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## Research article

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# Seven new species of *Meta* C.L. Koch, 1836 (Araneae, Tetragnathidae) from Southwest China

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**Abstract.** Seven new species of the genus *Meta* C.L. Koch, 1836 from Southwest China are described here: *M. bowo* sp. nov. (♂♀), *M. cona* sp. nov. (♂♀), *M. gyirong* sp. nov. (♂), *M. hongyuan* sp. nov. (♂♀), *M. tibet* sp. nov. (♂♀), *M. wanglang* sp. nov. (♂♀) and *M. weining* sp. nov. (♂♀). Detailed descriptions, photos of somatic features and copulatory organs as well as line drawings, comparisons with closely related species, and a distribution map are provided.

**Keywords.** Description, illustration, long-jawed orbweavers, taxonomy.

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## Introduction

Southwest China includes the provinces of Chongqing, Guizhou, Sichuan, Tibet and Yunnan, with a combined area of 2,365,700 km<sup>2</sup>, and elevations ranging from 645 to >4000 m, resulting in an impressive vertical natural landscape. From southeast Tibet to western Sichuan and northwest Yunnan, the mountains of southwest China are a biodiversity hotspot, with only a narrow range on the western slope of the Gaoligong Mountains, located in northern Myanmar (Cai *et al.* 2019).

The diversity of Tetragnathidae Menge, 1866 spiders in Southwest China is relatively high, with 81 species belonging to 14 genera (*Dianleucauge* Song & Zhu, 1994, *Diphya* Nicolet, 1849, *Dolichognatha* O. Pickard-Cambridge, 1869, *Dyschiriognatha* Simon, 1893, *Guizygiella* Zhu, Kim & Song, 1997, *Leucauge* White, 1841, *Meta* C.L. Koch, 1836, *Metleucauge* Levi, 1980, *Okileucauge* Tanikawa, 2001,

*Orsinome* Thorell, 1890, *Pachygnatha* Sundevall, 1823, *Tetragnatha* Latreille, 1804, *Tylorida* Simon, 1894, and *Wolongia* Zhu, Kim & Song, 1997) (Li & Lin 2016; Wang *et al.* 2020a, 2020b).

The spider genus *Meta* C.L. Koch currently comprises 26 species distributed across the world, including ten species from China (Li & Lin 2016; Wang *et al.* 2020; World Spider Catalog 2022). Spiders of the genus *Meta* prefer shady woods and shallow caves, where they build horizontal webs and position themselves in the middle of the web to capture prey. While examining the specimens collected from Southwest China (including Guizhou, Sichuan and Tibet), seven new species of the genus *Meta* were recognized and are described here.

## Material and methods

All specimens were preserved in 75% ethanol and examined, illustrated, photographed and measured using a Leica M205A stereo microscope (Leica Microsystems Ltd made in Germany) equipped with a drawing tube, a Leica DFC450 camera and LAS software ver. 4.6 (Leica Microsystems Ltd made in Germany). Male palps and epigynes were examined and illustrated after being dissected. Female genitalia were cleared in 90% lactic acid. Eye sizes were measured as the maximum dorsal diameter. Leg measurements are shown as: total length (femur, patella and tibia, metatarsus, tarsus). All measurements are in millimeters. Specimens are deposited in the School of Life Sciences, Southwest University, Chongqing, China (SWUC). The terminology used in the text and figure legends follows Álvarez-Padilla & Hormiga (2011).

## Abbreviations

ALE	=	anterior lateral eye
AME	=	anterior median eye
CD	=	copulatory duct
CEP	=	cymbial ectobasal process
Co	=	conductor
Em	=	embolus
FD	=	fertilization duct
MEA	=	metaine embolic apophysis
MOA	=	median ocular area
Pa	=	paracymbium
PLE	=	posterior lateral eye
PME	=	posterior median eye
Sp	=	spermathecae

## Results

### Taxonomy

Class Arachnida Cuvier, 1812  
 Order Araneae Clerck, 1757  
 Family Tetragnathidae Menge, 1866  
 Genus *Meta* C.L. Koch, 1836

***Meta bowo* sp. nov.**

urn:lsid:zoobank.org:act:791783C1-74A5-4987-AC31-4A0C3BEDB30F

Figs 1A–B, 2–4, 22

### Differential diagnosis

This new species resembles *M. yani* Wang, Zhou, Irfan, Yang & Peng, 2020 (Wang *et al.* 2020a: figs 1e–f, 10a–d, 11a–b, 12a–e) in having the similar conductor of male palp and the similar oval outline of female epigynal plate, but can be distinguished by the following characters: cymbial ectobasal process oval with a depression on distal margin in ventral view, a small tooth medially in retrolateral view in *M. bowo* sp. nov. (Figs 2B–C, 3B–D), whereas Y-shaped, with a small tooth laterally in retrolateral view in *M. yani* (Wang *et al.* 2020a: figs 10b–c, 12b); lower outgrowth of metaine embolic apophysis thumb-shaped with blunt end in ventral view in *M. bowo* sp. nov. (Fig. 3E), whereas narrow with sharp pointed end in *M. yani* (Wang *et al.* 2020a: figs 10c, 12b); spermathecae kidney-shaped in *M. bowo* sp. nov. (Figs 2D–E, 4B), boxing glove-shaped in *M. yani* (Wang *et al.* 2020a: figs 11b, 12e); a pair of conspicuous sclerotized corners in *M. bowo* sp. nov. (Fig. 4A) whereas smooth, rounded margin posteriorly in *M. yani* (Wang *et al.* 2020a: fig 11a).

### Etymology

The epithet refers to the type locality.

### Type material

#### Holotype

CHINA • ♂; Tibet, Bowo County, 29°52′11.10″ N, 95°45′22.67″ E; alt. 2720 m; 15 Jul. 2020; L.Y. Wang, T. Yuan, P. Liu and Y.M. Hou leg.; SWUC-T-TEg-02-01.

#### Paratypes

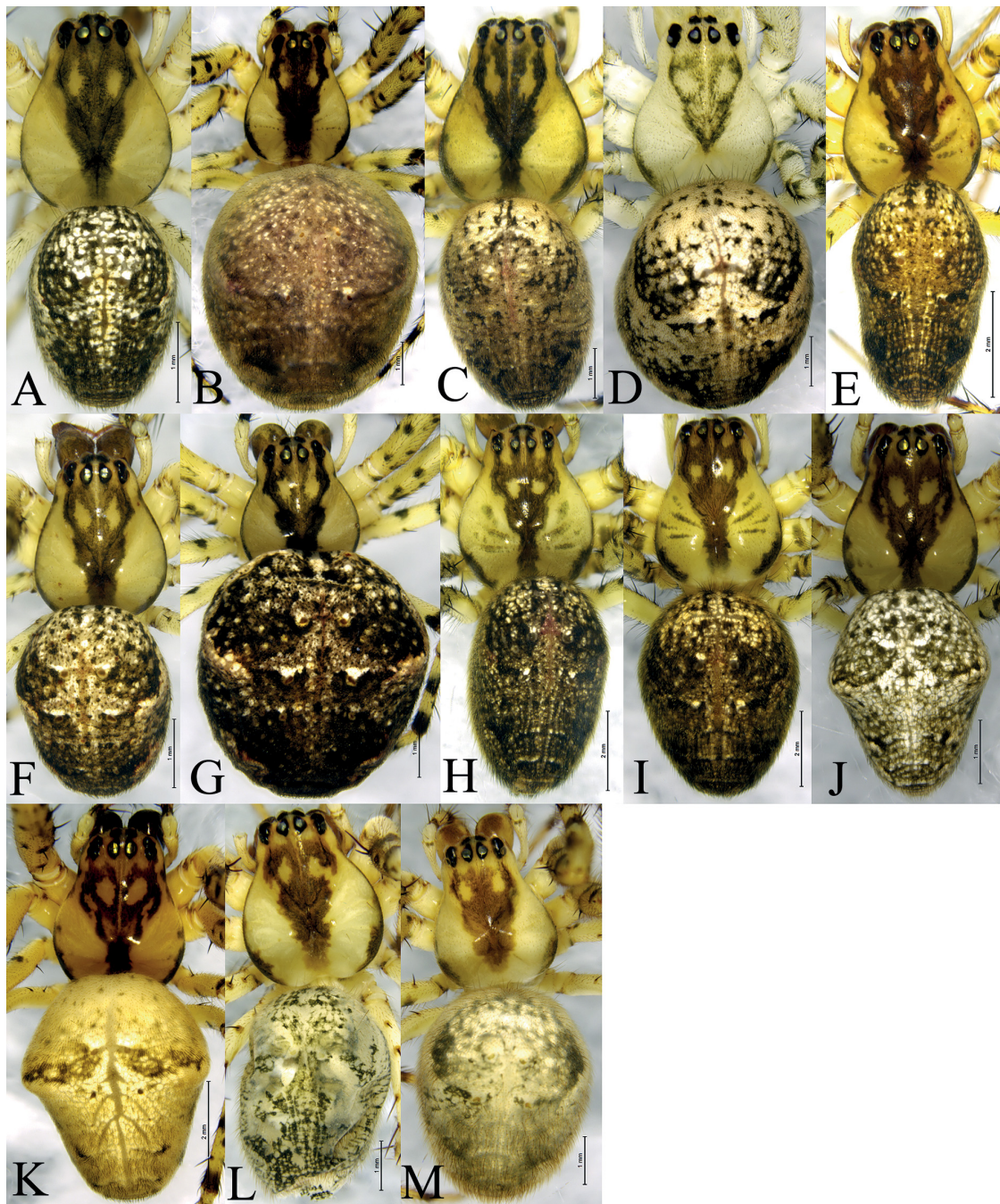
CHINA • 4 ♂♂; same collection data as for holotype; SWUC-T-TEg-02-02–05 • 3 ♀♀; same collection data as for preceding; SWUC-T-TEg-02-06–08 • 2 ♂♂; Bowo County, Gu Township, Gu Village; 29°54′38.58″ N, 95°27′47.94″ E; alt. 2597 m; 16 Jul. 2020; L.Y. Wang, T. Yuan, P. Liu and Y.M. Hou leg.; SWUC-T-TEg-02-09–10 • 1 ♂; Bowo County; 29°52′20.17″ N, 95°45′18.29″ E; alt. 2719 m; 16 Jul. 2020; L.Y. Wang, T. Yuan, P. Liu and Y.M. Hou leg.; SWUC-T-TEg-02-11 • 2 ♂♂; Bowo County; 29°52′7.60″ N, 95°45′19.06″ E; alt. 2700 m; 8 Aug. 2020; L.Y. Wang, T. Yuan, P. Liu and Y.M. Hou leg.; SWUC-T-TEg-02-12–13 • 1 ♀; same collection data as for preceding; SWUC-T-TEg-02-14 • 1 ♂; Bowo County; 29°51.956′ N, 95°45.381′ E; alt. 2810 m; 18 May 2019; L.Y. Wang, T. Yuan, P. Liu and H. Wang leg.; SWUC-T-TEg-02-15.

### Description

#### Male (holotype, Fig. 1A)

MEASUREMENTS. Total length 4.94. Prosoma 2.47 long, 1.91 wide; opisthosoma 2.55 long, 1.87 wide. Eye sizes and interdistances: AME 0.15, ALE 0.18, PME 0.16, PLE 0.16; AME–AME 0.10, AME–





**Fig. 1.** A. *Meta bowo* sp. nov., ♂, holotype (SWUC-T-TEg-02-01), habitus, dorsal view. B. *Meta bowo* sp. nov., ♀, paratype (SWUC-T-TEg-02-06), habitus, dorsal view. C. *Meta cona* sp. nov., ♂, holotype (SWUC-T-TEg-03-01), habitus, dorsal view. D. *Meta cona* sp. nov., ♀, paratype (SWUC-T-TEg-03-02), habitus, dorsal view. E. *Meta gyirong* sp. nov., ♂, holotype (SWUC-T-TEg-04-01), habitus, dorsal view. F. *Meta hongyuan* sp. nov., ♂, holotype (SWUC-T-TEg-05-01), habitus, dorsal view. G. *Meta hongyuan* sp. nov., ♀, paratype (SWUC-T-TEg-05-03), habitus, dorsal view. H. *Meta tibet* sp. nov., ♂, holotype (SWUC-T-TEg-06-01), habitus, dorsal view. I. *Meta tibet* sp. nov., ♀, paratype (SWUC-T-TEg-06-05), habitus, dorsal view. J. *Meta wanglang* sp. nov., ♂, holotype (SWUC-T-TEg-07-01), habitus, dorsal view. K. *Meta wanglang* sp. nov., ♀, paratype (SWUC-T-TEg-07-03), habitus, dorsal view. L. *Meta weining* sp. nov., ♂, holotype (SWUC-T-TEg-08-01), habitus, dorsal view. M. *Meta weining* sp. nov., ♀, paratype (SWUC-T-TEg-08-03), habitus, dorsal view.



ALE 0.13, PME–PME 0.10, PME–PLE 0.16, ALE–PLE 0.02. MOA 0.41 long, front width 0.37, back width 0.45. Clypeus height 0.13.

CHELICERAE. Strong, with three promarginal and four retromarginal teeth.

LEG MEASUREMENTS. I = 12.96 (3.45, 4.53, 3.56, 1.42); II = 9.90 (2.81, 3.38, 2.50, 1.21); III = 5.29 (1.67, 1.61, 1.28, 0.73); IV = 7.12 (2.36, 2.19, 1.86, 0.71). Leg formula: 1243.

