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Research article

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Description of three new species of genus *Vacrothele* (Araneae, Mygalomorphae, Macrothelidae) from China with notes on two taxonomic amendments

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Abstract. Three new species of the genus *Vacrothele* Tang & Yang, 2022 are described in detail from China: *Vacrothele fuyuanensis* sp. nov., *Vacrothele jiangkouensis* sp. nov. and *Vacrothele baiseensis* sp. nov. Two described species of the *Macrothele* are transferred to the genus, i.e., *Vacrothele emei* (Lin & Li, 2021) comb. nov. and *Vacrothele taiwanensis* (Shimojana & Haupt, 1998) comb. nov. A key to species of *Vacrothele* and a geographic distribution map are given.

Keywords. Chinese fauna, new combination, spiders, taxonomy.

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Introduction

Macrothelidae Simon, 1892 has been recorded worldwide in two genera and 49 species, mainly in Asia and Africa and to a lesser extent in Europe (World Spider Catalog 2024). In China, 33 species of Macrothelidae have been recorded, representing 67.34% of the species diversity of the group, including 27 species of *Macrothele* Ausserer, 1871 spiders and six species of *Vacrothele* Tang & Yang, 2022 (Lin *et al.* 2021; Tang *et al*. 2022; Wu *et al*. 2022a, 2022b). It is mainly distributed in Yunnan, Hainan, Guizhou, Guangxi, Hunan, and Taiwan, where most of the species are found in the southwestern part of the south, and no species of the family have been found in the north (World Spider Catalog 2023) (Fig. 1). Many species of the family Macrothelidae remain to be discovered, especially in China.

During a survey of the fauna of China, three new species of *Vacrothele* are described from Yunnan and Guizhou. Re-identification of two previously known species of *Macrothele* leads to their transfer to *Vacrothele*.

Material and methods

Type materials of the new species are deposited in the Institute of Entomoceutics Research, Dali University (DUIER). All specimens examined were preserved in 80% ethanol. Claw images were captured with a Leica DFC7000T CCD linked to a Leica M205 FA fluorescent microscope and other morphological features were photographed and measured using a stereo microscope (Olympus SZX16). Male palps and female genitalia were dissected for examination. Female genitalia were treated in a 10% NaOH solution for 24 hours, to dissolve tissue. The habitat of each species was observed and photographed during collection.

All measurements are in millimeters. Leg measurements are shown as: total length (femur, patella, tibia, metatarsus, tarsus).

Abbreviations used in this paper are:

ALE = anterior lateral eye
AME = anterior median eye

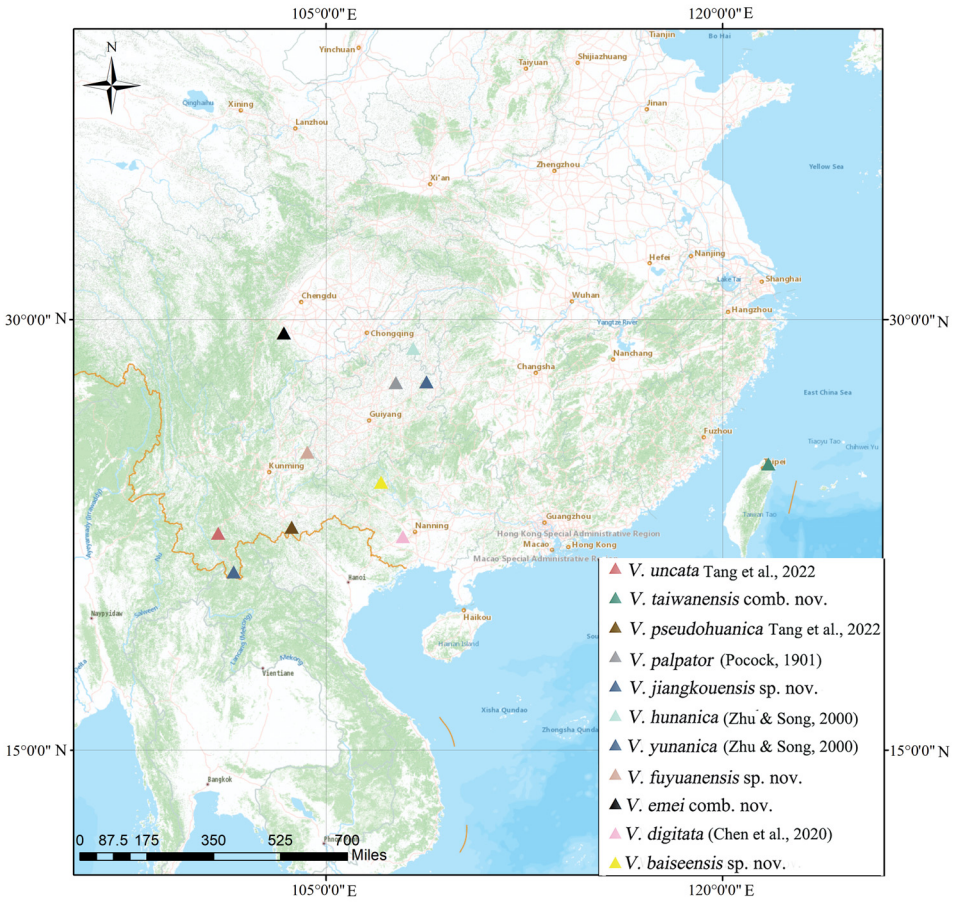

Fig. 1. Distribution of species of *Vacrothele* Tang & Yang, 2022.

