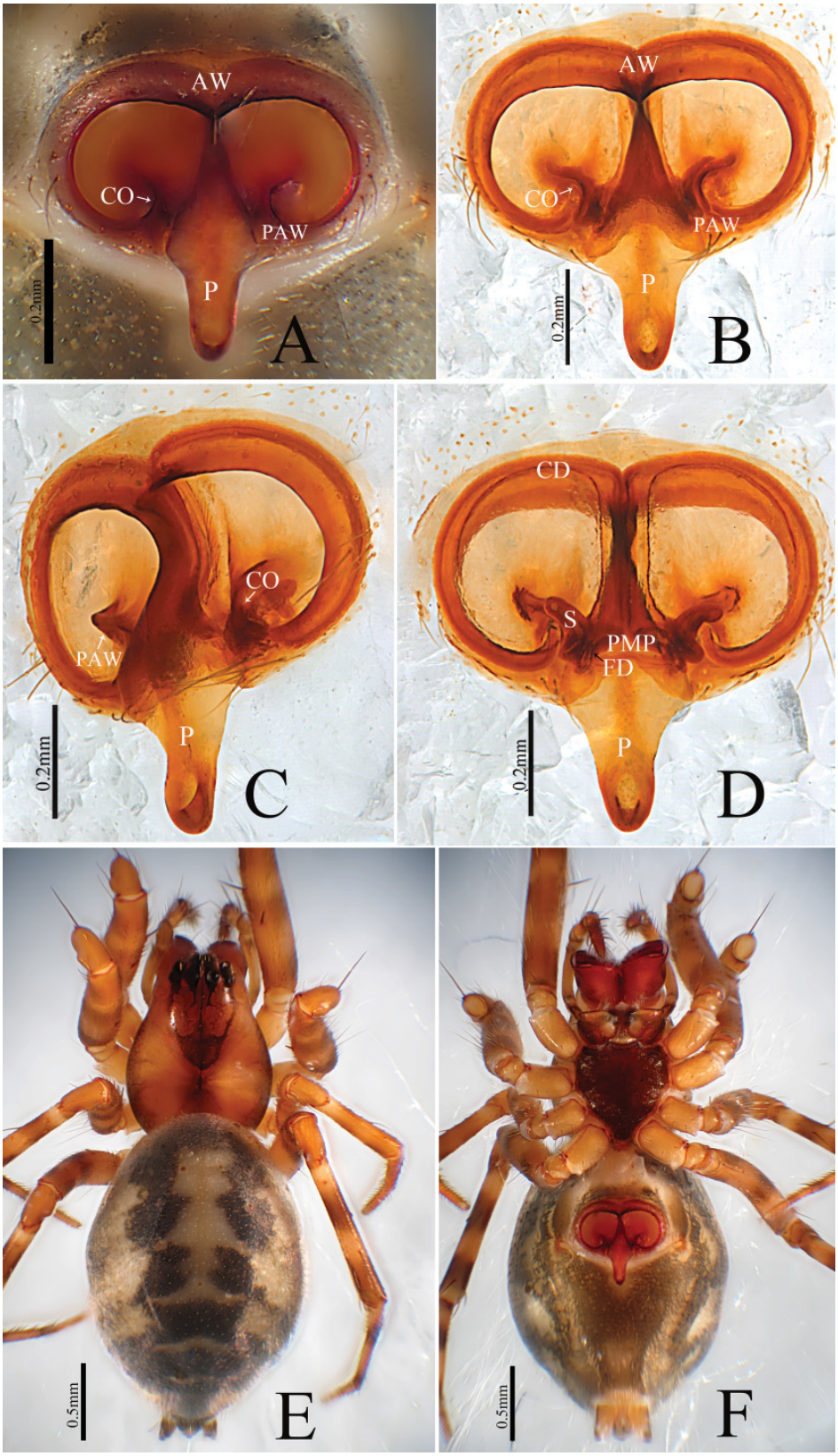


Fig. 29. *Acroterius longidentatus* gen. et sp. nov., ♀, holotype (HNU-2002–033A). **A–B**. Epigyne, ventral view. **C**. Epigyne, lateral view. **D**. Vulva, dorsal view. **E**. Habitus, dorsal view. **F**. Habitus, ventral view.

Male
Unknown.

Distribution

China (Yunnan Province, Fig. 39).

Acroterius longimultus gen. et sp. nov.
urn:lsid:zoobank.org:act:A79B8C4E-1540-4031-A067-7F12809D5B95
Figs 30–33, 39

Differential diagnosis

The new species resembles *Acroterius latus* gen. et sp. nov. (Figs 24A–D, 26A–B) in having the distal arm of the paracymbium with two projections in the male palp and the long parmula with a median incision in the epigyne (Figs 31A–B, 32A–D); it can be distinguished by: the distal suprategular apophysis long, sword-shaped, protruding beyond the apex of cymbium in retrolateral view (Figs 30B, 31B), but short, retained below the apex of cymbium in *A. latus* gen. et sp. nov. (Figs 24B, 26B). The dorsal projection of the embolic plate almost touches the base of the cymbium in prolateral view (Figs 30A, 31A), but doesn't touch the base of the cymbium in *A. latus* gen. et sp. nov. (Figs 24A, 26A). The lateral projection of the distal arm of the paracymbium is tongue-shaped, away from the posterior margin of the tibia (Figs 30B, D, 31B), but finger-shaped, almost touching the posterior margin of the tibia in *A. latus* gen. et sp. nov. (Figs 24B, D, 26B). The posterior projection of the anterior wall of the epigynal plate is longer than wide, protruding beyond the epigastric furrow (Fig. 32A–B), but wider than long, not protruding beyond the epigastric furrow in *A. latus* gen. et sp. nov. (Fig. 27A–B). The distal part of spermathecae inverted L-shaped (Fig. 32D), but hook-shaped in *A. latus* gen. et sp. nov. (Fig. 27D).

Etymology

The species name comes from the Latin adjective '*longus*' + '*multus*', meaning 'long' + 'much' and referring to the very long distal suprategular apophysis in the male palp.

Type material

Holotype
CHINA • ♂; Yunnan Province, Fugong County, Lumadeng Township, Yaping Village, Shibali; 27.16515° N, 98.77975° E; alt. 2527 m; 1 May 2004; Guang–xu leg.; HNU-20040501–1.

Paratypes (1 ♂, 1 ♀)
CHINA • 1 ♂, 1 ♀; same collection data as for holotype; HNU-20040501–2.

Description

Male (holotype)
Measurements. Total length: 3.18. Carapace 1.53 long, 1.23 wide, cephalic region slightly elevated, brown; fovea, cervical and radial grooves distinct; clypeus 0.21 high (Fig. 33A–B); abdomen 1.65 long, 1.19 wide (Fig. 33A–B). Eye sizes and interdistances: AME 0.07, ALE 0.08, PME 0.07, PLE 0.09, AME–AME 0.04, PME–PME 0.07, AME–ALE 0.08, PME–PLE 0.08, ALE–ALE 0.44, PLE–PLE 0.51.