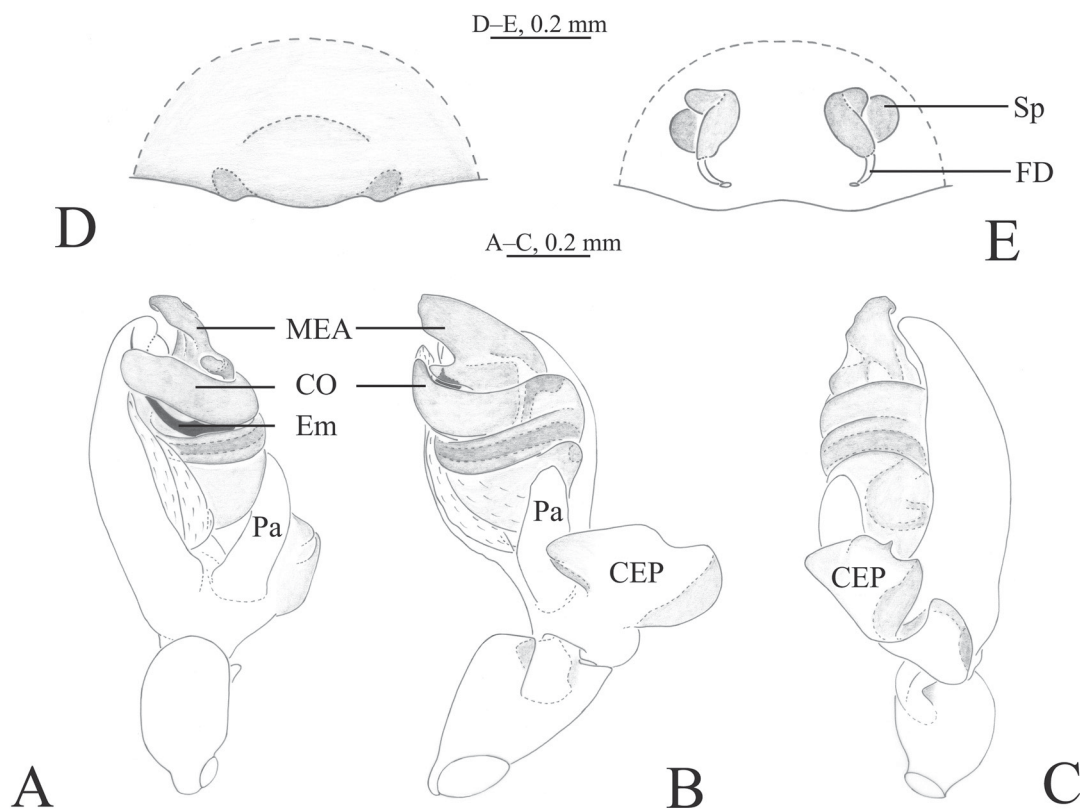
OPISTHOSOMA. Oval, with two pairs of sigillae. Both dorsum and venter white, with black markings.

PALP (Figs 2A–C, 3A–E). Cymbial ectobasal process simple, oval, with a deep depression on distal end and a sharp conspicuous tooth in retrolateral view. Paracymbium finger-like, widest medially, with sparse long hairs. Metaine embolic apophysis longer than wide, bifurcated, extending forward; lower outgrowth thumb-shaped with blunt end.

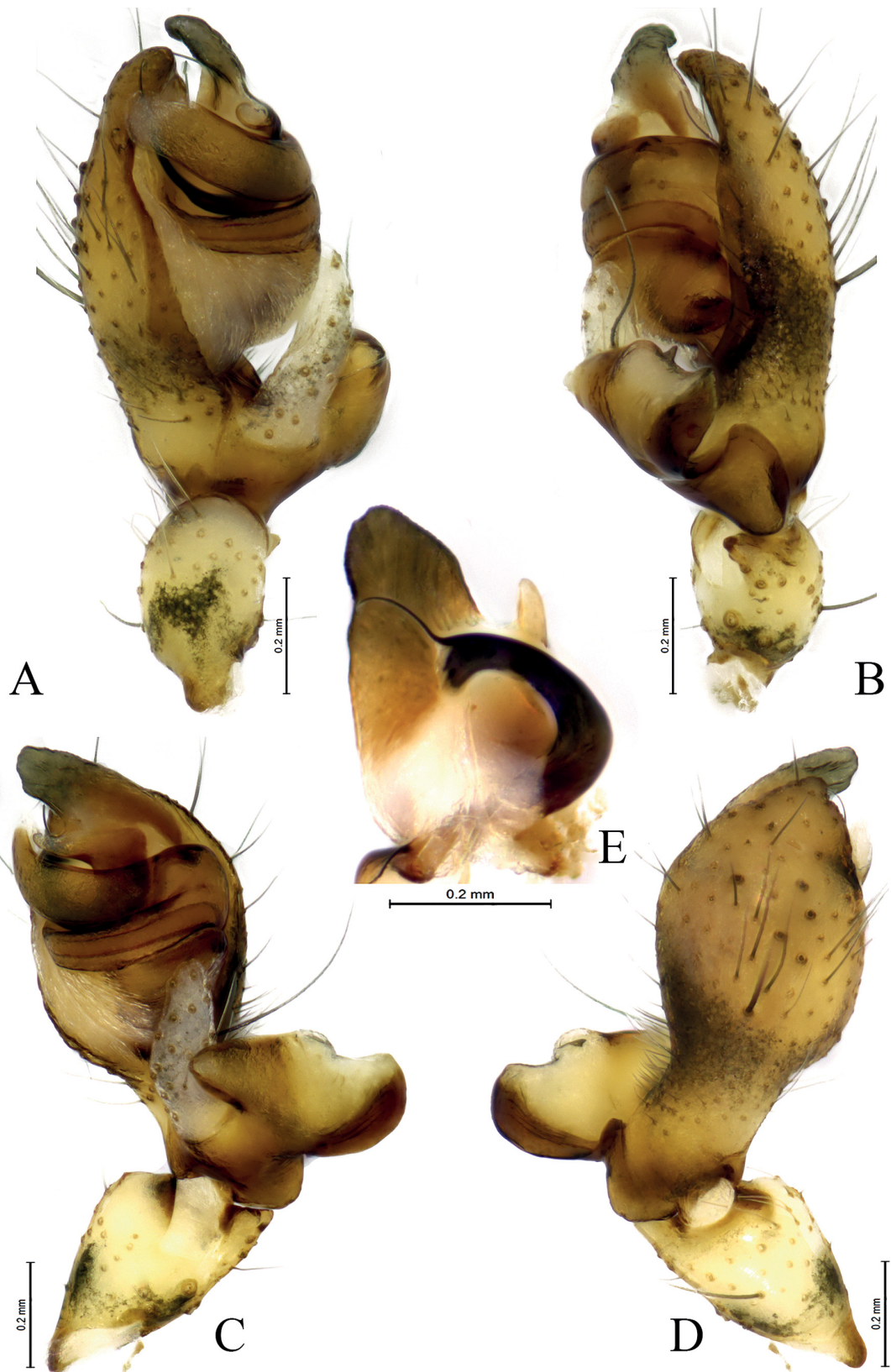
EMBOLUS. Short, abruptly thin with very fine tip. Conductor strong, arising meso-retrolaterally from bulb and extending clockwise, longer than wide, with membranous end.

**Female** (paratype SWUC-T-TEg-02-06, Fig. 1B)

MEASUREMENTS. Total length 8.82. Prosoma 3.09 long, 2.45 wide; opisthosoma 5.72 long, 4.95 wide. Eye sizes and interdistances: AME 0.22, ALE 0.23, PME 0.20, PLE 0.21; AME–AME 0.10, AME–



**Fig. 2.** *Meta bowo* sp. nov. **A–C.** ♂, holotype (SWUC-T-TEg-02-01). **D–E.** ♀, paratype (SWUC-T-TEg-02-06). **A.** Left palp, prolateral view. **B.** Same, ventral view. **C.** Same, retrolateral view. **D.** Epigyne, ventral view. **E.** Vulva, dorsal view.

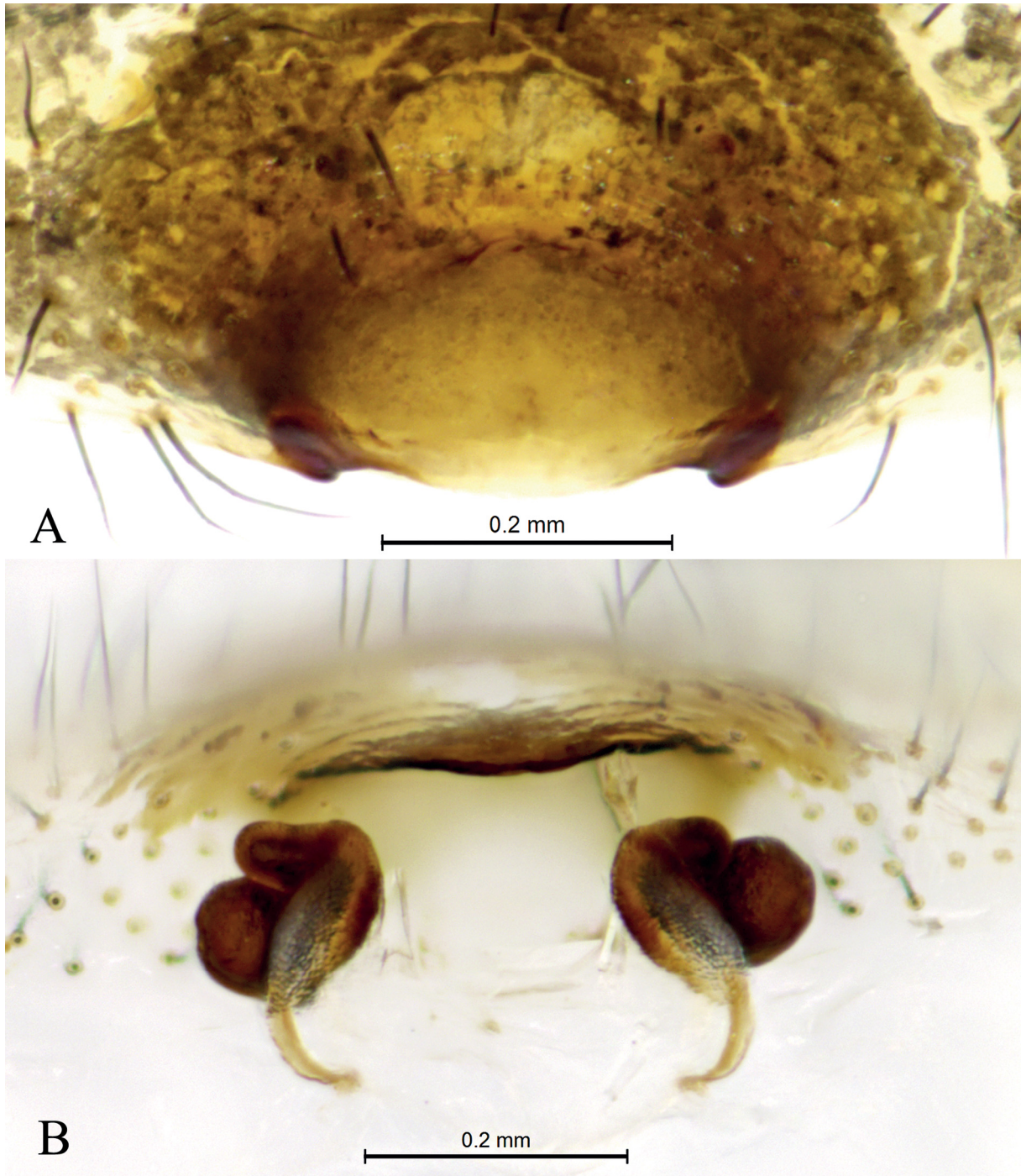


**Fig. 3.** *Meta bowo* sp. nov. A–D. ♂, holotype (SWUC-T-TEg-02-01). E. ♂, paratype (SWUC-T-TEg-02-02). A. Left palp, prolateral view. B. Same, ventral view. C. Same, retrolateral view. D. Same, dorsal view. E. Embolus and metaine embolic apophysis, dorsal view.



ALE 0.18, PME–PME 0.10, PME–PLE 0.22, ALE–PLE 0.03. MOA 0.53 long, front width 0.54, back width 0.56. Clypeus height 0.33.

LEG MEASUREMENTS. I = 13.94 (3.88, 4.88, 3.55, 1.63); II = 11.17 (3.29, 3.85, 2.68, 1.35); III = 6.47 (2.00, 2.16, 1.54, 0.77); IV = 8.72 (2.97, 2.94, 1.95, 0.86). Leg formula: 1243. Other morphological characteristics same as in male except opisthosoma light brownish with black markings.



**Fig. 4.** *Meta bowo* sp. nov., ♀, paratype (SWUC-T-TEg-02-06). **A.** Epigyne, ventral view. **B.** Vulva, dorsal view.



EPIGYNE (Figs 2D–E, 4A–B). Posterior margin of epigynal plate wave-like, posterior margin corners sclerotized with a pair of small protrusions.

VULVA (Figs 2D–E, 4A–B). Spermathecae kidney-shaped. Fertilization ducts thick, S-shaped.

### Distribution

China, Tibet (Bowo) (Fig. 22).

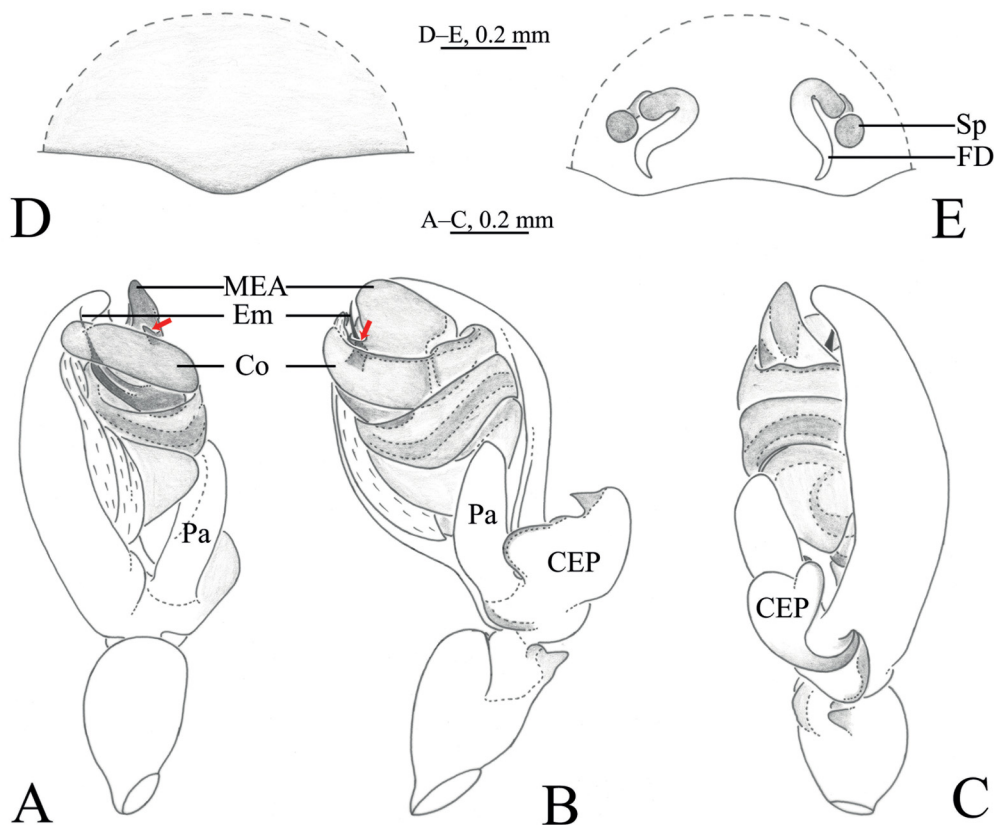
### *Meta cona* sp. nov.