ITC = inferior, unpaired, or third tarsal claw
NDMS = number of dorsal metatarsal spines
NDPS = number of dorsal patellar spines
NDTaS = number of dorsal tarsal spines
NDTS = number of dorsal tibial spines
NPFS = number of prolateral femoral spines
NPMS = number of prolateral metatarsal spines
NPPS = number of prolateral patellar spines
NPTaS = number of prolateral tarsal spines
NPTS = number of prolateral tibial spines
NRMS = number of retrolateral metatarsal spines
NRPS = number of retrolateral patellar spines
NRTaS = number of retrolateral tarsal spines
NRTS = number of retrolateral tibial spines
NVMS = number of ventral metatarsal spines
NVPS = number of ventral patellar spines
NVTaS = number of ventral tarsal spines
NVTS = number of ventral tibial spines
PLE = posterior lateral eye
PLS = posterior lateral spinneret
PME = posterior median eye
PMS = posterior median spinneret
STC = superior or paired tarsal claws
vs = versus

Results

Key to the known species of the genus Vacrothele Tang & Yang, 2022

1. Males 2
– Females 8

2. Palpal tibia with 6 dorsal spines ..... ***V. pseudohunanica*** Tang, Wu, Zhao & Yang, 2022
– Palpal tibia more than 6 dorsal spines 3

3. Tibia II with 4 ventral spines. ..... ***V. fuyuanensis*** sp. nov.
– Tibia II more than with 4 ventral spines 4

4. Embolus longer (5.43) ..... ***V. jiangkouensis*** sp. nov.
– Embolus relatively short 5

5. Embolus curved dorsally first, then ventrally ..... ***V. palpator*** (Pocock, 1901)
– Embolus curved ventrally first, then dorsally 3

6. Body smaller (9.4 mm); tibia I with seven spines (four ventral, two apical, one median spine) .... ***V. taiwanensis*** (Shimojana & Haupt, 1998) comb. nov.
– Body larger 7

7. Tibia I with 9 spines (five ventral, three prolateral, one retrolateral spine) .... ***V. yunnanica*** (Zhu & Song, 2000)
– Tibia I with 5 ventral spines ..... ***V. baiseensis*** sp. nov.

8. Receptacula directed forward, turning laterally, and then inward and turning anteriorly, somewhat S-shaped ..... ***V. hunanica*** (Zhu & Song, 2000)
– Receptacula directed anteriorly, turning laterally, then dorsally, finally medially 9

9. Receptacula G-shaped ..... ***V. emei*** (Lin & Li, 2021) comb. nov.
– Receptacula non G-shaped 10

10. Copulatory aperture thicker but joint of the copulatory aperture and spermatheca very thin .... ***V. uncata*** Tang, Wu, Zhao & Yang, 2022
– Receptacula short and finger-like ..... ***V. digitata*** (Chen, Jiang & Yang, 2020)

Taxonomy

Class Arachnida Cuvier, 1812
Order Araneae Clerck, 1757
Family Macrothelidae Simon, 1892
Genus *Vacrothele* Tang & Yang, 2022

Vacrothele fuyuanensis sp. nov.
urn:lsid:zoobank.org:act:6BB2A5D4-A6CF-4519-A87E-C667EC182C41
Figs 1–4

Diagnosis

The new species is similar to *V. pseudohunanica* Tang *et al*., 2022 in having the conical spines dorsally on palpal tibia and the embolus of the same shape, but males can be distinguished by the following characters: palpal tibia with 13 short spines visible in dorsal view (vs 7 short spines on the palpal tibia); relatively large bend in the middle of the embolus (vs relatively small bend). Females of *V. fuyuanensis* sp. nov. can be differentiated from *V. pseudohunanica* by copulatory duct extending flatly from the middle to the distal end (vs copulatory duct curved from the middle to the distal end).

Etymology

The specific epithet refers to the type locality.

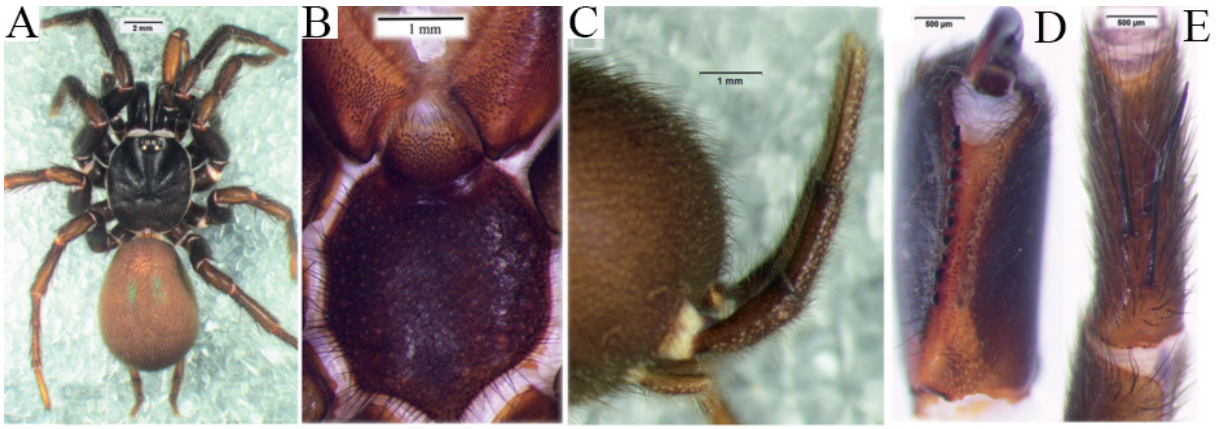

Fig. 2. *Vacrothele fuyuanensis* sp. nov., holotype, ♂ (DUIER, YN-VA-20210802001). **A**. Dorsal view. **B**. Maxilla, labium and sigilla. **C**. Spinnerets, right retrolateral view. **D**. Chelicera. **E**. Left leg II.

Material examined

Holotype

CHINA • ♂; Yunnan Province, Qujing City, Fuyuan County; 25°33′3″ N, 104°17′58″ E; 1914 m a.s.l.; 2 Aug. 2021; Yong-Ming You, Li-Jun Ding, Xiao-Liang Gu leg.; DUIER, Specimen No. YN-VA-20210802001.

Paratypes

CHINA – **Yunnan Province** • 1 ♂; same data as for holotype; DUIER, Specimen No. YN-VA-20210802002 • 3 ♀♀; same data as for holotype; YN-VA-20210802003 to YN-VA-20210802005 • 1 ♂; Qujing City, Yingshang Town, Xiaojiagou; 25°28′45″ N, 104°17′37″ E; 1910 m a.s.l.; 31 Jul. 2021; Yong-Ming You, Li-Jun Ding, Xiao-Liang Gu leg.; DUIER, Specimen No. YN-VA-20210731001 • 4 ♀♀; same data as for preceding; DUIER, Specimen No. YN-VA-20210731002 to YN-VA-20210731005.

Description

Male (holotype Figs 2–3)

Measurements. Total length: 13.15 (not including chelicerae and spinnerets): cephalothorax 5.55 long, 4.68 wide; abdomen 7.40 long, 5.29 wide (Fig. 2A).