Chelicerae. With five promarginal and five retromarginal teeth; teeth of reteromargin almost equal in length.

Length of legs. I = 5.56 (1.39, 1.61, 1.63, 0.93), II = 4.80 (1.32, 1.43, 1.28, 0.77), III = 3.87 (1.21, 1.08, 1.04, 0.54), IV = 5.45 (1.39, 1.73, 1.61, 0.72). Leg formula I–IV–II–III.

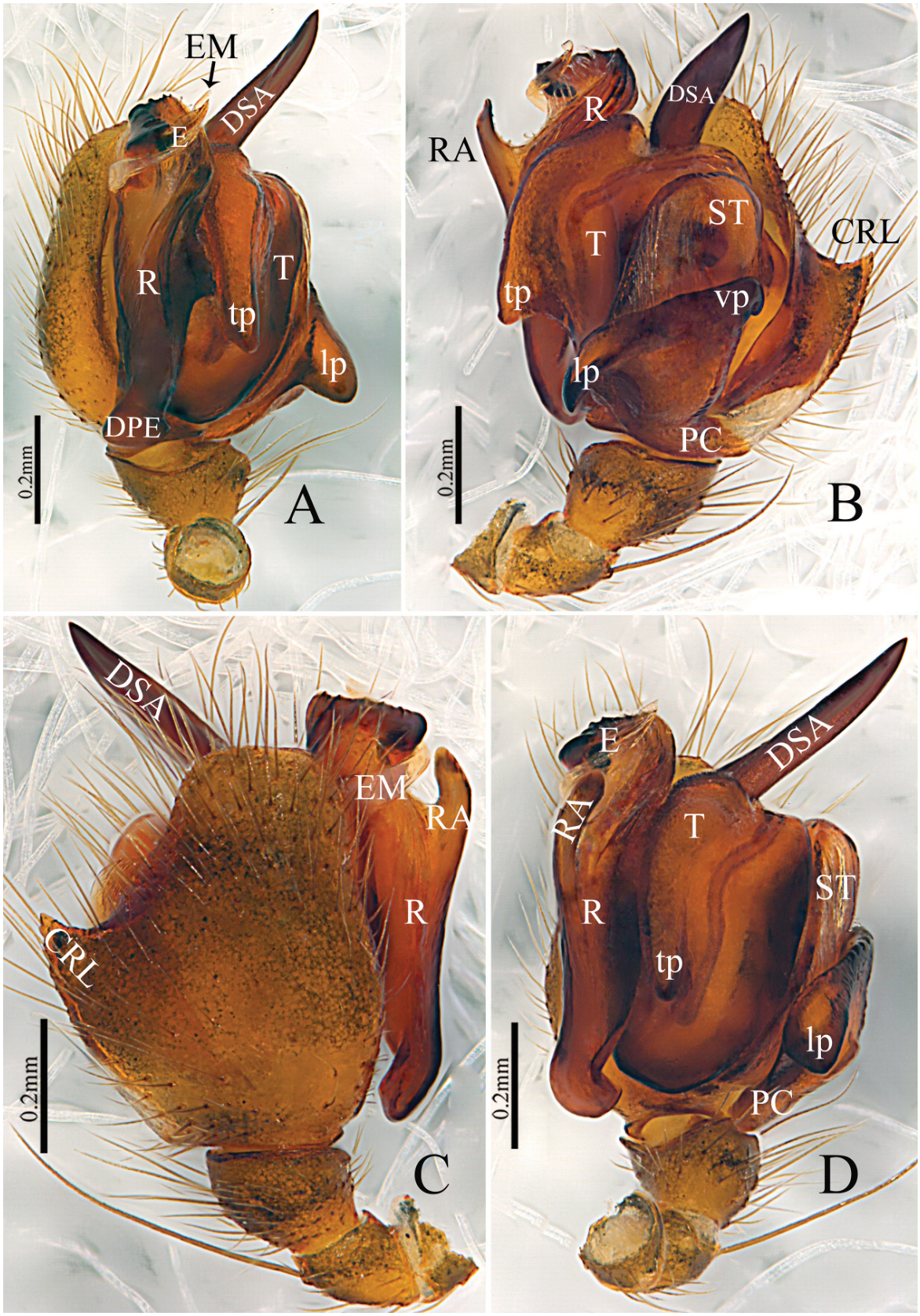


Fig. 30. *Acroterius longimultus* gen. et sp. nov., ♂, holotype (HNU-20040501–1), palp. **A**. Prolateral view. **B**. Retrolateral view. **C**. Dorsal view. **D**. Ventral view.

Palp (Figs 30A–D, 31A–B). Paracymbium highly sclerotized, distal arm with three projections; lateral projection large, curved, beak-shaped with pointed end in retrolateral view; median projection tongue-shaped, wider than long; ventral projection sclerotized, tip curved with blunt end, strongly overlapping subtegulum (Figs 30B, 31B); distal suprategular apophysis much longer than that of all other species in this genus, sword-shaped, protruding above cymbium (Figs 30A–D, 31A–B). Radical apophysis longer than wide, finger-shaped with broad blunt end, pointing towards distal margin of radix in ventral view (Figs 30A–D, 31A–B). Dorsal projection of embolic plate with broad, round end, curved and almost touching base of cymbium in prolateral view (Figs 30A, 31A). Embolus stout, short with pointed end (Figs 30A–C, 31A–B).

Female (HNU-20040501–02)

Measurements. Total length: 2.67. Carapace 1.13 long, 0.91 wide, cephalic region slightly elevated, yellowish brown, with longitudinal band starting from base of posterior lateral eyes extending to mid-dorsal; fovea, cervical and radial grooves distinct; Clypeus 0.24 high (Fig. 33D–E); abdomen 1.54 long, 1.16 wide. Eye sizes and interdistances: AME 0.06, ALE 0.08, PME 0.06, PLE 0.07, AME–AME 0.04, PME–PME 0.05, AME–ALE 0.06, PME–PLE 0.09, ALE–ALE 0.39, PLE–PLE 0.42, ALE–PLE contiguous.

Chelicerae. With five promarginal and five retromarginal teeth.