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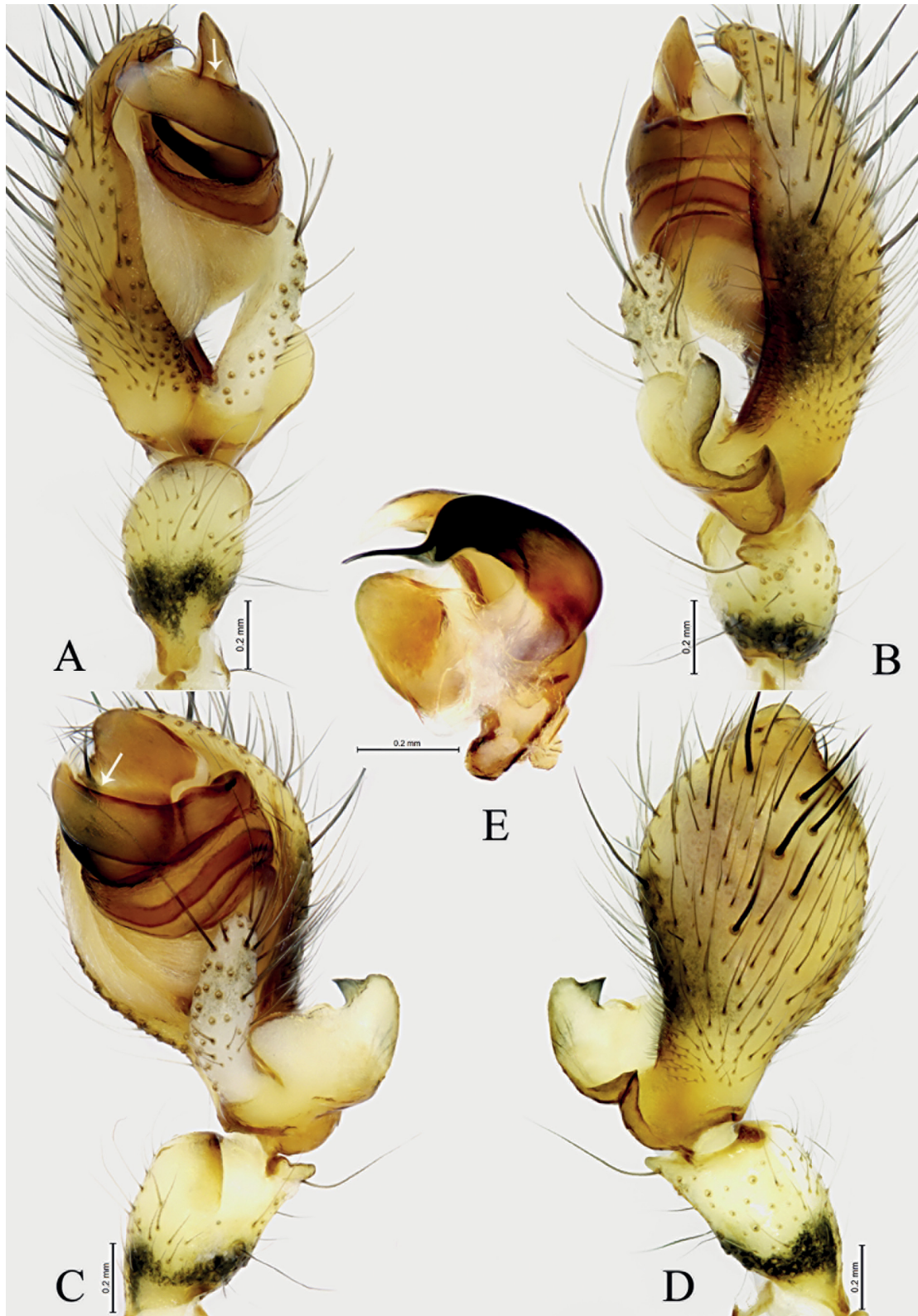
Figs 1C–D, 5–7, 22

### Differential diagnosis

The male of this new species resembles *M. bowo* sp. nov. (Figs 1–4) in having the similar conductor, paracymbium and the abruptly thin embolus of male palp, but can be distinguished by the following characters: metaine embolic apophysis relatively globular, lower outgrowth narrow with pointed end in ventral view in *M. cona* sp. nov. (Figs 5B, 6E), whereas longer than wide, lower outgrowth thumb-shaped with blunt end in *M. bowo* (Figs 2B, 3E); cymbial ectobasal process robust with a sharp tooth at



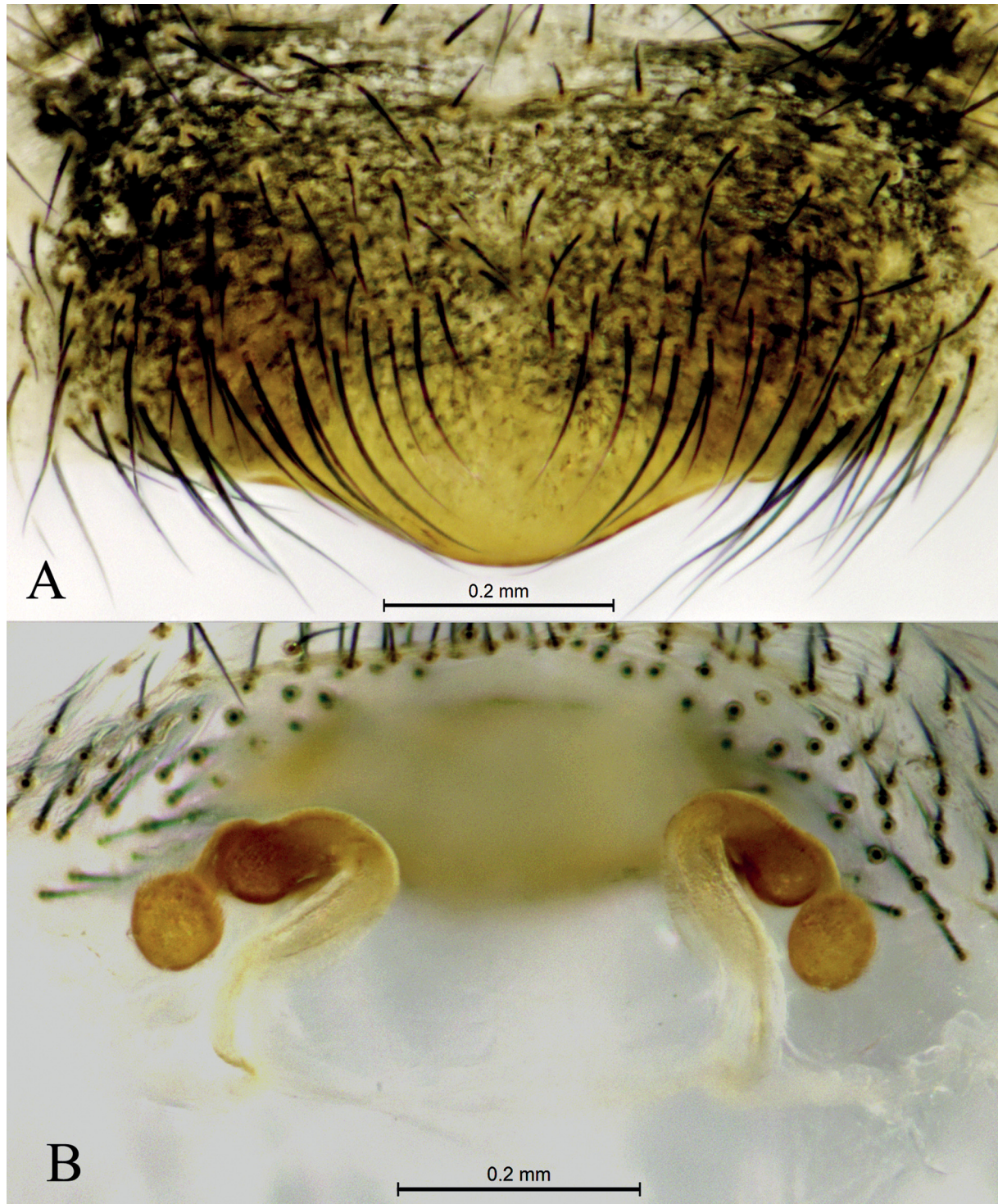
**Fig. 5.** *Meta cona* sp. nov. A–C. ♂, holotype (SWUC-T-TEg-03-01). D–E. ♀, paratype (SWUC-T-TEg-03-02). A. Left palp, prolateral view. B. Same, ventral view. C. Same, retrolateral view. D. Epigyne, ventral view. E. Vulva, dorsal view. A–B. Red arrow indicating the lower outgrowth of metaine embolic apophysis.



**Fig. 6.** *Meta cona* sp. nov., ♂, holotype (SWUC-T-TEg-03-01). **A.** Left palp, prolateral view. **B.** Same, ventral view. **C.** Same, retrolateral view. **D.** Same, dorsal view. **E.** Right palp, Embolus and metaine embolic apophysis, dorsal view. **A, C.** White arrow indicating the lower outgrowth of metaine embolic apophysis.



distal end visible in ventral view in *M. cona* sp. nov. (Figs 5B–C, 6B–D), whereas oval with a depression on distal margin, tooth invisible in ventral view in *M. bowo* (Figs 2B–C, 3B–D). The female of *M. cona* sp. nov. can be distinguished from all other congeners by the epigynal plate arc-shaped, relatively protruding posteriorly and spermathecae looks like beads on the string (Figs 5D–E, 7A–B).



**Fig. 7.** *Meta cona* sp. nov., ♀, paratype (SWUC-T-TEg-03-02). **A.** Epigyne, ventral view. **B.** Vulva, dorsal view.



**Etymology**

The epithet refers to the type locality.

**Type material****Holotype**

CHINA • ♂; Tibet, Cona County, Mama Township, Lebugou; 27°52'51.24" N, 91°47'33.85" E; alt. 2780 m; 4 Aug. 2020; L.Y. Wang, T. Yuan and Y.M. Hou leg.; SWUC-T-TEg-03-01.

**Paratypes**

CHINA • 1 ♀; same collection data as for holotype; SWUC-T-TEg-03-02 • 1 ♀; Cona County, Mama Township, Lebugou; 27°53'54.98" N, 91°48'2.01" E; alt. 3008 m; 4 Aug. 2020; L.Y. Wang, T. Yuan and Y.M. Hou leg.; SWUC-T-TEg-03-02.

**Description****Male** (holotype, Fig. 1C)

MEASUREMENTS. Total length 7.89. Prosoma 3.74 long, 3.00 wide; opisthosoma 4.30 long, 3.03 wide. Eye sizes and interdistances: AME 0.22, ALE 0.21, PME 0.23, PLE 0.20; AME–AME 0.22, AME–ALE 0.25, PME–PME 0.17, PME–PLE 0.31, ALE–PLE 0.05. MOA 0.57 long, front width 0.58, back width 0.60. Clypeus height 0.22.

CHELICERAE. Strong, with 3 promarginal and 4 retromarginal teeth.

LEG MEASUREMENTS. I = 20.25 (5.54, 7.04, 5.57, 2.10); II = 15.52 (4.47, 5.34, 4.05, 1.66); III = 8.76 (2.74, 2.71, 2.21, 1.10); IV = 12.13 (3.85, 3.93, 2.82, 1.53). Leg formula: 1243.

OPISTHOSOMA. Oval, with two pairs of sigillae. Both dorsum and venter white, with black markings.

PALP (Figs 5A–C, 6A–E). Cymbial ectobasal process simple, distal end protruding with a sharp tooth. Paracymbium finger-like, widest medially, with sparse long hairs. Metaine embolic apophysis sclerotized, globular, lower outgrowth narrow with pointed end, extending forward (shown with black arrow, Figs 5A–C, 6A–E).

EMBOLUS. Short, abruptly thin with very fine tip. Conductor strong, arising meso-retrolaterally from bulb and extending clockwise, longer than wide, with membranous end.

**Female** (paratype SWUC-T-TEg-03-02, Fig. 1D)

MEASUREMENTS. Total length 7.87. Prosoma 3.67 long, 2.83 wide; opisthosoma 4.53 long, 3.99 wide. Eye sizes and interdistances: AME 0.19, ALE 0.21, PME 0.22, PLE 0.21; AME–AME 0.23, AME–ALE 0.30, PME–PME 0.20, PME–PLE 0.31, ALE–PLE 0.08. MOA 0.68 long, front width 0.55, back width 0.61. Clypeus height 0.32.

LEG MEASUREMENTS. I = 16.24 (4.53, 5.76, 3.90, 2.05); II = 13.03 (3.69, 4.61, 3.18, 1.55); III = 7.68 (2.28, 2.53, 1.73, 1.14); IV = 10.25 (3.09, 3.34, 2.64, 1.18). Leg formula: 1243. Other morphological characteristics same as in male.

EPIGYNE (Figs 5D–E, 7A–B). Posterior margin of epigynal plate arc-shaped, protruding posteriorly.

