អ្នកជំនាញខាងជាណកសាស្ត្រឥណ្ឌូចិន
The Indochina Entomologist
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OPEN ACCESS
New Taxa
ICE, 1 (10): 65–74 (2024)
ISSN (Online) 3065-1107
www.indochinaentomologist.com

https://doi.org/10.70590/ice.2024.01.10
http://zoobank.org/urn:lsid:zoobank.org:pub:E088B820-09B2-4A7D-BF75-22A052862AB2

Two new species and a new provincial record of *Draconarius* (Araneae, Agelenidae) from China

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Abstract: Two new species of *Draconarius* Ovtchinnikov, 1999 are described based on material collected in Zhejiang Province, eastern China: *D. chenhaojuni* **sp. nov.** (♀) and *D. kozue* **sp. nov.** (♂♀). Additionally, *D. aspinatus* (Wang, Yin, Peng & Xie, 1990) is newly found in Hubei Province, central China, which was only recorded in Anhui Province before. The above-mentioned three species are illustrated and their collected localities are mapped. Specimens are deposited in the Centre for Behavioral Ecology and Evolution, College of Life Sciences, Hubei University in Wuhan (CBEE).

Keywords: Biodiversity, Coelotinae, morphology, new distribution, taxonomy

中国龙隙蛛属两新种与一新省级纪录种（蜘蛛目：漏斗蛛科）

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摘要：本文报道了产自中国东部浙江省的龙隙蛛属 *Draconarius* Ovtchinnikov, 1999 两新种：陈浩骏龙隙蛛 *D. chenhaojuni* **sp. nov.** (♀)和梢江龙隙蛛 *D. kozue* **sp. nov.** (♂♀)，并在中部湖北省首次发现无刺龙隙蛛 *D. aspinatus* (Wang, Yin, Peng & Xie, 1990)，此前该种仅被记录于安徽省。本文提供了上述三个物种的形态特征图与分布图。标本保存于湖北大学生命科学学院行为生态与进化研究中心（CBEE）。

关键词：生物多样性，隙蛛亚科，形态学，新分布，分类学

Citation: Yu F-B & Wei M 2024: Two new species and a new provincial record of *Draconarius* (Araneae, Agelenidae) from China. *The Indochina Entomologist*, 1 (10): 65–74. [于峰彬 & 魏勉 2024: 中国龙隙蛛属两新种与一新省级纪录种（蜘蛛目：漏斗蛛科）. 中南半岛昆虫学家, 1 (10): 65–74.]
https://doi.org/10.70590/ice.2024.01.10

Accepted by Ye-Jie LIN: 5.XI.2024; published online: 6.XI.2024

Introduction

Draconarius Ovtchinnikov, 1999 is the most diverse genus within the agelenid subfamily Coelotinae F. O. Pickard-Cambridge, 1893, with the type species, *D. venustus* Ovtchinnikov, 1999, originating from Tajikistan (Ovtchinnikov, 1999). To date, a total of 269 species of *Draconarius* have been described. Of these, 176 species are distributed in China, with 121 specifically distributed in southwest China (World Spider Catalog, 2024).

During our examination of specimens from Zhejiang Province in eastern China, we discovered two new species. Characteristics such as the long embolus in males, and the posteriorly situated atrium and anteriorly located epigynal teeth in females, suggesting that these species belong to the genus *Draconarius*. And we also found specimens of *D. aspinatus* (Wang, Yin, Peng & Xie, 1990) as a new provincial record from Hubei Province. These discoveries indicate the large potential of undescribed *Draconarius* species in eastern and central China.