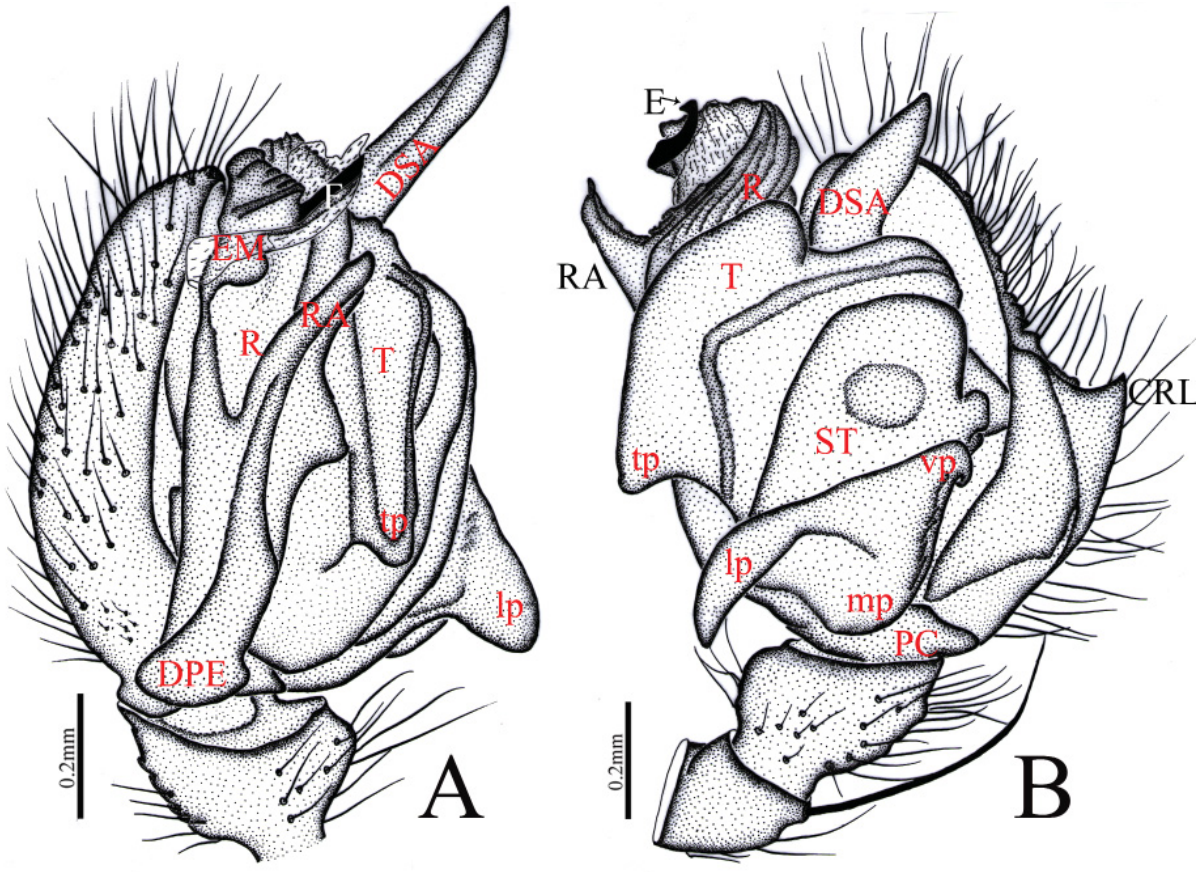


Fig. 31. *Acroterius longimultus* gen. et sp. nov., ♂, holotype (HNU-20040501–1), palp. **A**. Prolateral view. **B**. Retrolateral view.

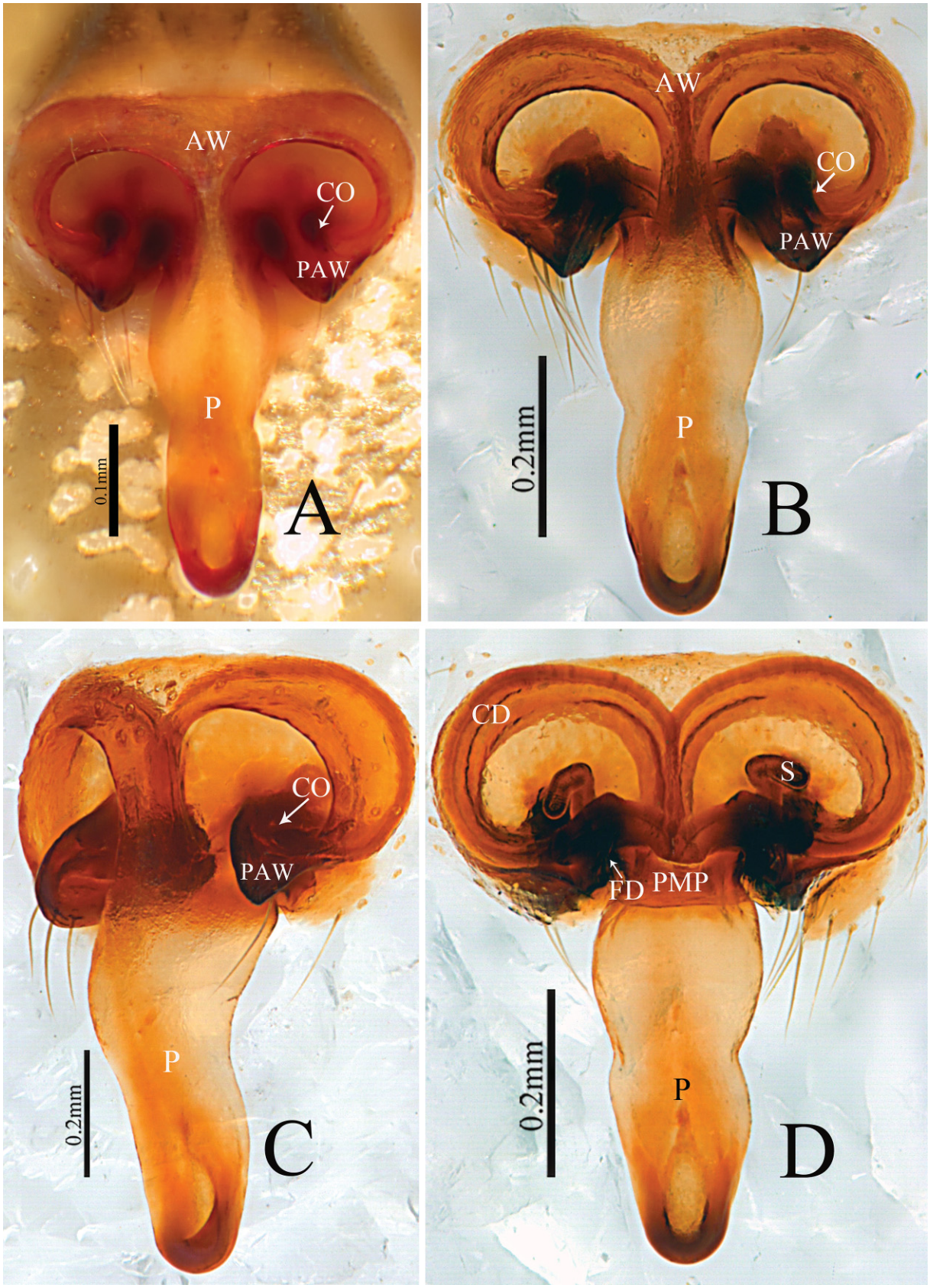


Fig. 32. *Acroterius longimultus* gen. et sp. nov., ♀, paratype (HNU-20040501–02). **A–B**. Epigyne, ventral view. **C**. Epigyne, lateral view. **D**. Vulva, dorsal view.