VULVA. Spermathecae looks like beads on the string. Fertilization ducts thick, S-shaped.

### Distribution

China, Tibet (Cona) (Fig. 22).

### *Meta gyirong* sp. nov.

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Figs 1E, 8–9, 22

### Differential diagnosis

*M. gyirong* sp. nov. can be distinguished from all other congeners by the metaine embolic apophysis tongue-shaped with blunt end; cymbial ectobasal process L-shaped with a ramous about two times longer than tibia, gradually narrow towards distal end with pointed tip and a sharp tooth (Figs 8A–C, 9A–D).

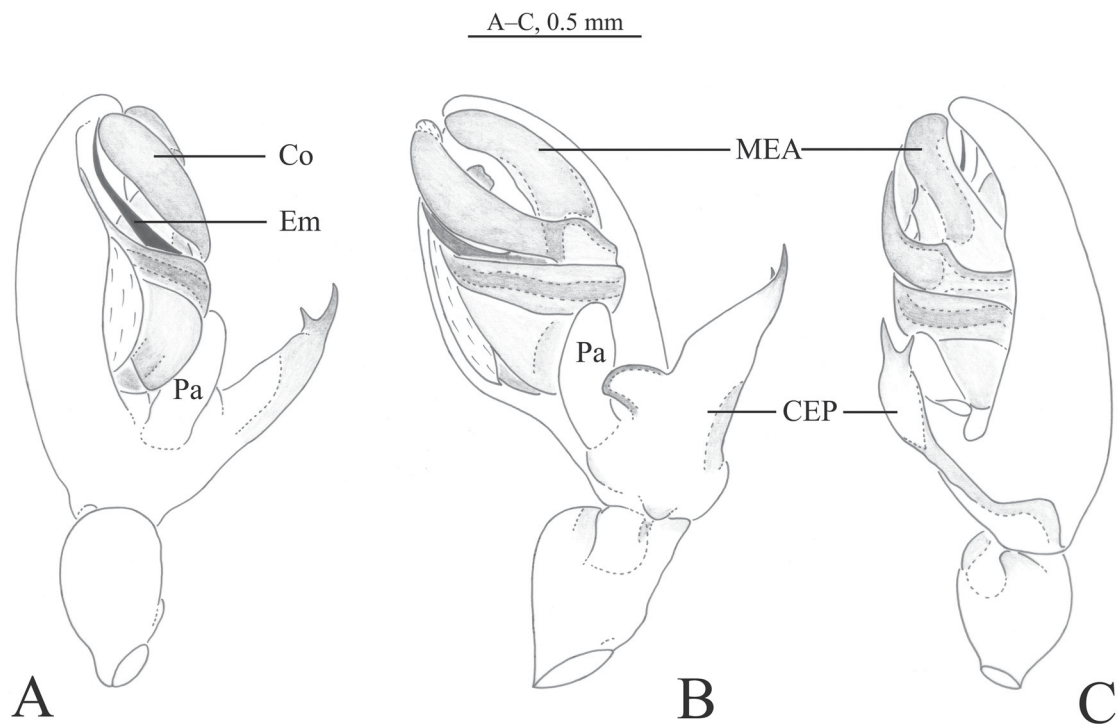
### Etymology

The epithet refers to the type locality.

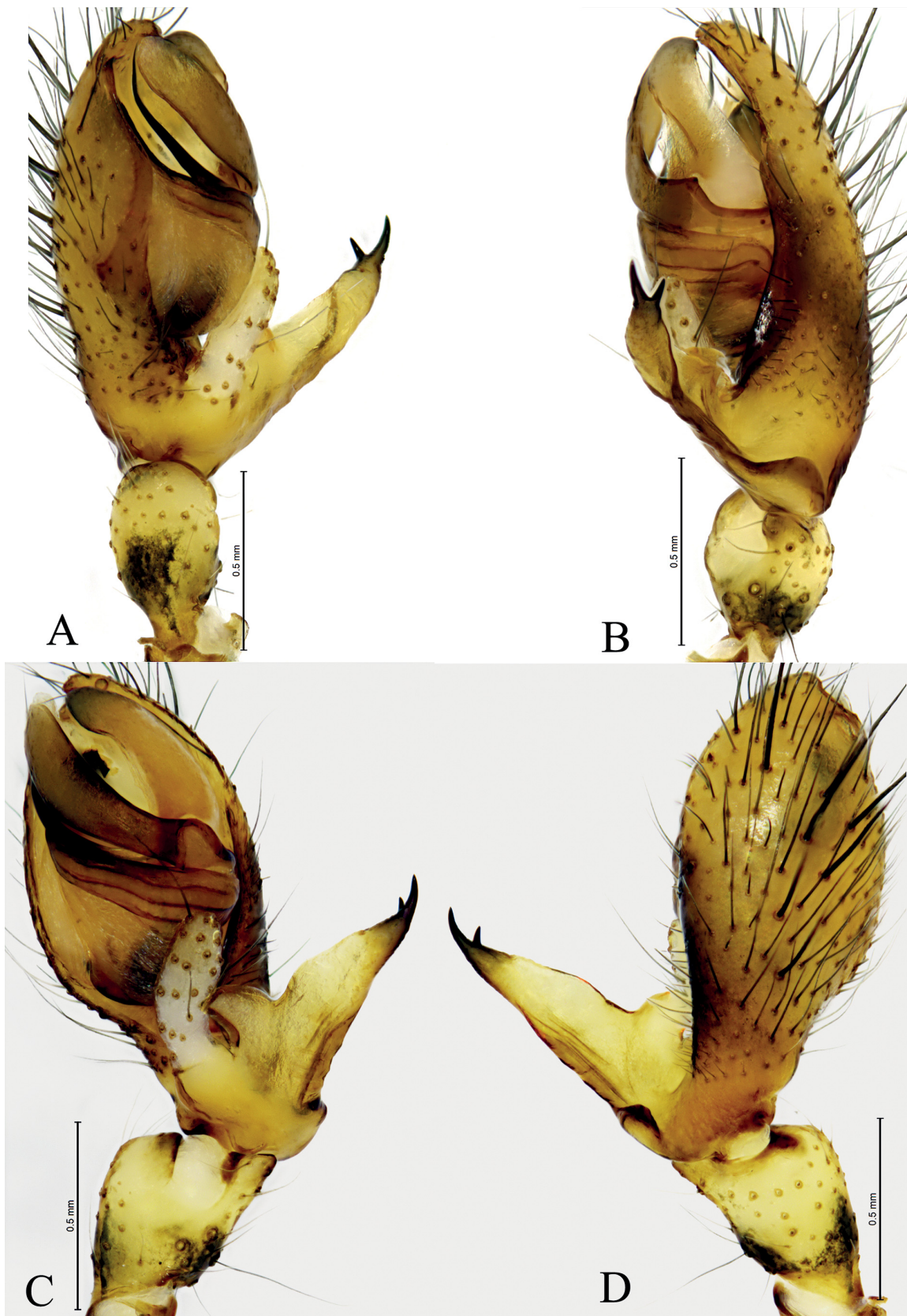
### Type material

#### Holotype

CHINA • ♂; Tibet, Gyirong County, Gyirong Town, Riwubanba; 28°28'33.55" N, 85°13'35.65" E; alt. 3089 m; 30 Jul. 2020; L.Y. Wang, T. Yuan, P. Liu and Y.M. Hou leg.; SWUC-T-TEg-04-01.



**Fig. 8.** *Meta gyirong* sp. nov., ♂, holotype (SWUC-T-TEg-04-01). **A.** Left palp, prolateral view. **B.** Same, ventral view. **C.** Same, retrolateral view.



**Fig. 9.** *Meta gyirong* sp. nov., ♂, holotype (SWUC-T-TEg-04-01). **A.** Left palp, prolateral view. **B.** Same, ventral view. **C.** Same, retrolateral view. **D.** Same, dorsal view.



### Paratypes

CHINA • 2 ♂♂; same collection data as for holotype; SWUC-T-TEg-04-02–03 • 3 ♂♂; Gyirong County, Gyirong Town, Riwubanba; 28°28'33.55" N, 85°13'35.65" E; alt. 3089 m; 15 Jul. 2018; L.Y. Wang, Z.S. Wu and Y.N. Mu leg.; SWUC-T-TEg-04-04–06 • 1 ♂; Gyirong County, Gyirong Town, Longmu; 28°28.836' N, 85°13.489' E; alt. 3074 m; 17 Jul. 2018; L.Y. Wang, Z.S. Wu and Y.N. Mu leg.; SWUC-T-TEg-04-07.

### Description

#### Male (holotype, Fig. 1E)

MEASUREMENTS. Total length 7.37. Prosoma 3.44 long, 2.67 wide; opisthosoma 4.39 long, 2.62 wide. Eye sizes and interdistances: AME 0.20, ALE 0.21, PME 0.20, PLE 0.20; AME–AME 0.14, AME–ALE 0.22, PME–PME 0.14, PME–PLE 0.27, ALE–PLE 0.03. MOA 0.51 long, front width 0.53, back width 0.55. Clypeus height 0.21.

CHELICERAE. Strong, with 3 promarginal and 4 retromarginal teeth.

LEG MEASUREMENTS. I = 27.24 (7.28, 9.50, 8.14, 2.32); II = 19.08 (5.59, 6.83, 5.04, 1.62); III = 10.04 (3.25, 3.20, 2.53, 1.06); IV = 13.31 (4.30, 4.29, 3.54, 1.18). Leg formula: 1243.

OPISTHOSOMA. Oval, with two pairs of sigillae. Both dorsum and venter yellowish brown, with black markings.

PALP (Figs 8A–C, 9A–D). Cymbial ectobasal process simple, two times longer than tibia narrow towards distal end, with sharp tooth. Paracymbium finger-like, widest medially, with sparse long hairs. Metaine embolic apophysis sclerotized, longer than wide, slightly curved, extending forward.

EMBOLUS. Long, arc-shaped with fine tip. Conductor strong, arising meso-retrolaterally from bulb and extending clockwise, sword-shaped in ventral view.

#### Female

Unknown.

### Distribution

China, Tibet (Gyirong) (Fig. 22).

#### *Meta hongyuan* sp. nov.

urn:lsid:zoobank.org:act:58FF42FD-1DF9-4525-9325-403E3809F8B7

Figs 1F–G, 10–12, 22

### Differential diagnosis

The male of this new species resembles *M. bowo* sp. nov. (Figs 2–4) in having the similar bifurcate metaine embolic apophysis and paracymbium of male palp, but can be distinguished by the following characters: cymbial ectobasal process U-shaped with a sharp pointed tip in ventral view and lacking a tooth-like process in *M. hongyuan* sp. nov. (Figs 10B–C, 11B–D), whereas oval with a tooth-like process and a depression on distal margin in *M. bowo* (Figs 2B–C, 3B–D); embolus long, arc-shaped and gradually narrowing towards tip in *M. hongyuan* sp. nov. (Figs 10A, 11A), whereas short and abruptly thin in *M. bowo* (Figs 2A, 3A, E). The female of *M. hongyuan* sp. nov. can be distinguished from all other congeners by the epigynal plate posteriorly with a distinct sclerotized depression and spermathecae brain-shaped (Figs 10D–E, 12A–B).

**Etymology**

The epithet refers to the type locality.

**Type material****Holotype**

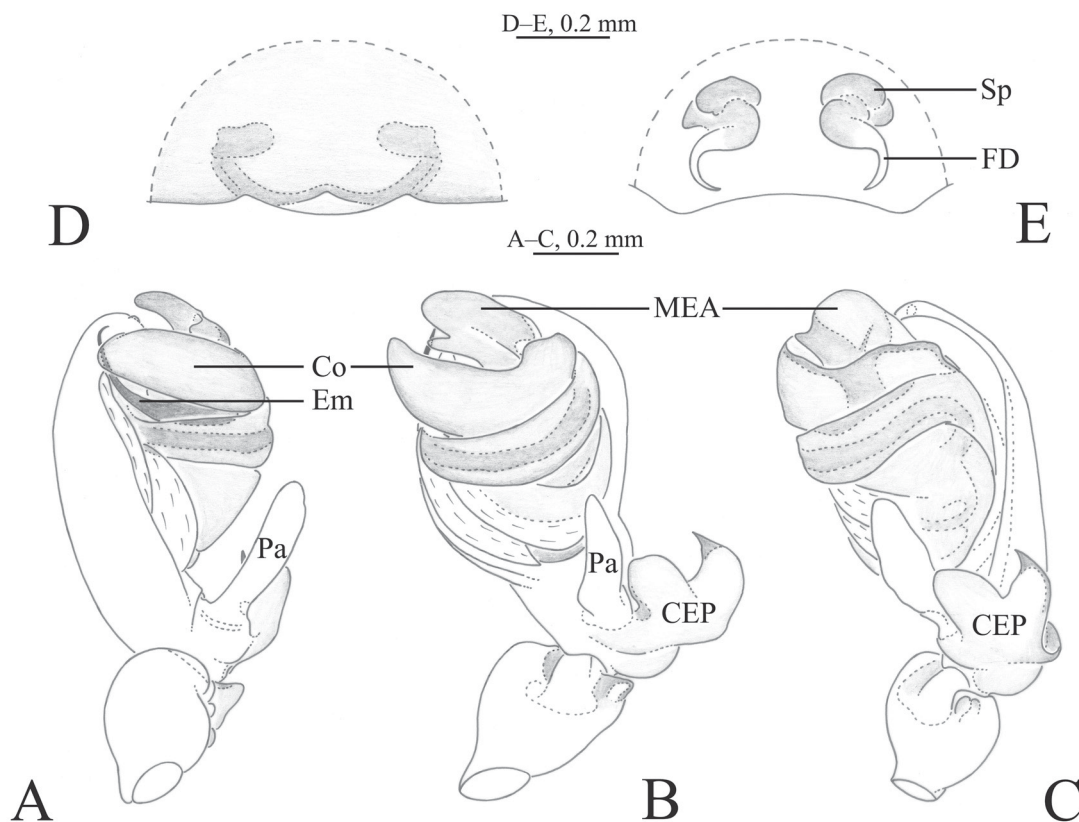
CHINA • ♂; Sichuan Province, Hongyuan County, Shuajingsi Town, Shuamalukou; 31°57'41.23" N, 102°38'12.03" E; alt. 3189 m; 13 Oct. 2020; L.Y. Wang, Y. Zhang, J.X. Zhao and J.S. Luo leg.; SWUC-T-TEg-05-01.