Prosoma. Carapace hirsute, dark chestnut and grey. Fovea transverse. Dorsal view with both eyes concave. Labium brown, with ca 87 cuspules; maxillae 1.80 long, cuspules area 1.10 long. Sternum black, with three pairs of sigilla (Fig. 2B).

Eyes. Eyes sizes and inter-distances: AME 0.27, ALE 0.40, PME 0.18, PLE 0.25; ALE–AME 0.14, AME–AME 0.18, ALE–PLE 0.21, PLE–PME 0.10, PME–PME 0.59. Eye group 1.01 long, 1.54 wide.

Chelicerae. Black brown, with 11 stout promarginal teeth and 11 small teeth plus 20 tiny basomesal teeth (Fig. 2D).

Palp. Palpal tibia with 13 stout dorsal spines (Fig. 3A–C). Embolus thick and long, tapering from base to end, flared at end, length 3.72 (Fig. 3D–G).

Legs. Brown, with numerous spines. Leg I: NPFS 1; NPPS 2; NPTS 1, NRTS 2, NVTS 5; NPMS 1, and NVMS 16; NPTaS 3 and NRTaS 4. Leg II: NPFS 1; NPPS 2; NPTS 1, NVTS 4 (Fig. 2E); NPMS 1,

Fig. 3. *Vacrothele fuyuanensis* sp. nov., holotype, ♂ (DUIER, YN-VA-20210802001). **A–C**. Left palp tibia. **A**.Prolateral view. **B**. Dorsal view. **C**. Retrolateral view. **D–G**. Embolus. **D**. Prolateral view. **E**. Dorsal view. **F**. Retrolateral view. **G**. End of embolus.

NVMS 6; NPTaS 5, NRTaS 4, with 3 claws. Leg III: NRPS 1, NRPS 1; NPTS 2, NRTS 2, NDTS 2, NVTS 7; NVMS 8, NPMS 4, NRMS 3; NPTaS 4, NRTas 5. Leg IV: NPFS 1; NPPS 2, NRPS 1; NPTS 3, NRTS 2, NVTS 9, NDTS 1; NPMS 3, NRMS 2, NDMS 1, NVMS 9; NPTaS 7, NRTaS 6. Measurement of legs: I 13.44 (3.19, 1.36, 3.43, 3.67, 1.79); II 13.84 (3.62, 1.47, 3.42, 3.76, 1.57); III 14 (3.13, 1.34, 3.77, 3.89, 1.87); IV 14.2 (3.37, 1.40, 3.94, 3.79, 1.70). Leg formula: 4321.

Spinnerets. PMS white; PLS slenderness, basal, distal end white; PMS 2.23 long, 0.48 wide; PLS 11.79 long (3.39, 3.62, 4.78); PMS–PMS 1.33 (Fig. 2C).

Female (Fig. 4)

Measurements. Total length 11.21 (not including chelicerae and spinnerets), cephalothorax 5.35 long, 4.65 wide; abdomen 8.60 long, 6.32 wide (Fig. 4A).

Eyes. Eyes sizes and inter-distances: AME 0.24, ALE 0.39, PME 0.26, PLE 0.38; AME–AME 0.25, ALE–AME 0.16, ALE–PLE 0.25, PME–PME 0.62, PLE–PME 0.17. Eye group 0.94 long, 1.79 wide.

Chelicerae. Chelicerae brownish, with 11 stout internal teeth, basomesally with 20 tiny teeth, with 11 smaller external teeth (Fig. 4B).

Legs. Brown, with numerous spines. Leg I: NVMS 5; NPTaS 5, NRTaS 4. Leg II: NPTS 1, NVTS 2; NPMS 5, NRMS 6; NPTaS 5, NRTaS 4. Leg III: NPPS 2, NRPS 2; NPTS 3, NRTS 2, NDTS 1, NVTS 2; NVMS 6, NPMS 5, NRMS 2, NDMS 2; NPTaS 5, NRTaS 6. Leg IV: NPPS 2, NRPS 1; NPTS 2, NRTS 2, NVTS 2; NPMS 3, NRMS 4, NVMS 8, NDMS 3; NPTaS 9, NRTaS 6. Measurement of legs: I 11.64 (2.85, 1.58, 3.01, 2.97, 1.23); II 11.79 (2.98, 1.39, 2.85, 3.10, 1.47); III 12.25 (2.78, 1.30, 3.35, 3.68, 1.14); IV 12.61 (2.97, 1.74, 3.33, 2.97, 1.60). Leg formula: 4321.

Spermathecae. Receptacula finger-like. Copulatory ducts broad at base, gradually tapering posteriorly (Fig. 4C).

Spinnerets. PMS white; PLS slenderness, distal end white. PMS 1.97 long, 0.43 wide; PLS 6.44 long (2.27, 1.92, 2.25); PMS–PMS 1.72

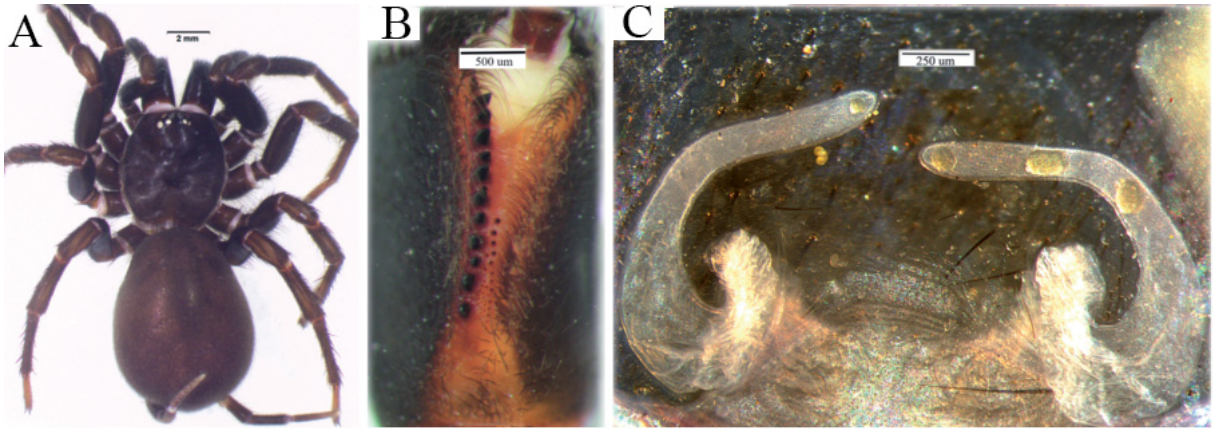

Fig. 4. *Vacrothele fuyuanensis* sp. nov., paratype, ♀ **(**DUIER, YN-VA-20210802003). **A**. Dorsal view. **B**. Chelicera. **C**. Genitalia, dorsal view.