Material and methods

All specimens were preserved in 75% ethanol and examined with an Olympus SZX7 stereomicroscope. Male palps and female genitalia were examined and photographed after dissection. Epigynes were cleared and cleaned with Proteinase K. Photographs were taken with a Canon EOS 70D wide zoom digital camera (8.5 megapixels) mounted on an Olympus BX 43 compound microscope. The images were montaged using Helicon Focus 7.0.2 image stacking software. Left palps are illustrated. Leg measurements are given as: total length (femur, patella, tibia, metatarsus, tarsus). Only the appendages on the left (e.g., palp, legs) were measured. Abbreviations used in the text are as follows. Eye area: **ALE** = anterior lateral eye; **AME** = anterior median eye; **AME**–**ALE** = distance between AME and ALE; **AME**–**AME** = distance between AME and AME; **ALE**–**PLE** = distance between ALE and PLE; **AME**–**PME** = distance between AME and PME; **PLE** = posterior lateral eye; **PME** = posterior median eye; **PME**–**PLE** = distance between PME and PLE; **PME**–**PME** = distance between PME and PME. Depository of the specimens: **CBEE—**Centre for Behavioural Ecology and Evolution, College of Life Sciences, Hubei University; **HNNU—**Hunan Normal University.

Taxonomy

Family Agelenidae C. L. Koch, 1837 漏斗蛛科
Subfamily Coelotinae F. O. Pickard-Cambridge, 1893 隙蛛亚科
Genus *Draconarius* Ovtchinnikov, 1999 龙隙蛛属

Type species. *Draconarius venustus* Ovtchinnikov, 1999

Draconarius aspinatus (Wang, Yin, Peng & Xie, 1990) 无刺龙隙蛛

Figs 1; 5A; 6

Coelotes aspinatus Wang, Yin, Peng & Xie, 1990: 207, figs 68–72 (♂♀).

Coelotes aspinatus Song, Zhu & Chen, 1999: 374, figs 216L–M, 218D, K (♂♀).

Draconarius aspinatus Wang, 2002: 66.

Draconarius aspinatus Wang, 2003: 521, fig. 13A–E (♂♀).

Draconarius aspinatus Ubick, 2005: 315, fig. 20c–d (♂).

Draconarius aspinatus Zhu, Wang & Zhang, 2017: 231, fig. 116A–E (♂♀).

Type materials (not examined). **Holotype:** ♀ (HNNU), **CHINA, Anhui Province:** Huangshan City, Huangshan Mountain, 24.X.1974, Jia-Fu Wang & Chang-Min Yin leg. **Paratypes:** 3♂, same data as holotype.

Materials examined. 2♂6♀ (CBEE), **CHINA, Hubei Province:** Luotian County, Tiantangzhai National Nature Reserve, Shenxiangu Valley, 30.IX.2024, local collector leg.

Diagnosis. Male resembles that of *D. altissimus* (Hu, 2001) but can be distinguished by conductor margin

smooth (fig. 116D in Zhu *et al*. 2017) [vs. serrated in the latter (fig. 43. 3, 5 in Hu 2001)] (Zhu *et al*. 2017). Female resembles that of *D. chenhaojuni* **sp. nov.**, see detailed statement in the diagnosis of the new species.