Length of legs. I = 3.88 (1.19, 1.31, 0.86, 0.52), II = 3.74 (1.15, 1.08, 0.88, 0.63), III = 2.62 (0.8, 0.84, 0.61, 0.37), IV = 3.37 (0.93, 1.03, 0.86, 0.55). Leg formula I–II–IV–III.

Epigyne. Lateral margin of parmula wave-like on each side (Fig. 32A–C); parmula 0.45 long, 0.15 wide at base (Fig. 32A–C); posterior projection of anterior wall of epigynal plate longer than wide and protruding beyond epigastric furrow (Fig. 32A–B). Spermathecae slender, inverted L-shaped (Fig. 32D).

Distribution

China (Yunnan Province, Fig. 39).

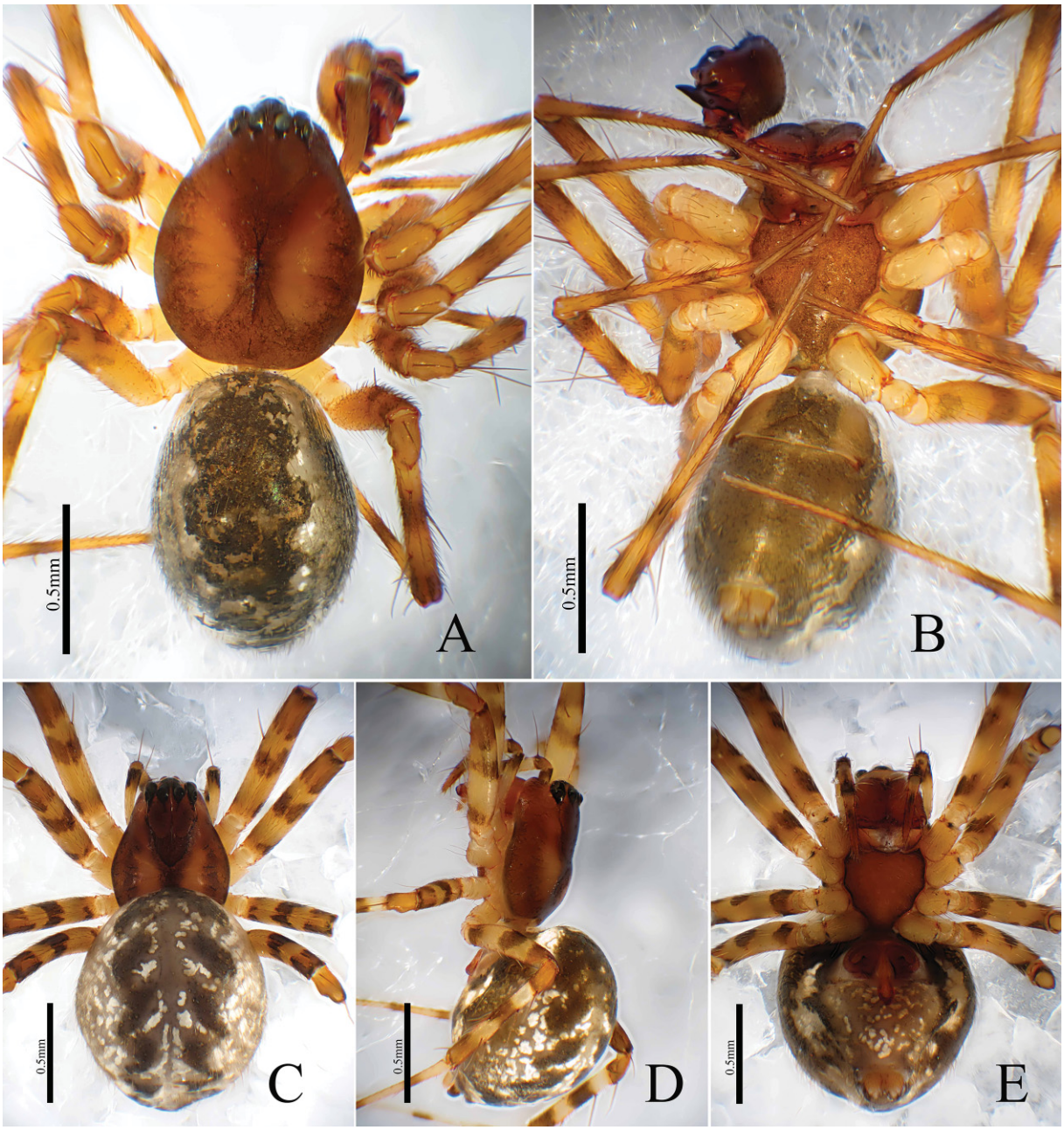


Fig. 33. *Acroterius longimultus* gen. et sp. nov. **A–B**. ♂, holotype (HNU-20040501–1). **C–E**. ♀, paratype (HNU-20040501–02). **A**, **C**. Habitus, dorsal view. **B, E**. Habitus, ventral view. **D**. Habitus, lateral view.

Acroterius longiprojectus gen. et sp. nov.
urn:lsid:zoobank.org:act:5E2F3303-07EE-4A75-9FE8-62EC8372BB8C
Figs 34, 39

Differential diagnosis

The new species resembles *Acroterius hamatus* gen. et sp. nov. (Fig. 19A–D) in having long parmula in epigyne (Fig. 34B–E); it can be distinguished by: the posterior projection of the anterior wall of the epigynal plate longer than wide (Figs 34B–C), but wider than long in *A. hamatus* gen. et sp. nov. (Figs 19A–B, 21A–B). In ventral view, the distal part of parmula is not expanded (Fig. 34B–C), but distinctly expanded in *A. hamatus* gen. et sp. nov. (Fig. 19A–B). The spermathecae are not curved (Fig. 34E), but the tip is curved, pointing towards the posterior margin of the epigyne in *A. hamatus* gen. et sp. nov. (Figs 19D, 21D).

Etymology

The species name comes from the Latin adjective '*longus*' + '*projectus*' meaning 'long' + 'projection', referring to the long posterior projection of the anterior wall of the epigynal plate in the epigyne.

Type material

Holotype

CHINA • ♀; Yunnan Province, Fugong County, Lumadeng Township, Yakou of old Shibali; 27.06430° N, 98.75123° E; alt. 3270 m; 13 Aug. 2005; Guo Tang leg.; HNU-Tang–05–06.

Description

Female (holotype)

Measurements and colour. Total length: 3.15. Carapace 1.33 long, 0.97 wide, cephalic region slightly elevated, brown, dorsally with distinct pattern starting from base of posterior eyes extending to proximal part of cephalothorax; fovea, cervical and radial grooves distinct; clypeus 0.26 high (Fig. 34A); Abdomen 1.83 long, 1.48 wide (Fig. 34A). Eye sizes and interdistances: AME 0.06, ALE 0.08, PME 0.06, PLE 0.07 AME–AME 0.04, PME–PME 0.06, AME–ALE 0.07, PME–PLE 0.09, ALE–ALE 0.42, PLE–PLE 0.45, ALE–PLE contiguous.