Natural history

The spiders primarily inhabit existing rock crevices or caves, dirt slopes, and under leaf litter along highways.

Distribution

Qujing, Yunnan Province, China

Vacrothele jiangkouensis sp. nov.
urn:lsid:zoobank.org:act:58085DAA-6B1F-47ED-AD50-3640ECBECA99
Figs 1, 5–7

Diagnosis

The new species is similar to *V. emei* Lin & Li, 2021 in having the conical spines dorsally on palpal tibia and the embolus of the same shape, but males can be distinguished by the following characters (Lin *et al*. 2021): palpal tibia with 11 short spines visible in dorsal view (vs 7 short spines on the palpal tibia). Females of *Vacrothele jiangkouensis* sp. nov. can be differentiated from receptacula nearly teardrop shaped (vs receptacula finger-like in *V. emei*).

Etymology

This new species name is derived after the type locality of the specimen.

Material examined

Holotype

CHINA • ♂; Guizhou Province, Jiangkou County, Walnut Ping; 108°47′38″ E, 27°55′35″ N; 700 m a.s.l.; 15 Sep. 2016; Zi-Zhong Yang, Cheng-Gong Li leg.; DUIER, Specimen No. GZ-VA-20160915001.

Paratypes

CHINA • 3 ♂♂; same data as for holotype; DUIER, Specimen No. GZ-VA-20160915002 to GZ-VA-20160915004 • 2 ♀♀; same data as for holotype; DUIER, Specimen No. GZ-VA-20160915005, GZVA-20160915006.

Description

Male (holotype, Figs 5–6)

Measurements. Total length 12.23 (not including chelicerae and spinnerets), cephalothorax 5.91 long, 5.13 wide; abdomen 5.78 long, 4.07 wide (Fig. 5A).

Prosoma. Carapace hirsute, brown and gray. Fovea transverse. Dorsal view of both eyes concave posteriorly. Labium basally and terminally brown; maxillae inner and outer chestnut color. Labium and maxillae with numerous cuspules; maxillae 1.77 long, cuspules area 1.26 long (Fig. 5B). Sternum chestnut color, with three pairs of sigilla (Fig. 5B).

Eyes. Eyes sizes and inter-distances: AME 0.28, ALE 0.33, PME 0.18, PLE 0.20; ALE–AME 0.17, AME–AME 0.15, ALE–PLE 0.15, PLE–PME 0.08, PME–PME 0.57. Eye group 0.91 long, 1.42 wide.

Chelicerae. Brown, with 12 stout internal teeth, 8 smaller external teeth, basomesally with 16 tiny teeth (Fig. 5D).

Palp. Palpal tibia with 1 anterolateral spine and 11 stout dorsal spines (Fig. 6A–C). Embolus conical, flared at end, embolus 5.43 long (Fig. 6D–E).

Legs. Brown, with numerous spines. Leg I: NVTS 4; NPMS 1, and NVMS 26. NVTaS 5. Leg II: NPFS 2; NPTS 3, NVTS 7 (Fig. 5E); NDMS 1, NVMS 7; NVTaS 5. Leg III: NVFS 6; NPPS 1; NVTS 6, NRTS 2, NVMS 8, NRMS 2; NPTaS 10, NRTas 10. Leg IV: NPFS 3; NPPS 1, NRPS 1; NRTS 3, NVTS 5; NPMS 6, NRMS 8, NDMS 2; NPTaS 11, NRTaS 14. Measurement of legs: I 14.10 (3.13, 1.82, 3.83, 3.40, 1.92); II 15.01 (3.87, 1.15, 3.84, 3.86, 2.29); III 15.75 (4.39, 1.19, 3.42, 4.08, 2.67); IV 15.84 (3.98, 1.60, 4.18, 3.35, 2.73). Leg formula: 4321.

Spinnerets. PMS grayish white; PLS, slenderness, basal, distal end white (Fig. 5C). PMS 1.43 long, 0.37 wide; PLS 6.93 long (2.34, 2.14, 2.45); PMS–PMS 1.48 (Fig. 6B).

Female (Fig. 7)

Measurements. Total length 15.08 (not including chelicerae and spinnerets), cephalothorax length: 4.94, width: 5.06; abdomen width: 8.17, width: 5.60 (Fig. 7A).

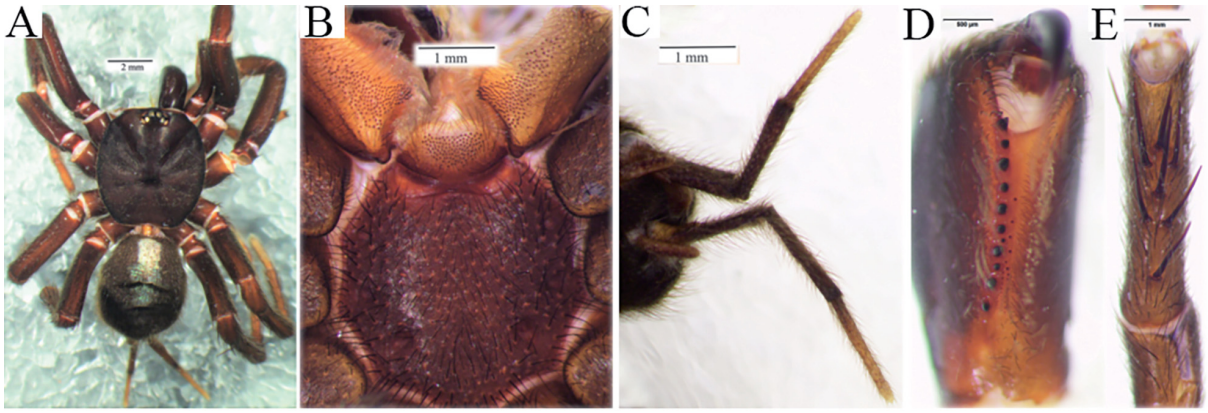

Fig. 5. *Vacrothele jiangkouensis* sp. nov., holotype, ♂ (DUIER, GZ-VA-20160915001). **A**. Dorsal view. **B**. Maxilla, labium and sigilla. **C**. Spinnerets, right retrolateral view. **D**. Chelicera. **E**. Left leg II.