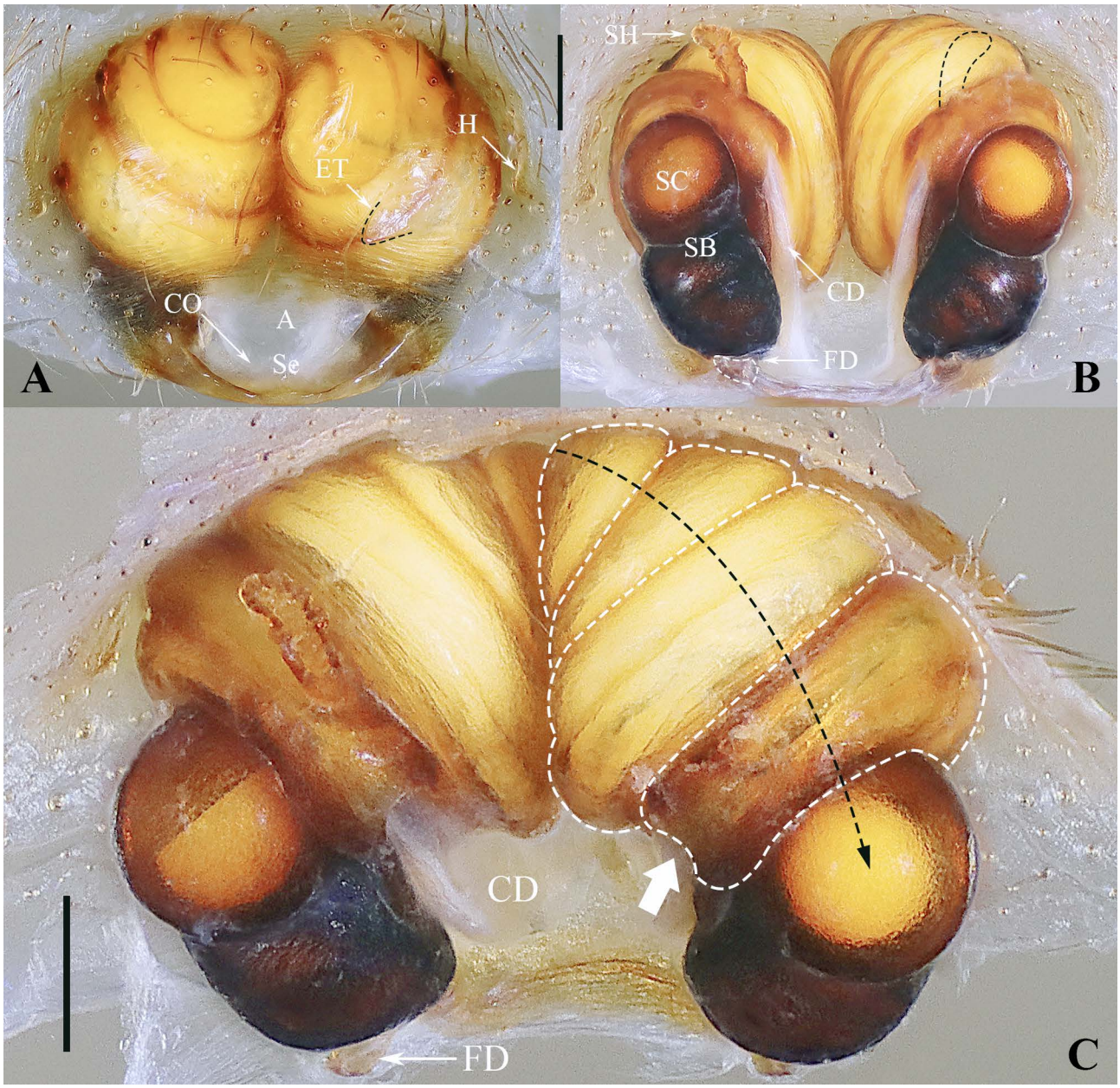

FIGURE 1. *Draconarius aspinatus* (Wang, Yin, Peng & Xie, 1990), female: **A** epigyne, ventral view **B** vulva, dorsal view (black dashed line indicates broken spermathecal head) **C** ditto, apical view (white and black dashed lines indicate four layers of anterior part of spermatheca and route to spherical chamber, and white bold arrow indicates copulatory duct). **Abbreviations:** A–atrium, CD–copulatory duct, ET–epigynal teeth, FD–fertilization duct, H–hood, SB–spermathecal base, SC–spherical chamber, Se–septum, SH–spermathecal head. Scale bar = 0.50 mm.

Description (partial). Female (Fig. 5A). See in figure.

Egipyne (Fig. 1). Epigynal plate oval and moderately sclerotized. Atrium posteriorly situated, bowl-shaped, with triangular membranous anterior margin and weak septum. Copulatory openings situated medially of atrium. Epigynal teeth medially situated. Hoods weak, laterally situated. Copulatory ducts thin and long, more than 1/2 the length of epigynal plate. Spermathecae large, anterior parts large and spherical, consisted with a four-layers helix. Spermathecal bases large, each consisted with an ellipsoidal posterior part and a large spherical chamber occupying 2/5 of the volume of spermathecal base. Spermathecal heads medially situated, stick-shaped with small processes

on surface. Fertilization ducts posteriorly situated.

Male. See in Zhu *et al*. (2017, fig. 116).

Distribution. China: Anhui Province, Hubei Province (**new provincial record**).