Chelicerae. With six promarginal and six retromarginal teeth; reteromarginal teeth long and highly sclerotized.

Length of legs. I = 4.66 (1.14, 1.35, 1.2, 0.77), II = 3.78 (0.95, 1.2, 1.11, 0.52), III = 2.45 (0.84, 1.02, 1.11, 0.49), IV = 4.16 (1.17, 1.23, 1.11, 0.65). Leg formula I–IV–II–III.

Epigyne. Parmula 0.49 long, 0.27 wide at base (Fig. 34B–C); posterior projection of anterior wall of epigynal plate longer than wide on either side (Fig. 34B–C). Spermathecae slender, long, almost touches lateral wall of epigyne on each side (Fig. 34E).

Male

Unknown.

Distribution

China (Yunnan Province, Fig. 39).

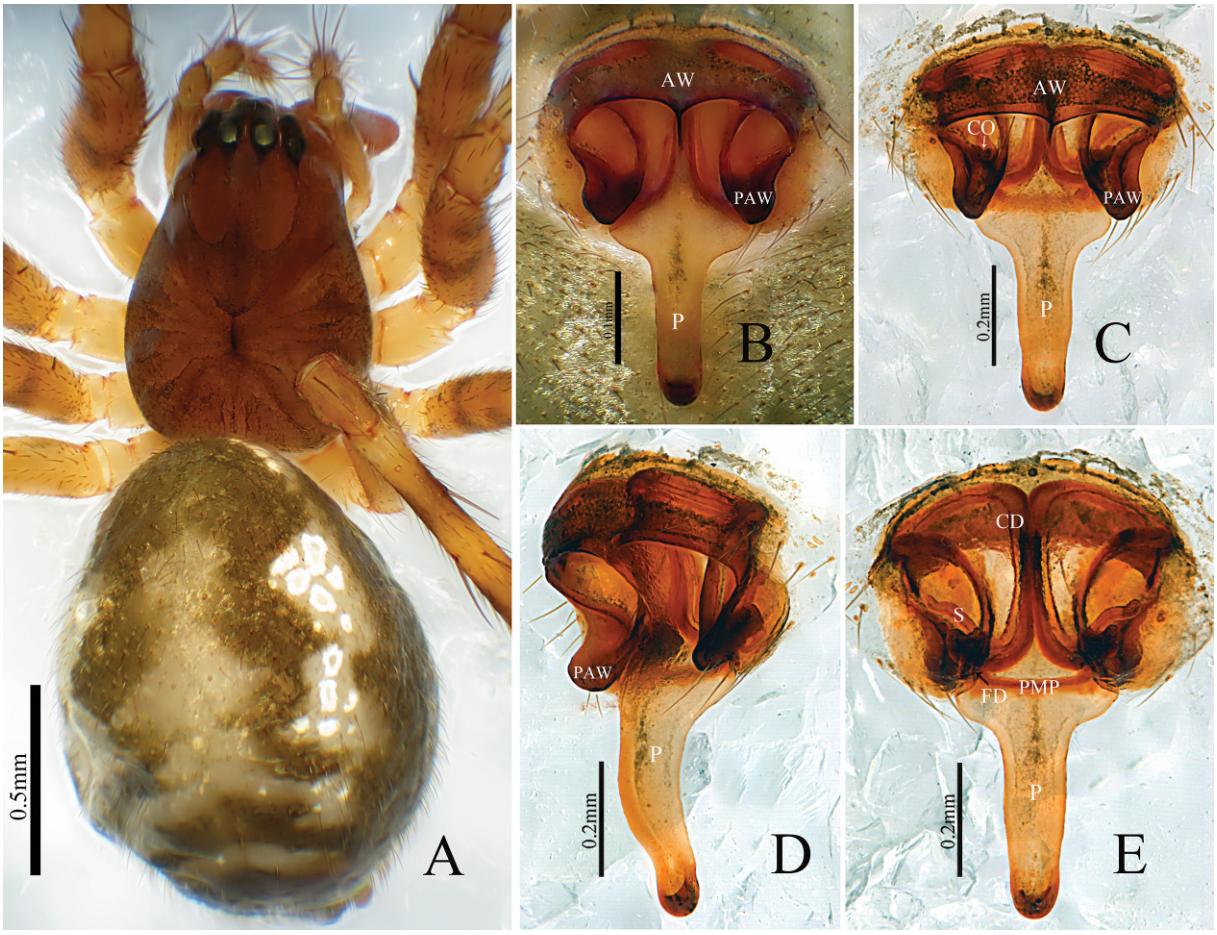


Fig. 34. *Acroterius longiprojectus* gen. et sp. nov., ♀, holotype (HNU-Tang–05–06). **A**. Habitus, dorsal view. **B–C**. Epigyne, ventral view. **D**. Epigyne, lateral view. **E**. Vulva, dorsal view**.**

Acroterius ovatus gen. et sp. nov.
urn:lsid:zoobank.org:act:33E64A5A-FD47-48ED-B075-B721D9EDE3A3
Figs 35–36, 39

Differential diagnosis

The new species resembles *Acroterius longidentatus* gen. et sp. nov. (Fig. 29A–C) in having a similar circular posterior projection of the anterior wall of the epigynal plate in the epigyne (Fig. 36A–C); it can be distinguished by the anterior wall of the oval epigynal plate margin (Fig. 36A–B), but semicircular in *A. longidentatus* gen. et sp. nov. (Fig. 29A–B). In dorsal view, parmula with wave-like margin and almost four times as long as median septum (Fig. 36D), but tongue-shaped and as long as median septum in *A. longidentatus* gen. et sp. nov. (Fig. 29D). The spermathecae are hook-shaped (Fig. 36D), but C-shaped in *A. longidentatus* gen. et sp. nov. (Fig. 29D).

Etymology

The species name comes from the Latin adjective '*ovatus*', meaning 'oval' and referring to the oval anterior wall of the epigynal plate margin of the epigyne.

Type material

Holotype

CHINA • ♀; Yunnan Province, Tengchong County, Mingguang Township, Zizhi Village; 25.79808° N, 98.62406° E; alt. 2756 m; 19 May 2006; Chang-min Yin, Jia-fang Hu and Ming-wei Yang leg.; HNU-YHY06.

Description

Female (holotype)

Measurements and colour. Total length: 3. Carapace 1.01 long, 0.96 wide, cephalic region slightly elevated, dark brown, dorsally with distinct pattern starting from base of posterior eyes extending to proximal part of cephalothorax; fovea, cervical and radial grooves distinct; clypeus 0.23 high (Fig. 35A–B); abdomen 1.99 long, 1.49 wide (Fig. 35A–B). Eye sizes and interdistances: AME 0.06, ALE 0.09, PME 0.08, PLE 0.07, AME–AME 0.04, PME–PME 0.06, AME–ALE 0.09, PME–PLE 0.07, ALE–ALE 0.45, PLE–PLE 0.48, ALE–PLE 0.02.