Fig. 6. *Vacrothele jiangkouensis* sp. nov., holotype, ♂ (DUIER, GZ-VA-20160915001). **A–C**. Left palp tibia. **A**.Prolateral view. **B**. Dorsal view. **C**. Retrolateral view. **D–G**. Embolus. **D**. Prolateral view. **E**. Dorsal view. **F**. Retrolateral view. **G**. End of embolus.

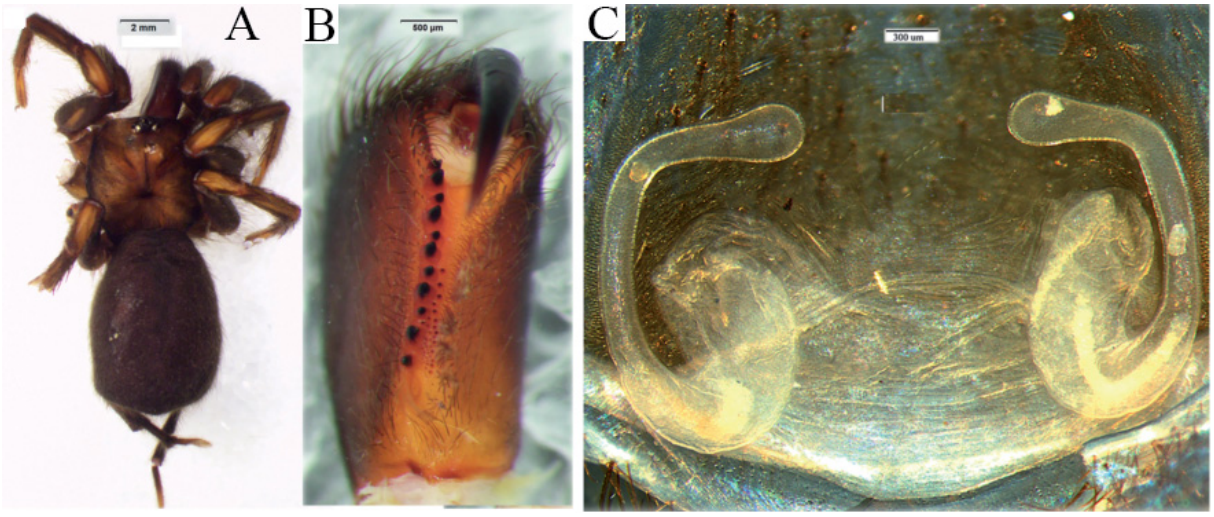

Fig. 7. *Vacrothele jiangkouensis* sp. nov., paratype, ♀ (DUIER, GZ-VA-20160915005). **A**. Dorsal view. **B**. Chelicera. **C**. Genitalia, dorsal view.

Eyes. Eyes sizes and inter-distances: AME 0.25, ALE 0.34, PME 0.30, PLE 0.32; AME–AME 0.20, ALE–AME 0.15, ALE–PLE 0.19, PME–PME 0.63, PLE–PME 0.02. Eye group 0.79 long, 1.35 wide.

Chelicerae. Brownish, with 11 stout internal teeth, basomesally with 20 tiny teeth, with 15 smaller external teeth (Fig. 7B).

Legs. Brown, with some spines. Leg I: NPMS 3; NVTaS 2, NRTaS 8. Leg II: NDTS 1; NVMS 10; NVTaS 12. Leg III: NVMS 4; NRTas 10. Leg IV: NVMS 4; NRTaS 8. Measurement of legs: I 11.68 (3.53, 1.27, 2.48, 2.50, 1.89); II 12.77 (3.70, 1.84, 2.44, 2.86, 1.93); III 12.91 (3.75, 1.80, 2.51, 2.96, 1.89); IV 13.28 (3.82, 1.95, 2.67, 2.79, 2.05). Leg formula: 4321.

Spermathecae. Receptacula nearly teardrop shaped, copulatory ducts long, broad at base and outward bending (Fig. 7C).

Spinnerets. PMS white; PLS, slenderness, basal, distal end white. PMS 1.68 long, 0.36 wide; PLS 7.08 long (2.01, 2.54, 2.53); PMS–PMS 1.13.

Natural history

This species primarily inhabits existing rock crevices or caves, dirt slopes, and under leaf litter along highways.

Distribution

Jiangkou County, Guizhou Province, China

Vacrothele baiseensis sp. nov.
urn:lsid:zoobank.org:act:C500F418-A5FB-4B0C-9608-DA3E6C265B65
Figs 1, 8–11

Diagnosis

The new species is similar to *Vacrothele digitata* (Chen, Jiang & Yang, 2020) in having the conical spines dorsally on palpal tibia and the embolus of the same shape, but males can be distinguished by the

following characters (Chen *et al*. 2020): embolus ends uniformly dilated into a flared shape (vs embolus ending basally thinned and then dilated into a flared shape in similar species); embolus length: 4.29 (vs 6.18); PLS length: 4.96 (vs 12.15); tibia of leg II with 5 long spines (vs 9 long spines). Females of *V. baiseensis* sp. nov. can be differentiated from *V. digitata* by copulatory duct time shorter, thick wall at the base (vs thin-walled at base).

Etymology

The specific epithet refers to the type locality.

Material examined

Holotype

CHINA • ♂; Guangxi Province, Baise City, Jiangyuan Highway Station; 23°91′29″ N, 106°64′57″ E; 282 m a.s.l.; 4 Nov. 2023, Zi-Zhong Yang, Yu-Lin Zheng leg.; DUIER, Specimen No. GX-VA-20231104001.

Fig. 8. *Vacrothele baiseensis* sp. nov., holotype, ♂ (DUIER, GX-VA-20231104001). **A**. Dorsal view. **B**. Maxilla, labium and sigilla. **C**. Spinnerets, right retrolateral view. **D**. Chelicera. **E**. Left leg II.

Fig. 9. *Vacrothele baiseensis* sp. nov., holotype, ♂ (DUIER, GX-VA-20231104001). **A–C**. Left palp tibia. **A**.Prolateral view. **B**. Dorsal view. **C**. Retrolateral view. **D–G**. Embolus. **D**. Prolateral view. **E**. Dorsal view. **F**. Retrolateral view. **G**. End of embolus.