Draconarius chenhaojuni sp. nov. 陈浩骏龙隙蛛

https://zoobank.org/70B293F3-9E15-44CC-817D-CAC086062A65

Figs 2; 5A; 6

Type material. Holotype ♀ (CBEE), **CHINA, Zhejiang Province:** Lishui City, Liandu District, Tiantangshan Farm, 28.4648°N, 120.0325°E, elevation: 600 m, 26.II.2021, Hao-Jun. Chen leg.

Etymology. The specific name is dedicated to Mr. Haojun Chen who collected the specimens; noun (name) in genitive case.

Diagnosis. Female of *Draconarius chenhaojuni* **sp. nov.** resembles that of *D. venustus* species-group, particularly *D. aspinatus* and *D. subaspinatus* Zhang, Zhu & Wang, 2017, by the posteriorly situated atrium, large spermatheca with large and spherical anterior part, and stick-shaped, medially situated spermathecal head (Figs 1, 2; fig. 242 in Zhu *et al*. 2017). It can be distinguished from the latter by 1) the distance between the epigynal teeth short, less than the width of the atrium (Fig. 2A) [vs. subequal to the width of atrium in *D. aspinatus* (Fig. 1A) or more than atrium width in *D. subaspinatus* (fig. 242A in Zhu *et al*. 2017)]; 2) atrium large and bowl-shaped with a weak septum (Fig. 2A) [vs. oval and without septum in *D. subaspinatus* (fig. 242A in Zhu *et al*. 2017)]; 3) anterior part of spermatheca consisted with a three-layers helix, the second layer extremely thin from ventral view (Fig. 2B) [vs. consisted with a four-layers helix in *D. aspinatus* (Fig. 1B) or just spherical in *D. subaspinatus* (fig. 242B in Zhu *et al*. 2017)]; 4) spermathecal base acuminate, with a relatively small spherical chamber occupying less than 1/3 the volume of spermathecal base (Fig. 2B) [vs. consisted with an ellipsoidal part and a large spherical chamber occupying more than 2/5 the volume of spermathecal base in *D. aspinatus* (Fig. 1B), or without the spherical chamber in *D. subaspinatus* (fig. 242B in Zhu *et al*. 2017)]; 4) spermathecal heads twisted and screw-shaped (Fig. 2B) [vs. stick-shaped in the latter in *D. aspinatus* and *D. subaspinatus* (Fig. 1B; fig. 242B in Zhu *et al*. 2017)].

Description. Female holotype (Fig. 5B). Carapace reddish brown. Cervical and radial groove distinct. Cephalic region moderately raised, lateral margin with distinct furrows. Chelicerae with three promarginal teeth and two retromarginal teeth, condyle red. Sternum longer than wide. Abdomen pale yellow with 4 chevrons, covered by hairs. Total length 13.92. Carapace 6.35 long, 4.18 wide, cephalic region 3.09 wide. Abdomen 8.31 long, 5.43 wide. Eye size and interdistance: AME 0.15, ALE 0.28, PME 0.23, PLE 0.25; AME–AME 0.11, AME–ALE 0.11, AME–PME 0.16, ALE–PLE 0.08, PME–PME 0.13, PME–PLE 0.31. Leg measurements: I 14.65 (4.24, 1.79, 3.76, 3.32, 1.96), II 13.41 (3.89, 1.62, 3.15, 3.19, 1.86), III 12.72 (3.60, 1.68, 2.67, 3.28, 1.82), IV 17.41 (4.59, 1.80, 4.12, 5.05, 2.16).

Epigyne (Fig. 2). Epigynal plate round and moderately sclerotized. Atrium posteriorly situated, bowl-shaped, with triangular membranous anterior margin and weak septum. Copulatory openings situated centrally of atrium. Epigynal teeth separated and anteriorly situated. Hoods weak, laterally situated. Copulatory ducts short, shorter than 1/2 of the length of spermathecae, membranous. Spermathecae large, anterior parts large and spherical, consisted with a three-layers helix. Spermathecal bases acuminate, with spherical chamber occupying less than 1/3 of the volume. Spermathecal heads medially situated, twisted and screw-shaped. Fertilization ducts posteriorly situated.

Male. Unknown.

Distribution: China (Zhejiang).