Chelicerae. With five promarginal and six retromarginal teeth; reteromarginal teeth long and highly sclerotized, protruding beyond fangs.



Fig. 35. *Acroterius ovatus* gen. et sp. nov., ♀, holotype (HNU-YHY06). **A**. Habitus, dorsal view. **B**. Habitus, ventral view.

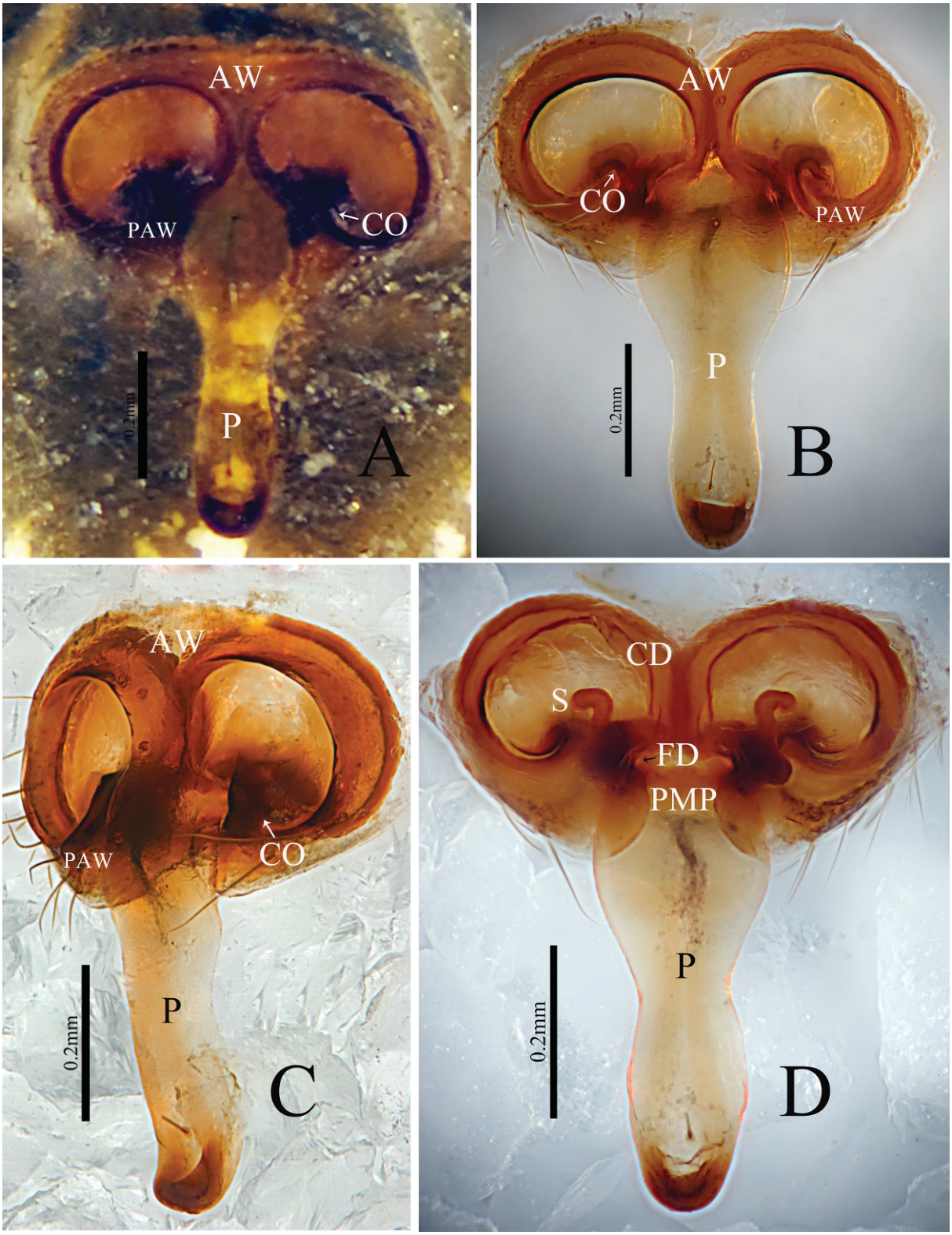


Fig. 36. *Acroterius ovatus* gen. et sp. nov., ♀, holotype (HNU-YHY06). **A–B**. Epigyne, ventral view. **C**. Epigyne, lateral view. **D**. Vulva, dorsal view.

Length of legs. I = 4.34 (1.19, 1.35, 1.07, 0.73), II = 4.03 (1.14, 1.28, 0.89, 0.72), III = 2.76 (0.94, 0.72, 0.65, 0.45), IV = 3.56 (1.15, 1.08, 0.74, 0.59). Leg formula I–II–IV–III.

Epigyne. Lateral margin of parmula wave-like (Fig. 36A–B); parmula 0.57 long, 0.18 wide at base (Fig. 35A–B); anterior wall of epigynal plate margin oval (Fig. 36A–B); posterior projection of anterior wall of epigynal plate somewhat circular on each side (Fig. 36A–B). Spermathecae slender, hook-shaped pointing towards lateral margin of epigyne (Fig. 36D).

Male

Unknown.

Distribution

China (Yunnan Province, Fig. 39).

Acroterius parvus gen. et sp. nov.
urn:lsid:zoobank.org:act:959DFFDC-D4A9-41C5-B099-B7AA5047F2D8
Figs 37, 39

Differential diagnosis

The new species resembles *Acroterius brevis* gen. et sp. nov. in having similar hook-shaped spermathecae; it can be distinguished by the triangular parmula, shorter than the median septum in the new species (Fig. 37A, D), but tongue-shaped and longer than the median septum in *A. brevis* gen. et sp. nov. (Fig. 8A–B, D).

Etymology

The species name comes from the Latin adjective '*parvus*', meaning 'small', referring to the small parmula of the epigyne.

Type material

Holotype

CHINA • ♀; Yunnan Province, Gongshan County, Bingzhongluo Township, Chukuai; 27.97928° N, 98.47389° E; alt. 3725 m; 19 Aug. 2006; Peng Hu leg.; HNU-Hu060819.

Paratype (1 ♀)

CHINA • 1 ♀; same collection data as for holotype; HNU-Hu060819.

Description

Female (holotype)

Measurements and colour. Total length: 4.15. Carapace 1.60 long, 2.90 wide, cephalic region slightly elevated, brown, dorsally with dark brown longitudinal band starting from base of posterior eyes extending to proximal part of cephalothorax; fovea, cervical and radial grooves distinct; clypeus 0.41 high (Fig. 37E–F); abdomen 2.55 long, 2.35 wide. Eye sizes and interdistances: AME 0.13, ALE 0.1, PME 0.09, PLE 0.12, AME–AME 0.06, PME–PME 0.08, AME–ALE 0.07, PME–PLE 0.12, ALE–ALE 0.51, PLE–PLE 0.62, ALE–PLE 0.03.