**Paratypes**

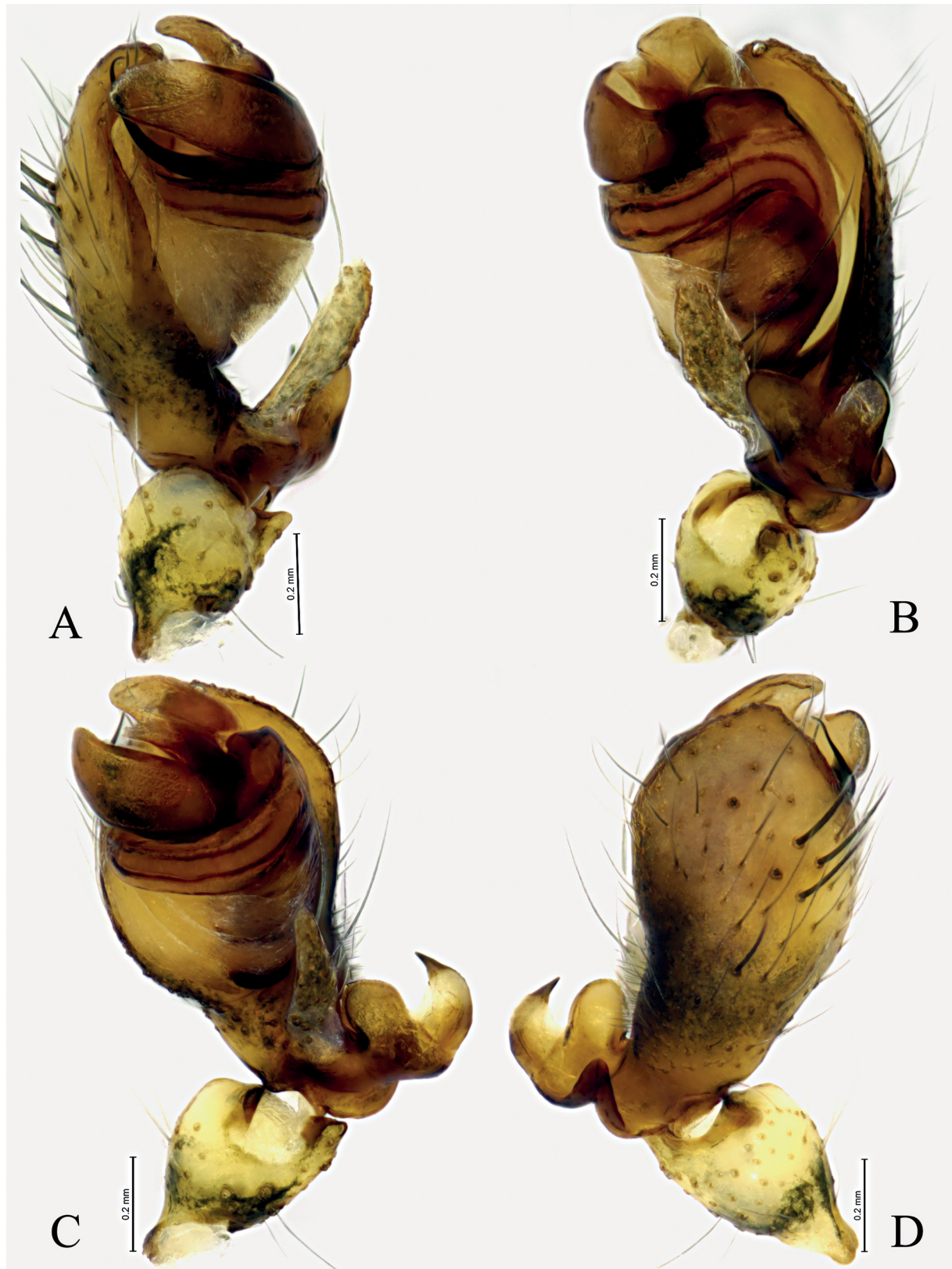
CHINA • 1 ♂; same collection data as for holotype; SWUC-T-TEg-05-02 • 2 ♀♀; same collection data as for preceding; SWUC-T-TEg-05-03–04.

**Description****Male (holotype, Fig. 1F)**

MEASUREMENTS. Total length 5.03. Prosoma 2.46 long, 1.93 wide, opisthosoma 2.82 long, 2.28 wide. Eye sizes and interdistances: AME 0.17, ALE 0.18, PME 0.17, PLE 0.18; AME–AME 0.10, AME–ALE 0.13, PME–PME 0.10, PME–PLE 0.16, ALE–PLE 0.03. MOA 0.45 long, front width 0.40, back width 0.45. Clypeus height 0.18.

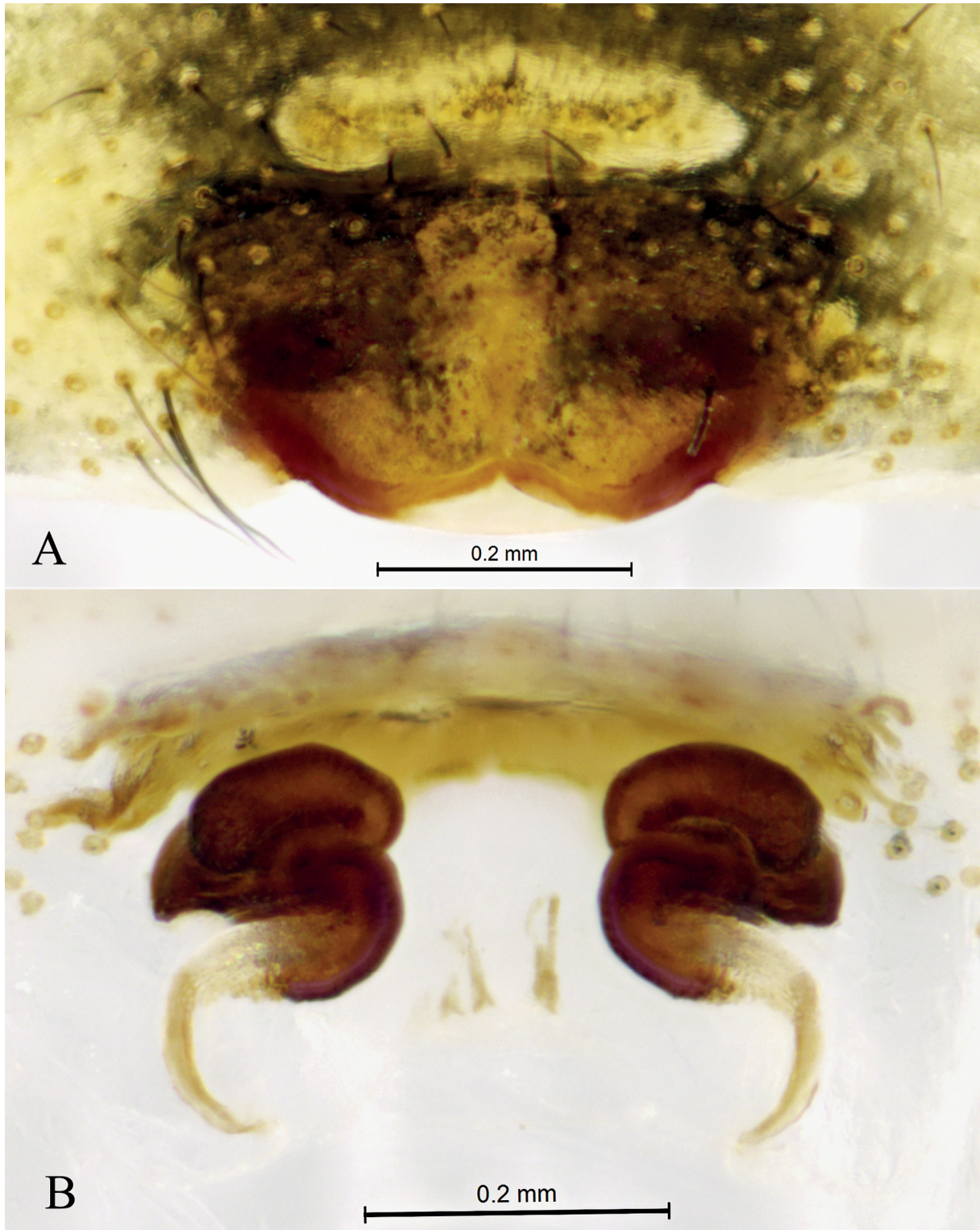


**Fig. 10.** *Meta hongyuan* sp. nov. **A–C.** ♂, holotype (SWUC-T-TEg-05-01). **D–E.** ♀, paratype (SWUC-T-TEg-05-03). **A.** Left palp, prolateral view. **B.** Same, ventral view. **C.** Same, retrolateral view. **D.** Epigyne, ventral view. **E.** Vulva, dorsal view.



**Fig. 11.** *Meta hongyuan* sp. nov., ♂, holotype (SWUC-T-TEg-05-01). **A.** Left palp, prolateral view. **B.** Same, ventral view. **C.** Same, retrolateral view. **D.** Same, dorsal view.





**Fig. 12.** *Meta hongyuan* sp. nov., ♀, paratype (SWUC-T-TEg-05-03). **A.** Epigyne, ventral view. **B.** Vulva, dorsal view.

CHELICERAE. Strong, with 3 promarginal and 4 retromarginal teeth.

LEG MEASUREMENTS. I = 12.18 (3.26, 4.22, 3.34, 1.36); II = 9.32 (2.56, 3.37, 2.36, 1.03); III = 5.31 (1.70, 1.61, 1.26, 0.74); IV = 6.97 (2.26, 2.20, 1.69, 0.82). Leg formula: 1243.

OPISTHOSOMA. Oval, with two pairs of sigillae. Both dorsum and venter white, with black markings.

PALP (Figs 10A–C, 11A–D). Cymbial ectobasal process simple, U-shaped with pointed end. Paracymbium finger-like, narrow towards tip, with sparse long hairs. Metaine embolic apophysis distal end broad, bifurcated, extending forward.

EMBOLUS. Long, arc-shaped, with curved tip. Conductor strong, arising meso-retrolaterally from bulb and extending clockwise, longer than wide, with membranous end.

**Female** (paratype SWUC-T-TEg-05-03, Fig. 1G)

MEASUREMENTS. Total length 6.17. Prosoma 2.39 long, 2.06 wide; opisthosoma 4.24 long, 3.85 wide. Eye sizes and interdistances: AME 0.17, ALE 0.18, PME 0.16, PLE 0.17; AME–AME 0.13, AME–ALE 0.16, PME–PME 0.12, PME–PLE 0.20, ALE–PLE 0.04. MOA 0.46 long, front width 0.44, back width 0.48. Clypeus height 0.23.

LEG MEASUREMENTS. I = 8.91 (2.46, 2.89, 2.40, 1.16); II = 7.43 (2.21, 2.53, 1.81, 0.88); III = 4.67 (1.50, 1.52, 1.00, 0.65); IV = 6.37 (2.04, 2.11, 1.52, 0.70). Leg formula: 1243. Other morphological characteristics same as in male.

EPIGYNE (Figs 10D–E, 12A–B). Posterior margin of epigynal plate with distinct sclerotized depression.

VULVA. Spermathecae brain-shaped. Fertilization ducts thick, S-shaped.

**Distribution**

China, Sichuan (Hongyuan) (Fig. 22).

*Meta tibet* sp. nov.

urn:lsid:zoobank.org:act:BD6EDAAA-FAF4-4420-990A-6F7BA3B68EFD

Figs 1H–I, 13–15, 22

**Differential diagnosis**

The male of this new species resembles *M. bowo* sp. nov. (Figs 2–4) and *M. cona* sp. nov. (Figs 5–7), in having the similar abruptly thin embolus and conductor of male palp, but can be distinguished from both species by the following characters: cymbial ectobasal process V-shaped and distal end of metaine embolic apophysis oval in *M. tibet* sp. nov. (Figs 13B–C, 14B–D). The female of *M. tibet* sp. nov. can be distinguished from all other congeners by the spermathecae globular, situated anteriorly (Figs 13D–E, 15A–B).

**Etymology**

The epithet refers to the type locality.

**Type material**

**Holotype**

CHINA • ♂; Tibet, Gyirong County, Gyirong Town, near Kaire waterfall; 28°29'2.68" N, 85°13'25.45" E; alt. 3143 m; 1 Aug. 2020; L.Y. Wang, T. Yuan, P. Liu and Y.M. Hou leg.; SWUC-T-TEg-06-01.

**Paratypes**

CHINA • 3 ♂♂; same collection data as for holotype; SWUC-T-TEg-06-02-04 • 5 ♀♀; same collection data as for preceding; SWUC-T-TEg-06-05-09 • 1 ♂; Gyirong County, Gyirong Town, Riwubanba; 28°28.317' N, 85°13.735' E; alt. 3233 m; 15 Jul. 2018; L.Y. Wang, Z.S. Wu and Y.N. Mu leg.; SWUC-T-TEg-06-10.