Paratypes

CHINA • 2 ♂♂; same data as for holotype; DUIER, Specimen No. GX-VA-20231104002, GX-VA-20231104003; 3 ♀♀; same data as for holotype; DUIER, Specimen No. GX-VA-20231104004 to GXVA-20231104006.

Description

Male (holotype, Figs 8–9)

Measurements. Total length 13.39 (not including chelicerae and spinnerets): cephalothorax 5.94 long, 5.23 wide; abdomen 7.40 long, 3.96 wide (Fig. 8A).

Prosoma. Carapace dark chestnut, gray hairy. Fovea transverse. In dorsal view, both eye rows recurved. Labium and maxillae brown and with numerous cuspules; maxillae l.62 long, cuspules area 1.0 long (Fig. 8B). Sternum black, with three pairs of sigilla.

Palp. Palp tibia with 8 stout dorsal spines (Fig. 9A–D). Embolus conical, flared at end, 4.26 long (Fig. 9E–H).

Eyes. Eyes sizes and inter-distances: AME 0.277, ALE 0.375, PME 0.220, PLE 0.305; ALE–AME 0.096, AME–AME 0.117, ALE–PLE 0.071, PME–PME 0.52. Eye group 0.672 long, 1.398 wide.

Chelicerae. Black brown, with 11 stout promarginal teeth (Fig. 8D).

Legs. Brown, with some spines. Leg I: NPTS 2, NRTS 1, NVTS 3; NPMS 3 prolateral and NVMS 9; NPTaS 3. Leg II: NPTS 2, NVTS 5 (Fig. 8E); NPMS 1, NVMS 7; NPTaS 6, NVTaS 4. Leg III: NPTS 6, NVTS 1; NVMS 4, NPMS 9; NPTaS 4, NVTaS 8. Leg IV: NPTS 3, NVTS 5, NDTS 1; NPMS 11, NDMS 3, NVMS 5; NDTaS 1, NPTaS 15. Measurement of legs: I 16.31 (4.55, 2.43, 3.30, 3.74, 2.26); II 17.16 (4.84, 2.44, 3.47, 3.79, 2.62); III 15.2 (3.35, 2.40, 3.03, 3.88, 2.54); IV 18.94 (4.08, 2.69, 4.05, 5.21, 2.91). Leg formula: 4321.

Spinnerets. PMS grayish white; PLS slenderness, basal, distal end white; PMS 1.335 long, 0.335 wide; PLS 4.96 long (1.54, 1.63, 1.79); PMS–PMS 1.0 4 (Fig. 8C).

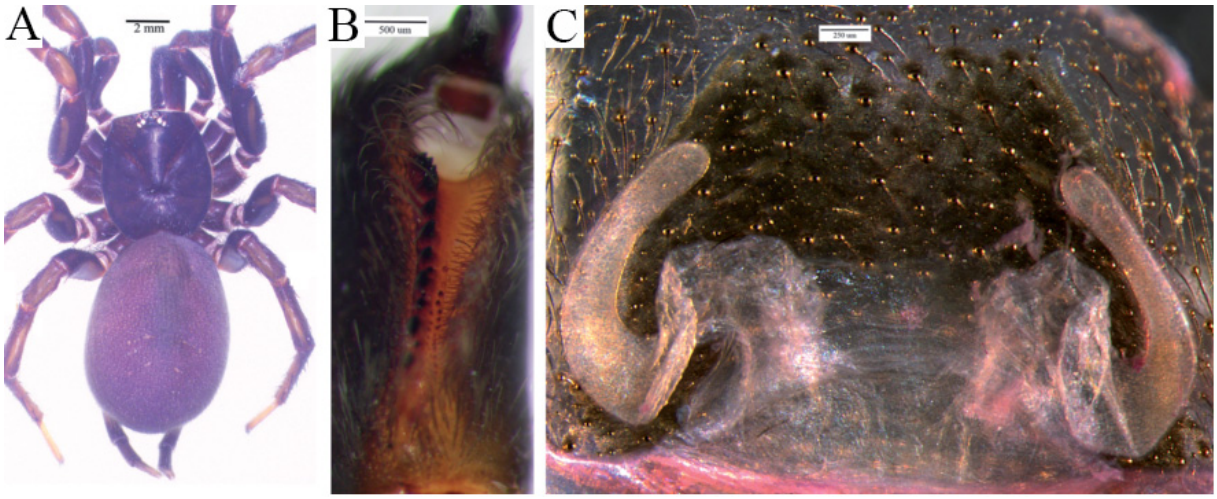

Fig. 10. *Vacrothele baiseensis* sp. nov., paratype, ♀ (DUIER, GX-VA-20231104004). **A**. Dorsal view. **B**. Chelicera. **C**. Genitalia, dorsal view.

Female (Fig. 10)

Measurements. Total length 17.16 (not including chelicerae and spinnerets), cephalothorax 7.3 long, 5.70 wide; abdomen 10.04 long, 6.55 wide (Fig. 10A).

Eyes. Eyes sizes and inter-distances: AME 0.28, ALE 0.39, PME 0.30, PLE 0.33; AME–AME 0.18, ALE–AME 0.14, ALE–PLE 113, PME–PME 0.53. Eye group 0.758 long, 1.5 wide.

Chelicerae. Brownish, with 11 stout internal teeth, basomesally with 20 tiny teeth, with 11 smaller external teeth (Fig. 10B).