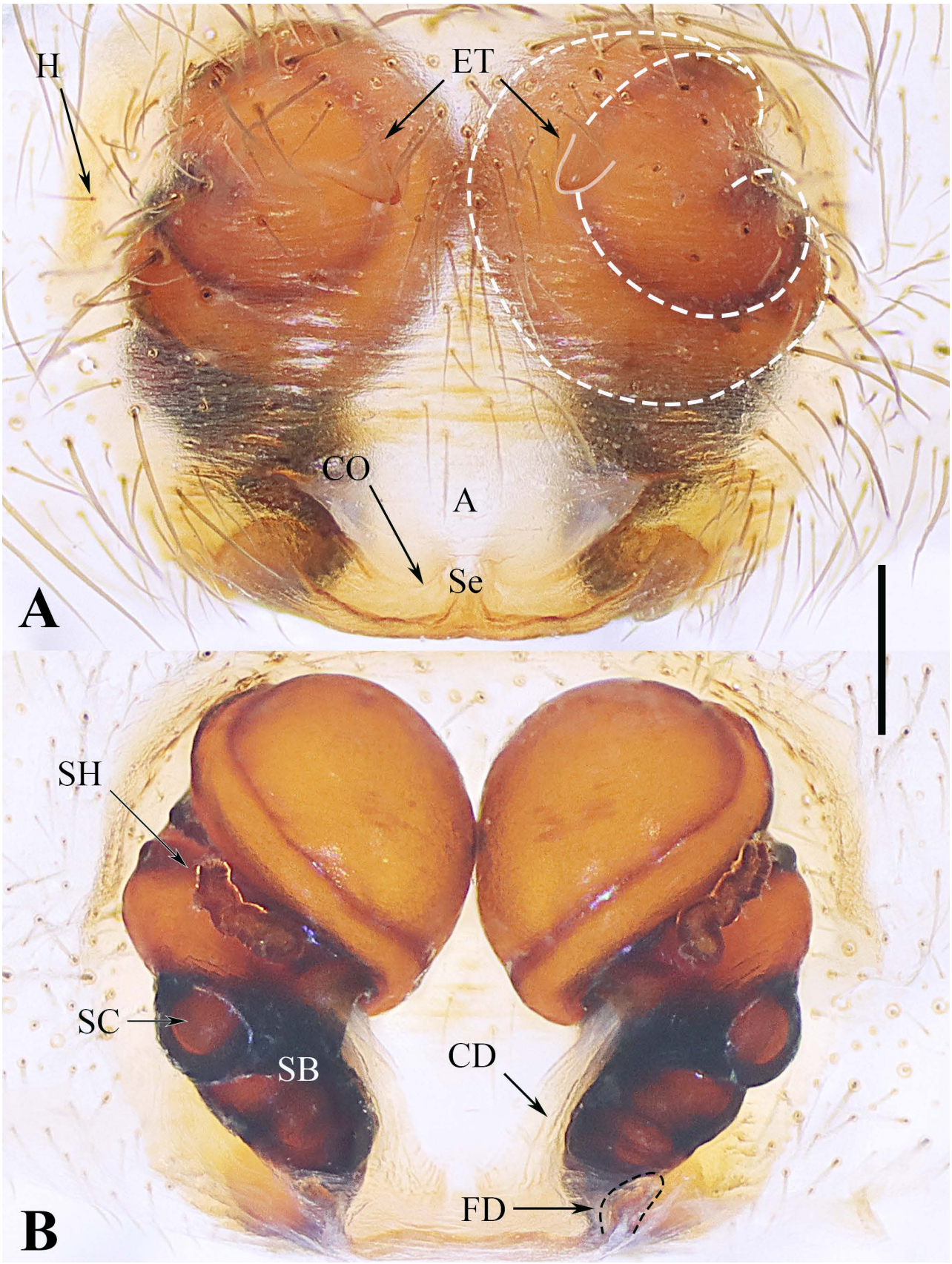

FIGURE 2. *Draconarius chenhaojuni* **sp. nov.**, female: **A** epigyne, ventral view (white dashed lines indicate two layers visible from ventral view) **B** vulva, dorsal view. **Abbreviations:** A–atrium, CD–copulatory duct, ET–epigynal teeth, FD–fertilization duct, H–hood, SB–spermathecal base, SC–spherical chamber, Se–septum, SH–spermathecal head. Scale bar = 0.50 mm.