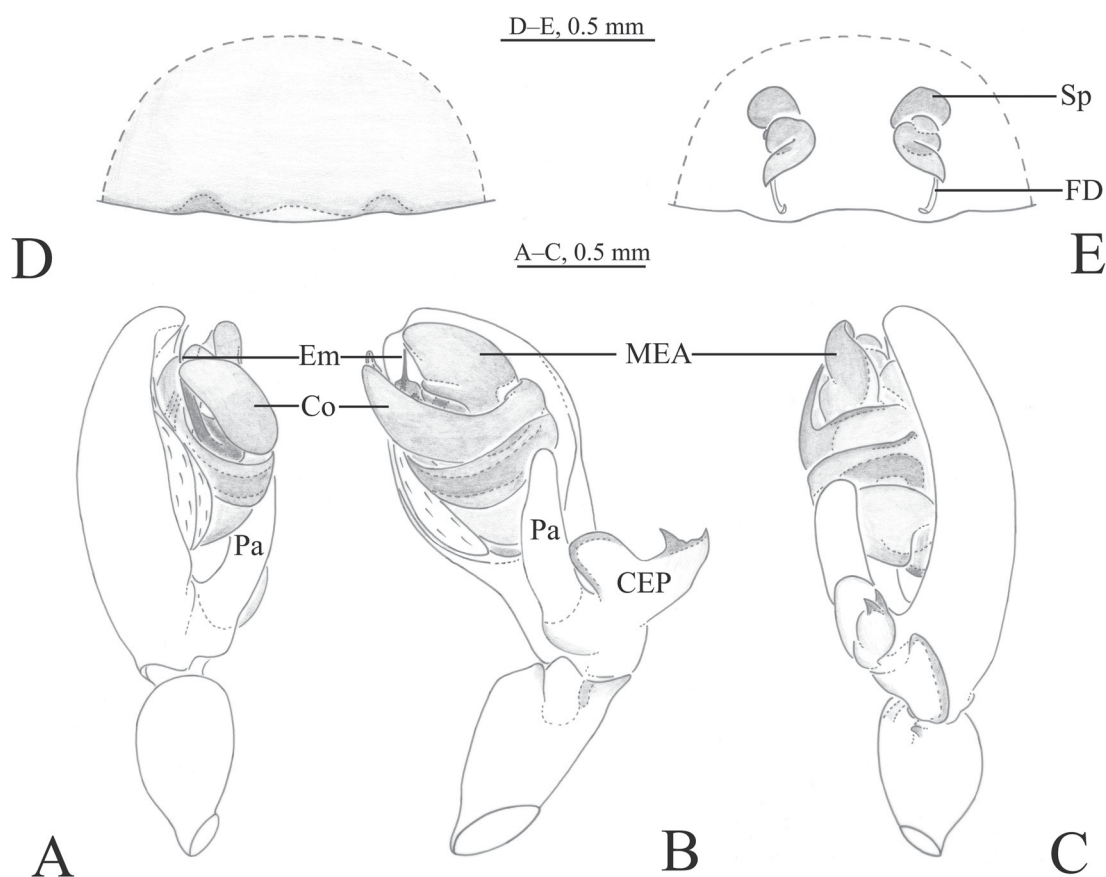
**Description**

**Male** (holotype, Fig. 1H)

MEASUREMENTS. Total length 9.32. Prosoma 4.18 long, 3.42 wide; opisthosoma 5.50 long, 3.43 wide. Eye sizes and interdistances: AME 0.21, ALE 0.23, PME 0.26, PLE 0.23; AME–AME 0.18, AME–ALE 0.29, PME–PME 0.19, PME–PLE 0.29, ALE–PLE 0.07. MOA 0.70 long, front width 0.65, back width 0.69. Clypeus height 0.29.

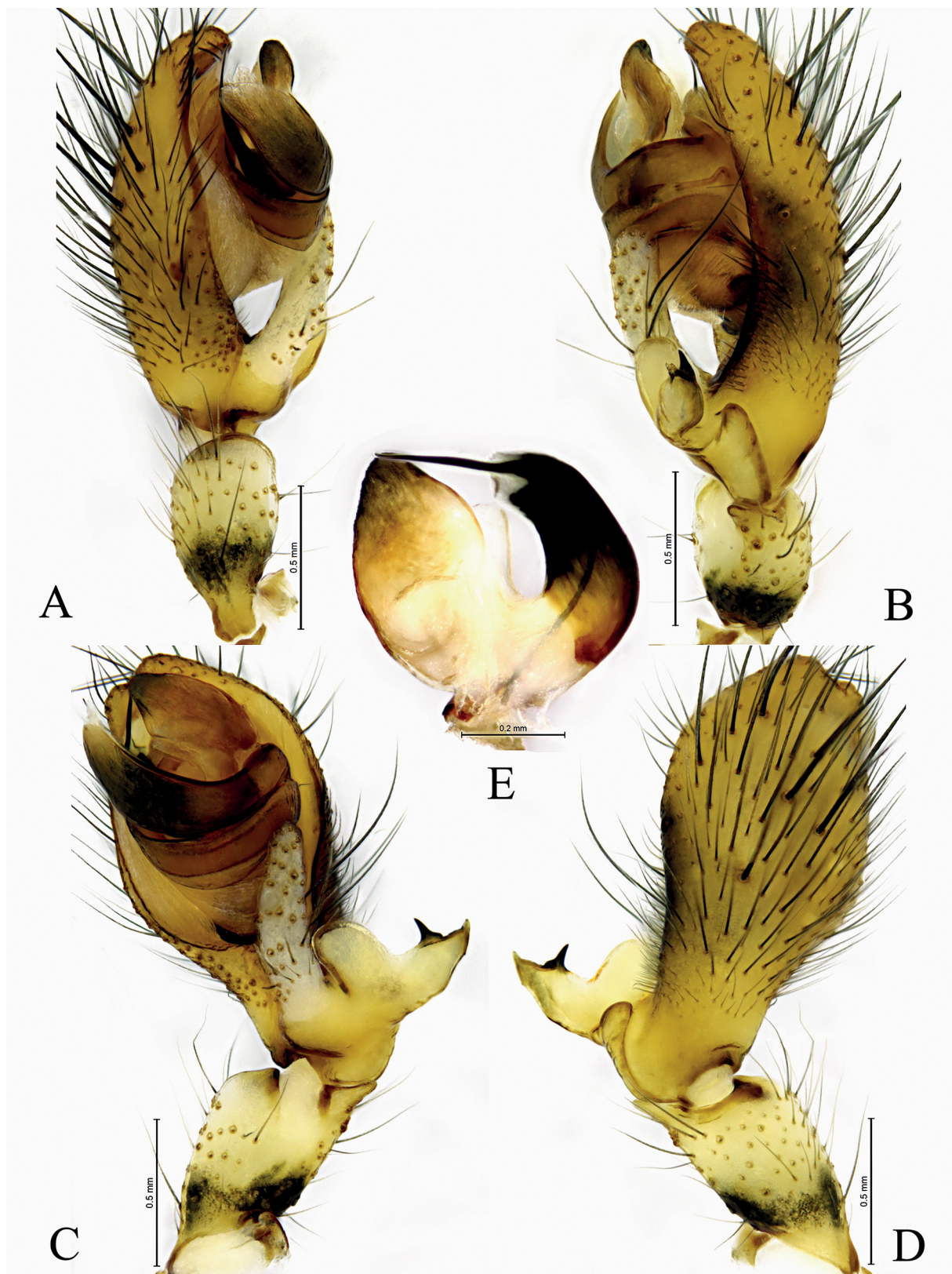
CHELICERAE. Strong, with 3 promarginal and 4 retromarginal teeth.

LEG MEASUREMENTS. I = 28.68 (7.07, 9.69, 8.69, 3.23); II = 21.24 (5.53, 7.63, 5.79, 2.29); III = 12.45 (3.78, 4.09, 3.10, 1.48); IV = 16.59 (5.18, 5.46, 4.38, 1.57). Leg formula: 1243.



**Fig. 13.** *Meta tibet* sp. nov. **A–C.** ♂, holotype (SWUC-T-TEg-06-01). **D–E.** ♀, paratype (SWUC-T-TEg-06-05). **A.** Left palp, prolateral view. **B.** Same, ventral view. **C.** Same, retrolateral view. **D.** Epigyne, ventral view. **E.** Vulva, dorsal view.

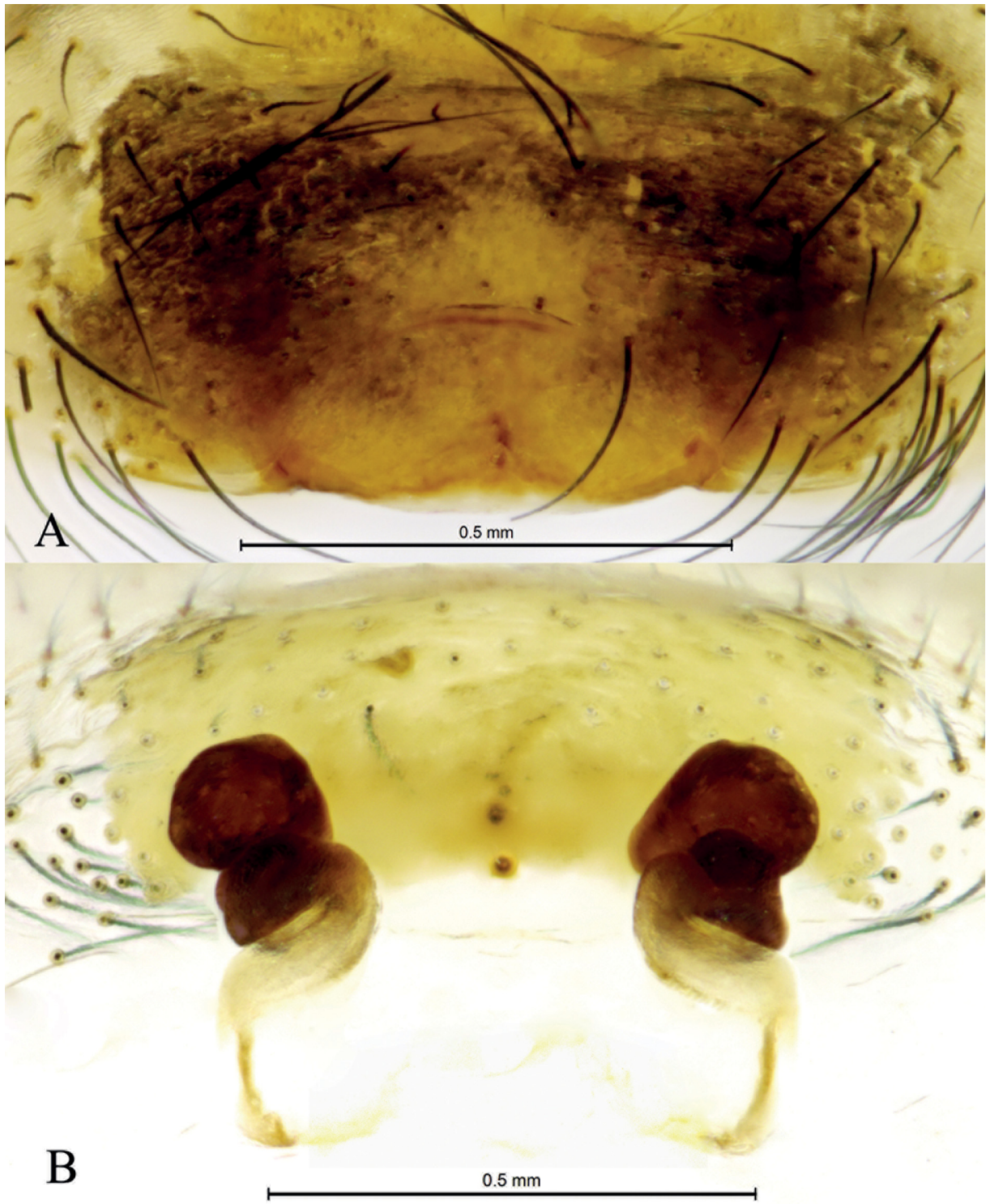




**Fig. 14.** *Meta tibet* sp. nov. **A–D.** ♂, holotype (SWUC-T-TEg-06-01). **E.** ♂, paratype (SWUC-T-TEg-06-02). **A.** Left palp, prolateral view. **B.** Same, ventral view. **C.** Same, retrolateral view. **D.** Same, dorsal view. **E.** Embolus and metaine embolic apophysis, dorsal view.



OPISTHOSOMA. Oval, with two pairs of sigillae. Both dorsum and venter brown, with white and black markings.



**Fig. 15.** *Meta tibet* sp. nov., ♀, paratype (SWUC-T-TEg-06-05). **A.** Epigyne, ventral view. **B.** Vulva, dorsal view.

**PALP** (Figs 13A–B, 14A–E). Cymbial ectobasal process simple, V-shaped with sharp tooth and pointed end. Paracymbium finger-like, narrow towards tip, with sparse long hairs. Metaine embolic apophysis with distal end oval, extending forward.

**EMBOLUS**. Short, abruptly thin with fine tip. Conductor strong, arc-shaped, arising meso-retrolaterally from bulb and extending clockwise, longer than wide, with membranous end.

**Female** (paratype SWUC-T-TEg-06-05, Fig. 11)

**MEASUREMENTS**. Total length 10.05. Prosoma 4.48 long, 3.41 wide; opisthosoma 5.50 long, 4.28 wide. Eye sizes and interdistances: AME 0.23, ALE 0.26, PME 0.25, PLE 0.24; AME–AME 0.19, AME–ALE 0.30, PME–PME 0.19, PME–PLE 0.34, ALE–PLE 0.07. MOA 0.72 long, front width 0.65, back width 0.71. Clypeus height 0.35.

**LEG MEASUREMENTS**. I = 21.78 (5.78, 7.67, 5.94, 2.39); II = 16.88 (4.76, 5.71, 4.52, 1.89); III = 10.41 (3.22, 3.38, 2.55, 1.26); IV = 14.03 (4.32, 4.69, 3.73, 1.29). Leg formula: 1243. Other morphological characteristics same as in male.

**EPIGYNE** (Figs 13D–E, 15A–B). Posterior margin of epigynal plate with inconspicuous sclerotized depression.

**VULVA**. Spermathecae globular, situated anteriorly. Fertilization ducts thick, S-shaped.

### Distribution

China, Tibet (Gyirong) (Fig. 22).

*Meta wanglang* sp. nov.

urn:lsid:zoobank.org:act:4AFF03AB-7F37-4B67-84AE-7BC24DAA7845

Figs 1J–K, 16–18, 22

### Differential diagnosis

This species can be differentiated from all other congeners by the cymbial ectobasal process robust with three conspicuous projections, the outer projection horn-shaped with pointed end; median projection broad with many denticles and the inner projection relatively sclerotized, thumb-shaped with blunt end in male palp (Figs 16B–C, 17B–D). The female can be differentiated from all other congeners by the spermathecae with buds-like outgrowths (Figs 16E, 18B); posterior margin of epigynal plate relatively membranous (Fig. 18B). Both male and female abdomen anteriorly with a pair of humps (Fig. 1J–K).