Chelicerae. With six promarginal and six retromarginal teeth; reteromarginal teeth long and highly sclerotized.

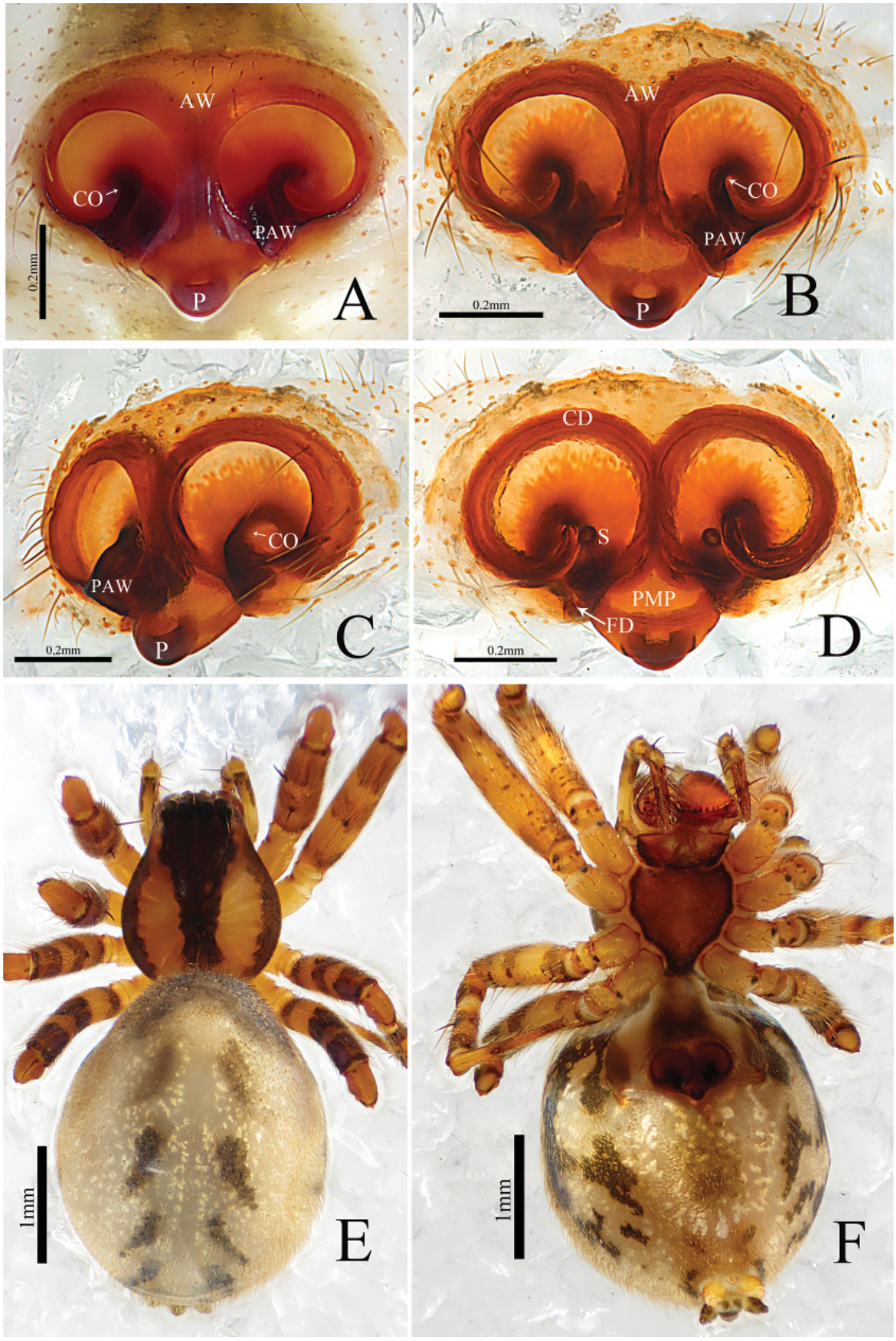


Fig. 37. *Acroterius parvus* gen. et sp. nov., ♀, holotype (HNU-Hu060819). **A–B**. Epigyne, ventral view. **C**. Epigyne, lateral view. **D**. Vulva, dorsal view. **E**. Habitus, dorsal view. **F**. Habitus, ventral view.

Length of legs. I = 7.25 (1.97, 2.24, 1.83, 1.21), II = 6.48 (1.87, 1.89, 1.69, 1.03), III = 4.63 (1.52, 1.34, 1.16, 0.61), IV = 6.02 (1.75, 1.84, 1.54, 0.89). Leg formula I–II–IV–III.

Epigyne. Posterior median plate extends posteriorly with small triangular parmula, wider than long (Fig. 37A–B); parmula 0.26 long, 0.26 wide at base (Fig. 37A–B); posterior projection of anterior wall of epigynal plate circular in ventral view, somewhat triangular in lateral view on each side (Fig. 37A–B). Spermathecae slender, distal part slightly curved and pointing towards fertilization ducts (Fig. 37D).

Male

Unknown.

Distribution

China (Yunnan Province, Fig. 39).