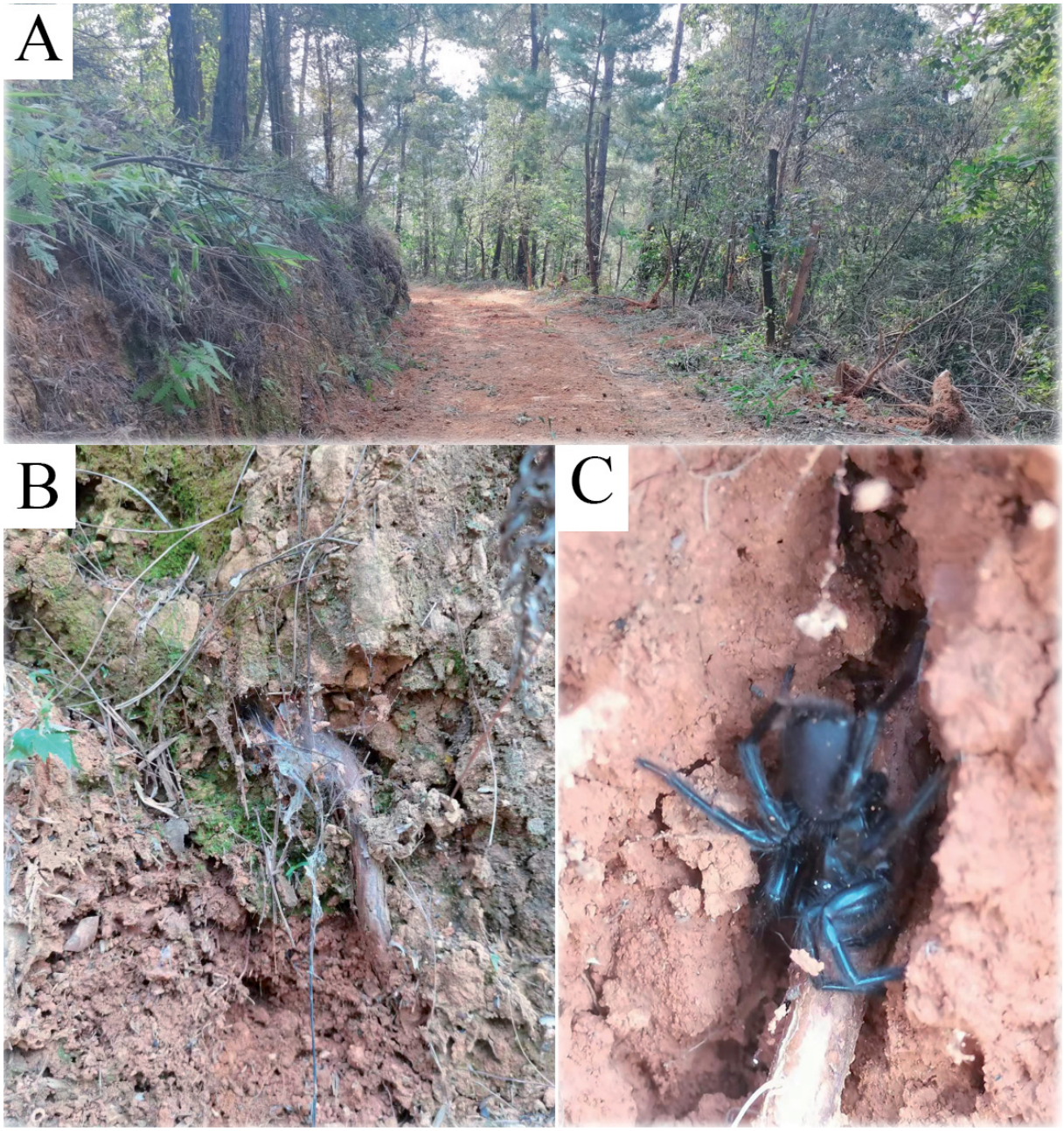

Fig. 11. Microhabitat, spider shelter, and general morphology of *Vacrothele baiseensis* sp. nov. **A**. Microhabitat. **B**. Spider shelter. **C**. Living female.

Legs. Brown, with numerous spines. Leg I: NPMS 4, NVMS 3; NPTaS 4 and NVTaS 3. Leg II: NVPS 2; NPTS 1; NPMS 4 and NVMS 2; NVTaS 5. Leg III: NPTS 2, NVTS 1; NVMS 5, NPMS 8, NDMS 1; NVTaS 5, NPTaS 4. Leg IV: NPTS 4, NDTS 1; NPMS 7, NDMS 3, NVMS 5; NDTaS 1. Measurement of legs: I 14.59 (3.95, 2.67, 2.98, 3.11, 1.88); II 13.78 (3.51, 2.60, 2.87, 3.10, 1.70); III 12.78 (3.20, 2.32, 2.69, 2.76, 1.81); IV 16.73 (3.71, 2.58, 3.41, 4.77, 2.26). Leg formula: 4321.

Spermathecae. Receptacula nearly finger-like. Copulatory ducts broad at base, slightly curled in the middle, gradually tapering posteriorly (Fig. 10C).

Spinnerets. PMS 1.80 long; PLS 6.09 long (2.4, 1.68, 2.01); PMS–PMS 1.375.

Natural history

This species primarily inhabits existing soil slopes and crevices in tree bark along roadways (Fig. 11).

Distribution

Baise City, Guangxi Province, China.

Vacrothele emei (Lin & Li, 2021) comb. nov.
Figs 1, 12–14

Macrothele emei Lin & Li in Lin *et al*., 2021: 1052 (1), figs 2–3, 13a, 14a, 16.

Material examined

CHINA • 1 ♂; Sichuan Province, Emeishan City, Huangwan Town, Emei Mountain, Zhongfeng Old Temple to Shengshuige; 29°57′04″ N, 103°40′32″ E; 790 m a.s.l.; 13 Nov. 2023; Zi-Zhong Yang, Meng-Meng Zhang, Meng-Yin Zhang, Yong-Ming You leg.; DUIER, Specimen No. SC-VA-20231113001 • 3 ♀♀; same data as for preceding; No. SC-VA-20231113002 to GZ-VA-20231113004.

Description

See Lin *et al*. (2021).