### Etymology

The epithet refers to the type locality.

### Type material

#### Holotype

CHINA • ♂; Sichuan Province, Pingwu County, Baima Township, Wanglang Nature Reserve, Muyangchang; 32°58'04" N, 104°06'18" E; alt. 2503 m; 24 Sep. 2019; L.Y. Wang, P. Liu, T. Yuan, Z. Fan, Y. Zhang and M. Zhang leg.; SWUC-T-TEg-07-01.

#### Paratypes

CHINA • 1 ♂; same collection data as for holotype; SWUC-T-TEg-07-02 • 9 ♀♀; same collection data as for preceding; SWUC-T-TEg-07-03–11 • 1 ♀; Muyangchang; 32°58'04" N, 104°06'18" E;



alt. 503 m; 13 Oct. 2018; Z.S. Zhang, L.Y. Wang, Z. Fan, P. Liu and T. Yuan leg.; SWUC-T-TEg-07-12 • 1 ♂; Muyangchang; 32°58'04" N, 104°06'18" E; alt. 2503 m; 23 Aug. 2016; L.Y. Wang and Z.S. Wu leg.; SWUC-T-TEg-07-13 • 2 ♀♀; same collection data as for preceding; SWUC-T-TEg-07-14–15.

### Description

**Male** (holotype, Fig. 1J)

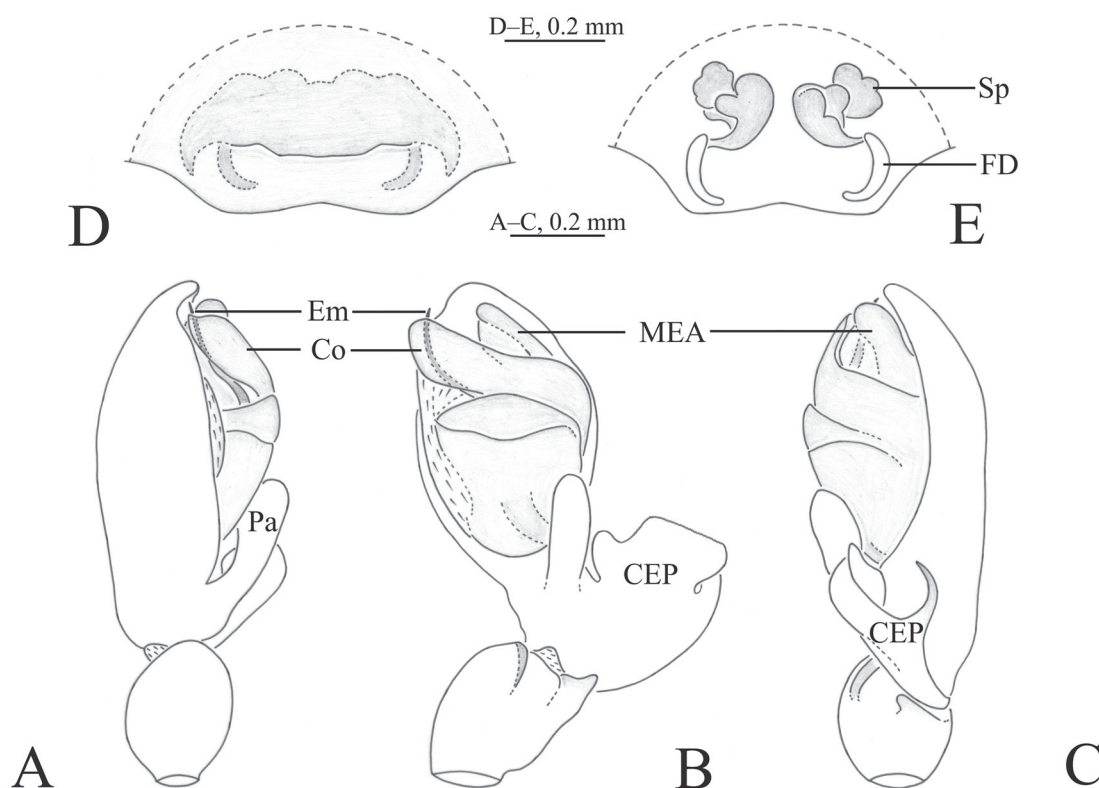
**MEASUREMENTS.** Total length 5.84. Prosoma 2.81 long, 2.14 wide, opisthosoma 3.28 long, 2.53 wide. Eye sizes and interdistances: AME 0.16, ALE 0.17, PME 0.17, PLE 0.19; AME–AME 0.13, AME–ALE 0.19, PME–PME 0.11, PME–PLE 0.24, ALE–PLE 0.03. MOA 0.52 long, front width 0.44, back width 0.48. Clypeus height 0.17.

**CHELICERAE.** Strong, with 3 promarginal and 4 retromarginal teeth.

**LEG MEASUREMENTS.** I = 10.68 (3.69, 4.76, 3.44, 1.45); II = 8.83 (3.09, 3.84, 2.56, 1.23); III = 4.93 (1.90, 1.96, 1.37, 0.84); IV = 6.40 (2.59, 2.68, 1.97, 0.88). Leg formula: 1243.

**OPISTHOSOMA.** Oval, with two pairs of sigillae. Anteriorly with pair of humps, dorsum and venter white, with black markings.

**PALP** (Figs 16A–C, 17A–D). Cymbial ectobasal process robust, with three conspicuous projections, outer projection horn-shaped with pointed end; median projection broad with many teeth and inner projection



**Fig. 16.** *Meta wanglang* sp. nov. **A–C.** ♂, holotype (SWUC-T-TEg-07-01). **D–E.** ♀, paratype (SWUC-T-TEg-07-03). **A.** Left palp, prolateral view. **B.** Same, ventral view. **C.** Same, retrolateral view. **D.** Epigyne, ventral view. **E.** Vulva, dorsal view.

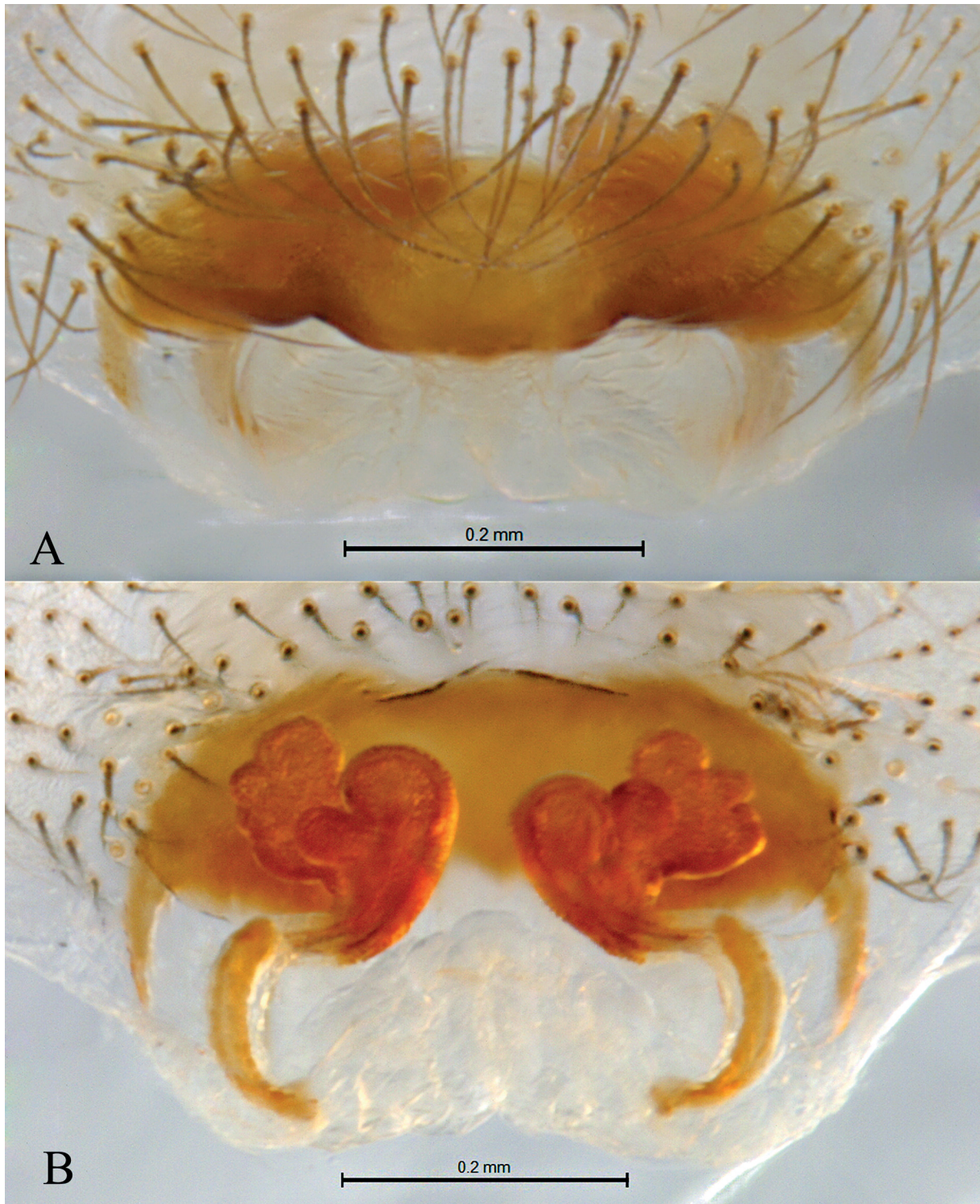
relatively sclerotized, thumb-shaped with blunt end. Paracymbium finger-like, relatively broad tip, with sparse long hairs. Metaine embolic apophysis grooved, with blunt end, extending forward.



**Fig. 17.** *Meta wanglang* sp. nov., ♂, holotype (SWUC-T-TEg-07-01). **A.** Left palp, prolateral view. **B.** Same, ventral view. **C.** Same, retrolateral view. **D.** Same, dorsal view.



EMBOLUS. Long, arc-shaped with fine tip. Conductor strong, arising meso-retrolaterally from bulb and extending clockwise, longer than wide.



**Fig. 18.** *Meta wanglang* sp. nov., ♀, paratype (SWUC-T-TEg-07-03). **A.** Epigyne, ventral view. **B.** Vulva, dorsal view.



**Female** (paratype SWUC-T-TEg-07-03, Fig. 1K)

MEASUREMENTS. Total length 7.37. Prosoma 3.26 long, 2.60 wide; opisthosoma 4.49 long, 3.73 wide. Eye sizes and interdistances: AME 0.18, ALE 0.23, PME 0.20, PLE 0.23; AME–AME 0.16, AME–ALE 0.25, PME–PME 0.14, PME–PLE 0.30, ALE–PLE 0.04. MOA 0.56 long, front width 0.55, back width 0.61. Clypeus height 0.22.

LEG MEASUREMENTS. I = 14.84 (4.08, 5.23, 3.80, 1.73); II = 12.82 (3.62, 4.60, 3.15, 1.45); III = 7.52 (2.49, 2.30, 1.68, 1.05); IV = 10.00 (3.17, 3.27, 2.49, 1.07). Other morphological characteristics same as in male, except opisthosoma lighter in color with few black markings.

EPIGYNE (Figs 16D–E, 18A–B). Posterior margin of epigynal plate relatively membranous.

VULVA. Spermathecae with buds-like outgrowths. Fertilization ducts thick, C-shaped.

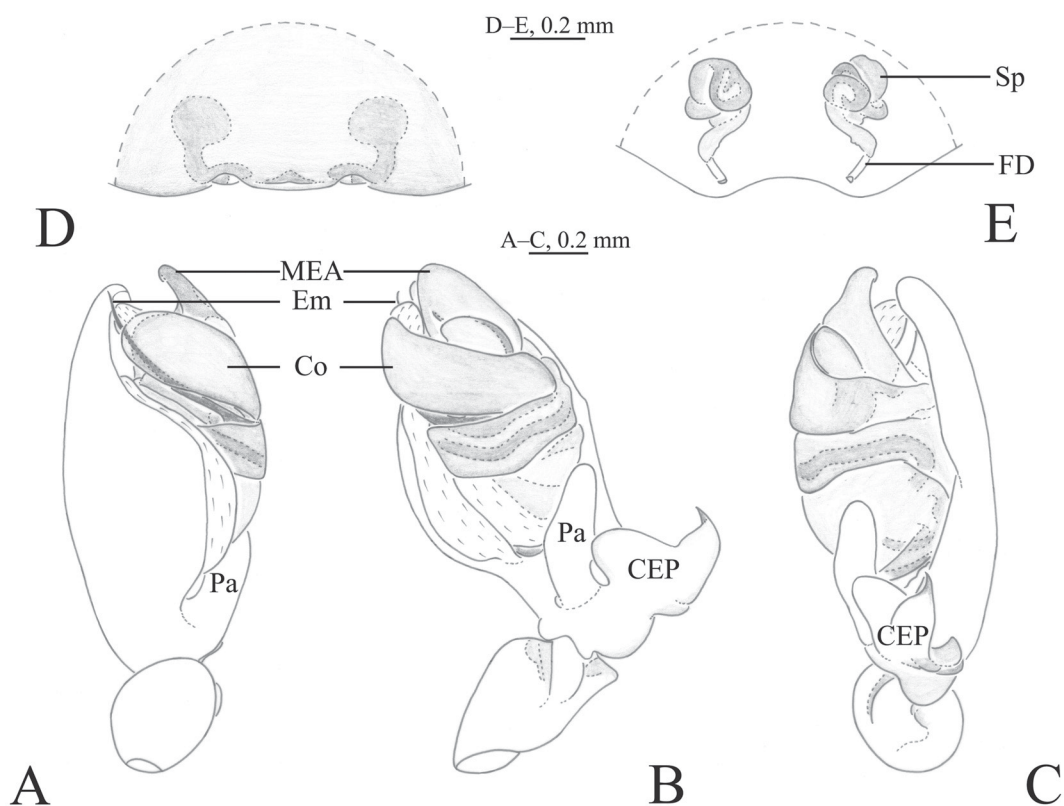
**Distribution**

China, Sichuan (Pingwu County) (Fig. 22).