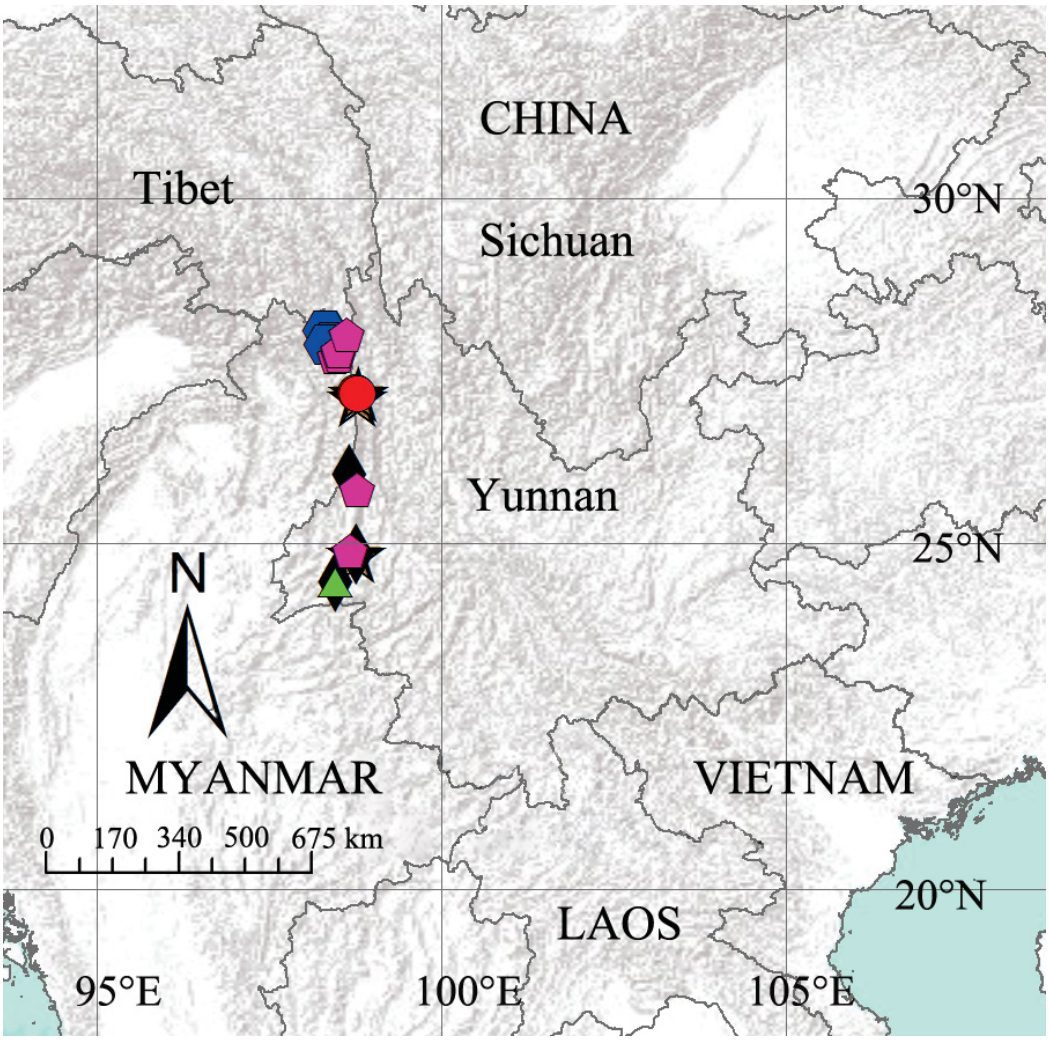


Fig. 38. Map indicating the type localities of *Acroterius absentus* sp. nov. (▲), *A. brevis* sp. nov. (●), *A. camur* sp. nov. (⬟), *A. hamatus* sp. nov. (⬢), *A. inversus* sp. nov. (◆) and *A. latus* sp. nov. (★).

Discussion

Based on illustrations and morphological characters provided by Merrett (1963), *Acroterius* gen. nov. can be identified as a member of the subfamily Linyphiinae given that: a claw is present on the female palp; the male palp lacks a tibial apophysis; the maxillae are long and parallel; and all tibiae have two dorsal spines. The discovery of this new genus is not surprising, considering that there is limited taxonomic research on Linyphiidae from Yunnan. Zhao & Li (2014, 2017), Irfan & Peng (2018, 2019a, 2019b) and Irfan *et al*. (2019) already identified 39 species and 10 genera; with the addition of *Acroterius* gen. nov., the number of linyphiid genera endemic to Yunnan is now eleven. *Acroterius* gen. nov. appears to be closely related to *Zhezhoulinyphia* as many species in both genera have been recorded from the same localities and they share similarities in the embolic division and spermathecae shape. Considering their morphological similarities and overlapping distribution, it is possible that these genera are sister taxa and their ancestor originated in the mountains of southwestern Yunnan. However, more taxonomic and phylogenetic studies need to be done on Linyphiidae from Yunnan and across the adjacent areas to understand the distribution and origins of these taxa.

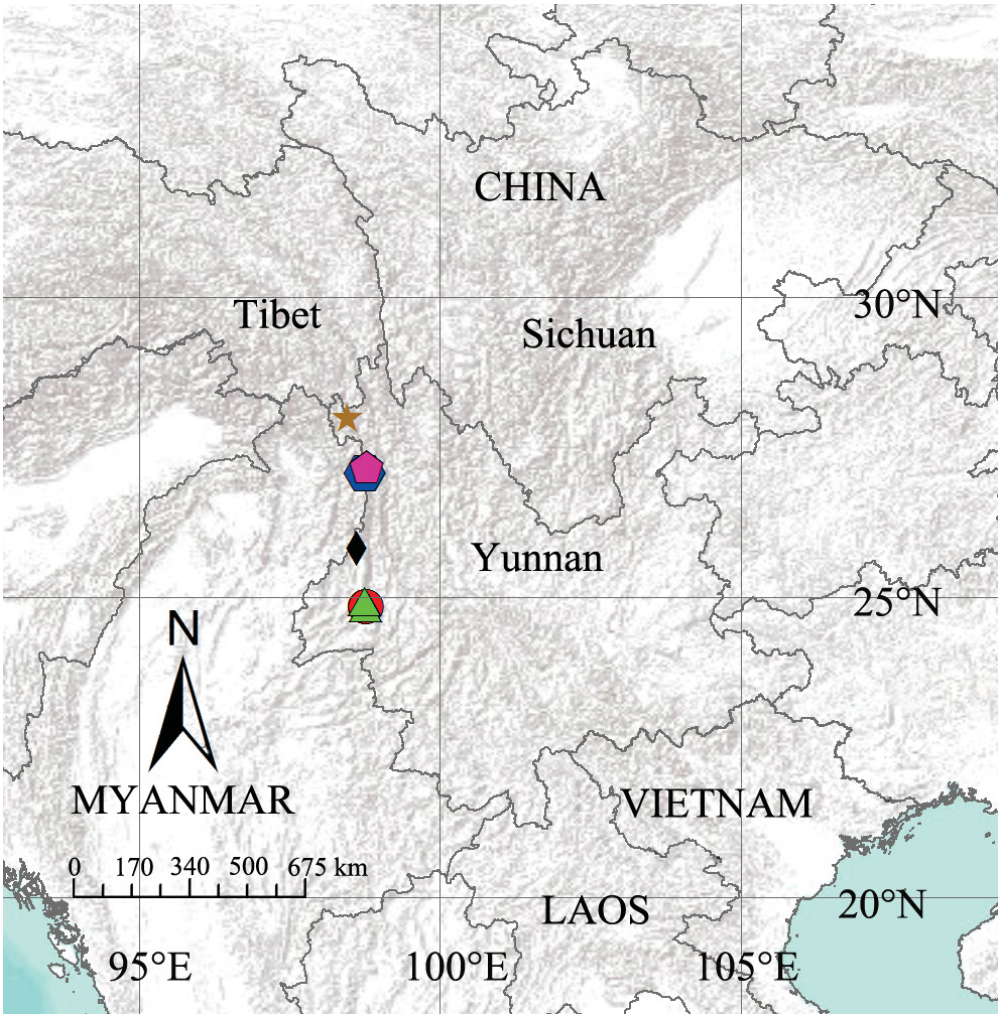


Fig. 39. Map indicating the type localities of *Acroterius circinatus* sp. nov. (▲), *A. longidentatus* sp. nov. (●), *A. longimultus* sp. nov. (⬟), *A. longiprojectus* sp. nov. (⬢), *A. ovatus* sp. nov. (◆) and *A. parvus* sp. nov. (★).

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