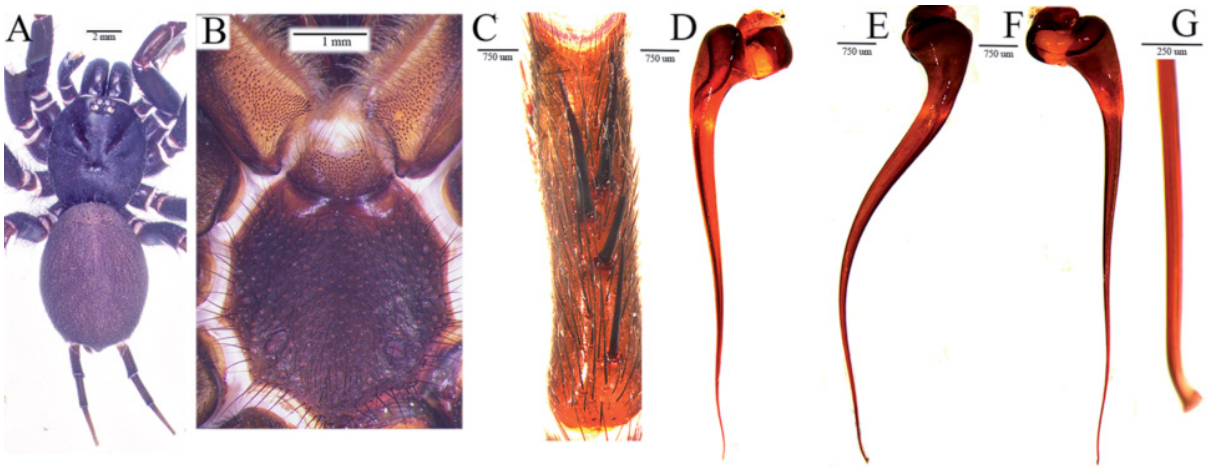

Fig. 12. *Vacrothele emei* (Lin & Li, 2021) comb. nov. (DUIER, SC-VA-20231113001). **A**. Male, dorsal view. **B**. Maxilla, labium and sigilla. **C**. Left leg II, tibia ventral spines. **D–G**. Embolus. **D**. Prolateral view. **E**. Dorsal view. **F**. Retrolateral view. **G**. End of embolus.

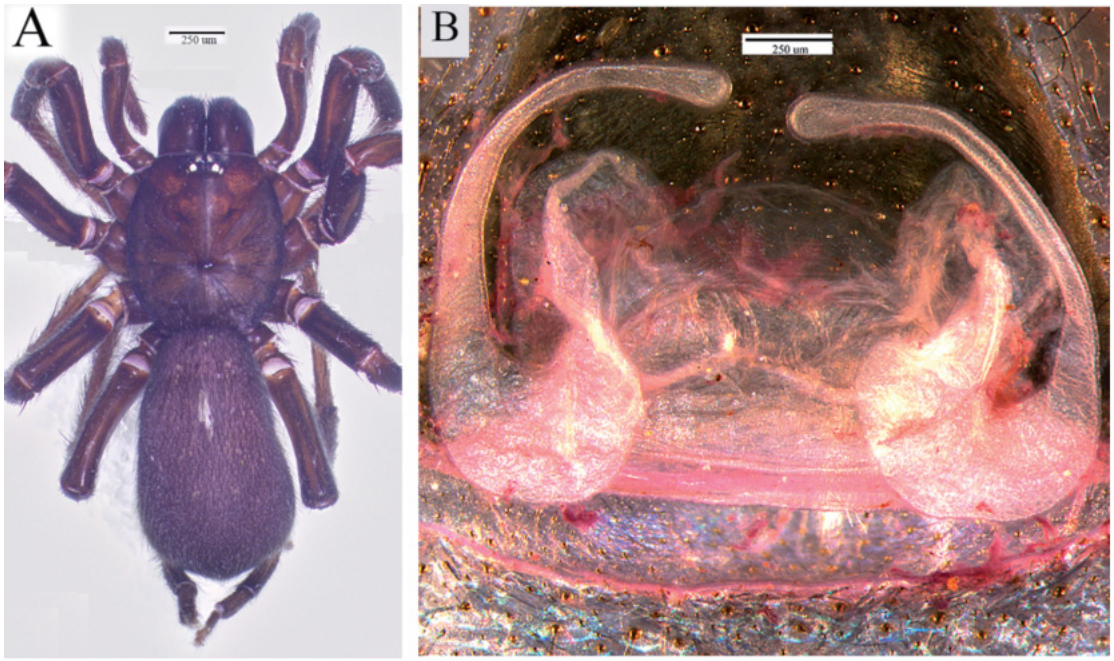

Fig. 13. *Vacrothele emei* (Lin & Li, 2021) comb. nov., ♀ (DUIER, SC-VA-20231113002). **A**. Dorsal view. **B**. Genitalia, dorsal view.

Fig. 14. Microhabitat, spider shelter, and general morphology of *Vacrothele emei* (Lin & Li, 2021) comb. nov. **A**. Microhabitat. **B**. Spider shelter. **C**. Web. **D**. Living female.

Natural history

The spider mainly inhabits the soil slopes along the roadway (Fig. 14).

Distribution

Sichuan, China.

Vacrothele taiwanensis (Shimojana & Haupt, 1998) comb. nov.
Fig. 1

Macrothele taiwanensis Shimojana & Haupt, 1998: 3, figs 5–6, 13, 16, 23.

Description

See Shimojana & Haupt (1998).

Natural history

Unknown

Distribution

Taiwan, China.

Discussion

The genus *Vacrothele* is characterized by the palpal tibia with stout dorsal spines, a conically shaped embolus bulb, a trumpet-shaped embolic end, the copulatory aperture wide at the base, tapering gradually from the base to the distal end, and the spermathecae digitiform (Tang *et al*. 2022). In this study, three new species are described from China and we believe that more species of *Vacrothele* will be discovered in this country.

Two species (*M. emei* and *M. taiwanensis*) belonging to *Macrothele* were found to be identical to the identifying characters of the *Vacrothele*, and are transferred in this work. The type locality was visited to collect the topotype of *M. emei* (Shimojana & Haupt 1998; Lin *et al.* 2021). However, due to domestic political reasons, it was not possible to travel to Taiwan to collect the topotype of *M. taiwanensis*, but it can be transferred to *Vacrothele* based on the original morphological description.

Because of the lack of comprehensive understanding of the Macrothelidae generally, there are current obvious limitations or shortcomings in the understanding of the *Vacrothele*. The existing morphological data used for the classification of *Vacrothele* are very imperfect and need to be reconstructed, e.g., dorsal surface of the palpal tibia with 5–13 stout spines. The study of types is the basic guarantee for the revision of species. In order to systematically revise and clarify the phylogenetic relationship of Macrothelidae, it is necessary to re-establish the morphological data. At the same time, for species with similar morphologies or those difficult to distinguish by external morphology, the method of molecular systematics should be employed to address the problem.

Author contributions

Conceptualization, YLZ; funding acquisition, ZZY and YZ; photographs, YLZ; writing–original draft, YLZ and ZZY; writing–review & editing, YLZ and ZZY. All authors have read and agreed to the published version of the manuscript.

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