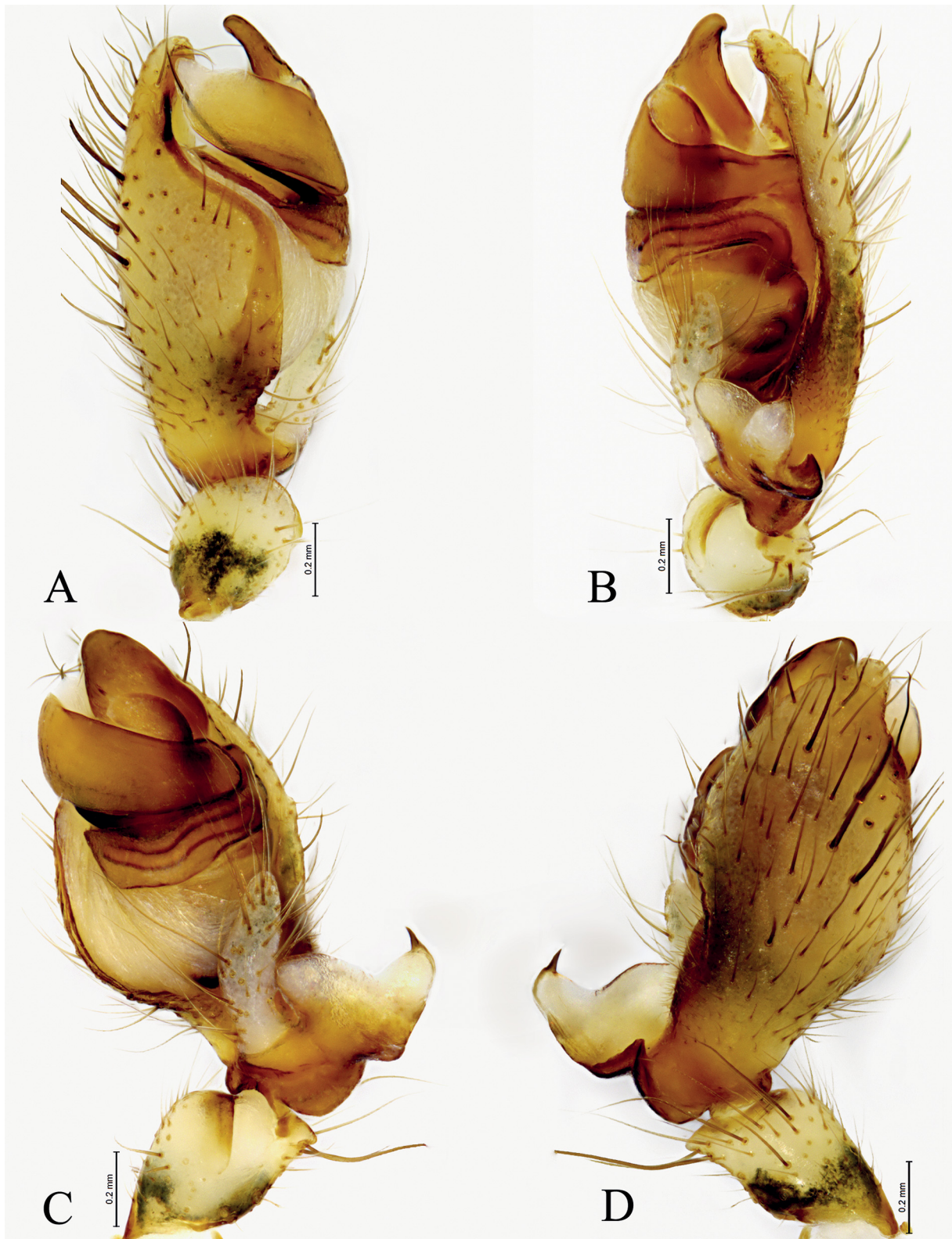
***Meta weining* sp. nov.**

urn:lsid:zoobank.org:act:B4BF84EA-2EF2-4C71-9E5C-0024D0705A84

Figs 1L–M, 19–22



**Fig. 19.** *Meta weining* sp. nov. **A–C.** ♂, holotype (SWUC-T-TEg-08-01). **D–E.** ♀, paratype (SWUC-T-TEg-08-03). **A.** Left palp, prolateral view. **B.** Same, ventral view. **C.** Same, retrolateral view. **D.** Epigyne, ventral view. **E.** Vulva, dorsal view.

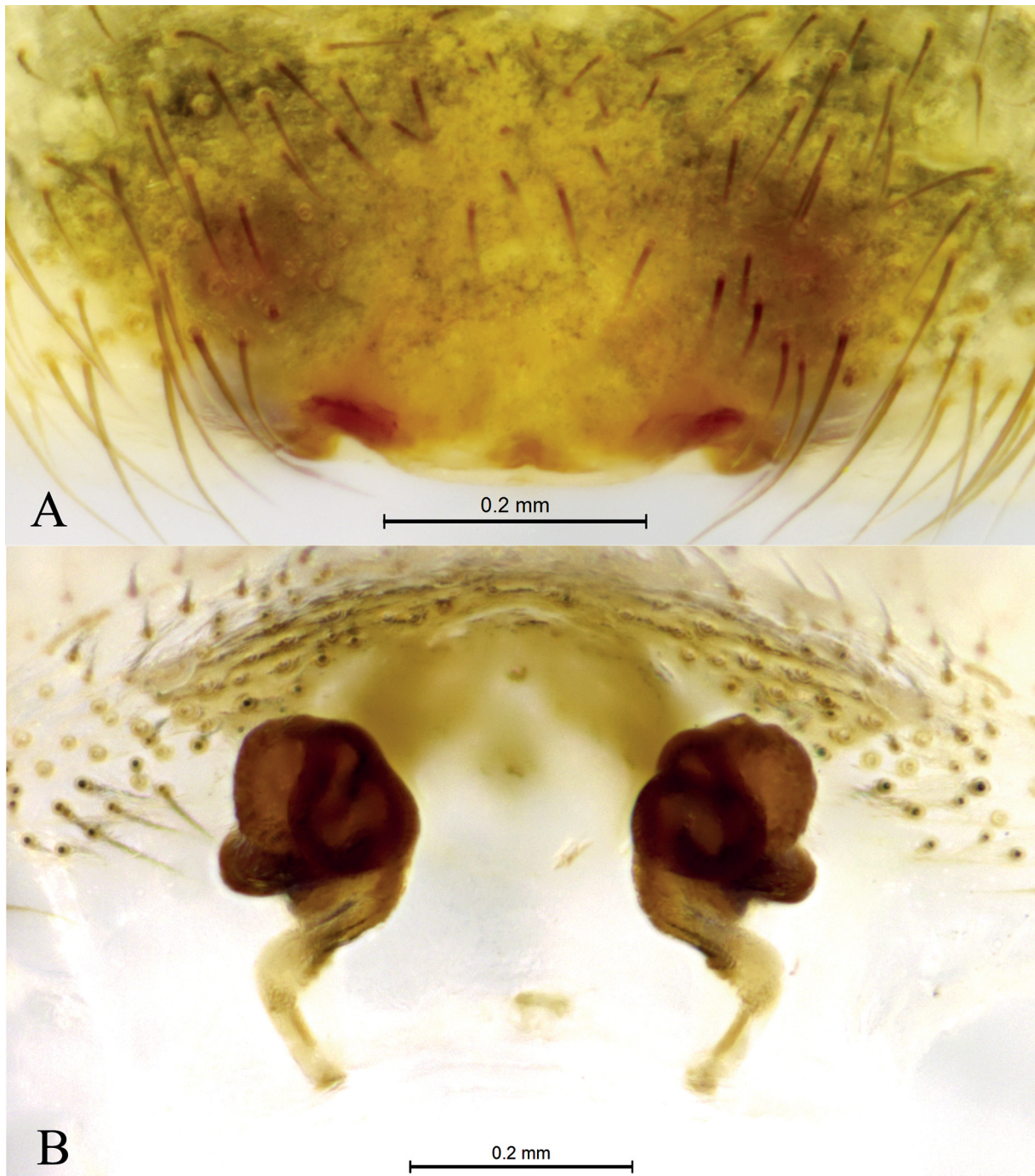


**Fig. 20.** *Meta weining* sp. nov., ♂, holotype (SWUC-T-TEg-08-01). **A.** Left palp, prolateral view. **B.** Same, ventral view. **C.** Same, retrolateral view. **D.** Same, dorsal view.



### Differential diagnosis

This new species resembles *M. tibet* sp. nov. (Figs 13–15) in having a similar embolus; V-shaped cymbial ectobasal process in male palp and epigynal plate posteriorly with small, sclerotized depression in female epigyne, but it can be differentiated by the embolus gradually narrow towards the tip in *M. weining* sp. nov. (Figs 19B–C, 20B–D), whereas abruptly narrow in *M. tibet* sp. nov. (Figs 13A–B, 14A, C, E). Metaine embolic apophysis longer than wide in ventral view in *M. weining* sp. nov. (Figs 19B, 20C),



**Fig. 21.** *Meta weining* sp. nov., ♀, paratype (SWUC-T-TEg-08-03). **A.** Epigyne, ventral view. **B.** Vulva, dorsal view.



whereas wider than long in *M. tibet* sp. nov. (Figs 13B, 14C). Cymbial ectobasal process tooth present at the end of lateral arm in ventral view in *M. weining* sp. nov. (Figs 19B, 20C), whereas tooth present on the lateral arm in *M. tibet* sp. nov. (Figs 13B, 14C). Spermathecae semicircular and fertilization ducts move around the spermathecae from dorsal to the ventral side of epigyne in *M. weining* sp. nov. (Figs 19E, 21B), whereas spermathecae globular and fertilization ducts move around the spermathecae from ventral to the dorsal side of epigyne in *M. tibet* sp. nov. (Figs 13E, 15B).

### Etymology

The epithet refers to the type locality.

### Type material

#### Holotype

CHINA • ♂; Guizhou, Bijie City, Weining County, Shanqiaojiedao, Dashan Village, Gaodiping Cave; 26°50'55.03" N, 104°17'08.81" E; alt. 2175 m; 23 Apr. 2017; H.M. Chen leg.; SWUC-T-TEg-08-01.

#### Paratypes

CHINA • 1 ♂; same collection data as for holotype; SWUC-T-TEg-08-02 • 2 ♀♀; same collection data as for preceding; SWUC-T-TEg-08-03–04.

### Description

#### Male (holotype, Fig. 1L)

MEASUREMENTS. Total length 7.92. Prosoma 3.54 long, 2.83 wide; opisthosoma 4.32 long, 3.00 wide. Eye sizes and interdistances: AME 0.22, ALE 0.22, PME 0.21, PLE 0.20; AME–AME 0.14, AME–



**Fig. 22.** Distribution records of seven new species of the genus *Meta* C.L. Koch, 1836 in Southwest China.

ALE 0.21, PME–PME 0.18, PME–PLE 0.29, ALE–PLE 0.05. MOA 0.58 long, front width 0.57, back width 0.61. Clypeus height 0.26.

CHELICERAE. Strong, with 3 promarginal and 4 retromarginal teeth.

LEG MEASUREMENTS. I = 18.59 (5.01, 6.53, 5.05, 2.00); II = 14.46 (4.15, 5.06, 3.75, 1.50); III = 7.74 (2.42, 2.62, 1.80, 0.90); IV = 11.03 (3.54, 3.53, 2.84, 1.12). Leg formula: 1243.

OPISTHOSOMA. Oval, with two pairs of sigillae. Both dorsum and venter greyish, with black markings.

PALP (Figs 19A–C, 20A–D). Cymbial ectobasal process simple, V-shaped with pointed end. Paracymbium finger-like, narrow towards tip, with sparse long hairs. Metaine embolic apophysis distal end oval, longer than wide with blunt end, extending forward.

EMBOLUS. Long, arc-shaped, with curved tip. Conductor strong, arising meso-retrolaterally from bulb and extending clockwise, longer than wide, with membranous end.

#### **Female** (paratype SWUC-T-TEg-08-03, Fig. 1M)

MEASUREMENTS. Total length 7.50. Prosoma 3.14 long, 2.59 wide; opisthosoma 4.42 long, 3.61 wide. Eye sizes and interdistances: AME 0.18, ALE 0.23, PME 0.21, PLE 0.20; AME–AME 0.18, AME–ALE 0.20, PME–PME 0.14, PME–PLE 0.23, ALE–PLE 0.07. MOA 0.61 long, front width 0.52, back width 0.58. Clypeus height 0.28.

LEG MEASUREMENTS. I = 14.05 (3.95, 5.03, 3.48, 1.59); II = 10.84 (3.18, 3.75, 2.64, 1.27); III = 6.51 (1.94, 2.21, 1.49, 0.87); IV = 8.93 (2.86, 3.01, 2.05, 1.01). Leg formula: 1243. Other morphological characteristics same as in male.

EPIGYNE (Figs 19D–E, 21A–B). Posterior margin of epigynal plate with indistinct sclerotized depression.

VULVA. Spermathecae semicircular. Fertilization ducts thick, S-shaped.

#### **Distribution**

China, Guizhou (Weining) (Fig. 22).

#### **Discussion**

The members of the genus *Meta* can be found in cliffs around cave entrances or among large stones in forest gullies. Due to the specific and isolated habitats of species of *Meta*, the existence of cave-endemic species is expected (Wang *et al.* 2020b). Combined with our previous work (Wang *et al.* 2020b), the number of endemic species found in Southwest China reaches 13. The specimens of all the species described here were collected on the cliffs and in mountainous ranges of southern China. However, this does not represent the actual number of species of *Meta* in the region. In order to reveal the actual species of long-jawed orbweavers spiders, it is still necessary to conduct an extensive survey in areas that have not yet been explored.

#### **Acknowledgments**

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