Draconarius kozue sp. nov. 梢江龙隙蛛

https://zoobank.org/15685F34-3D44-4582-99FE-3E8E7AE4081A

Figs 3; 4; 5B, C; 6

Type material. Holotype ♂ (CBEE), **CHINA, Zhejiang Province:** Hangzhou City, Tonglu County, Daqishan Nation Forest Park, 29.7557°N, 119.7314°E, elevation: 386 m, 13.V.2023, Hui-Hang Cai leg. **Paratypes:** 1♀ (CBEE), same data as holotype; 1♀ (CBEE), **CHINA, Zhejiang Province:** Hangzhou City, Fuyang District, Yemaoling Mountain, 29.8425°N, 120.0093°E, elevation: 402 m, 20.V.2023, Hui-Hang Cai leg.

Etymology. The specific epithet is from "Matsumoto Kozue", a fictional character of "Baki the Grappler" (a manga series written and illustrated by Itagaki Keisuke) as the collector of the holotype Cai's require; noun in apposition.

Diagnosis. Male of *Draconarius kozue* **sp. nov.** resembles that of *D. colubrinus* Zhang, Zhu & Song, 2002 in the absence of patellar apophysis and having a trapezoidal dorsal margin of the conductor when viewed ventrally (Fig. 3; fig. 135C in Zhu *et al*. 2017). However, they can be distinguished by: 1) the prolateral side of the dorsal margin of the conductor smoothly arc-shaped, and with the retrolateral side truncated (Fig. 3B) [vs. with prolateral side margin orthographic and retrolateral side hypotenuse-shaped in *D. colubrinus* (fig. 135C in Zhu *et al*. 2017)]; 2) embolic base nearly rectangular (Fig. 3B) [vs. nearly triangular in *D. colubrinus* (fig. 135C in Zhu *et al*. 2017)]; 3) median apophysis pear-shaped from ventral view, with the distal tip pointed upward (Fig. 3B) [vs. spoon-shaped and with a slim, retrolaterally pointed distal tip in *D. colubrinus* (fig. 135C in Zhu *et al*. 2017)]. Female of *Draconarius kozue* **sp. nov.** resembles that of *D. colubrinus* and *D. hangzhouensis* Chen, 1984 by with sclerotized posterior epigynal margin, medially or anteriorly situated epigynal teeth, and large spermathecae (Fig. 4; figs 135A, B, 163 in Zhu *et al*. 2017). It can be differentiated by: 1) the uplifted epigyne, with teeth situated on the elevated ridge (Fig. 4A) [vs. flat in the latter (figs 135A, 163A in Zhu *et al*. 2017)]; 2) the width of the copulatory duct less than that of the spermatheca, but with length subequal to that of the spermatheca (Fig. 4B) [vs. length of copulatory duct ca. half of the spermatheca in *D. colubrinus* (fig. 135B in Zhu *et al*. 2017) or obviously longer and wider than spermatheca in *D. hangzhouensis* (fig. 163B in Zhu *et al*. 2017)]; 3) spermatheca with distinct base, stalk, and head divisions (Fig. 4B) [vs. spermatheca kidney-shaped in *D. colubrinus* (fig. 135B in Zhu *et al*. 2017) or S-shaped in *D. hangzhouensis* (fig. 163B in Zhu *et al*. 2017), without distinct divisions].

Description. Male holotype (Fig. 5C). Carapace dark brown, cervical and radial grooves distinct. Cephalic region moderately raised. Chelicerae with three promarginal teeth and two retromarginal teeth, condyle red. Sternum longer than wide. Abdomen dark, with 5 chevrons, covered by blueish gray hairs. Legs reddish brown. Total length 11.09. Carapace 6.23 long, 4.18 wide, cephalic region 2.69 wide. Abdomen 4.78 long, 3.19 wide. Eye size and interdistance: AME 0.17, ALE 0.27, PME 0.24, PLE 0.26; AME–AME 0.10, AME–ALE 0.09, AME–PME 0.16, ALE–PLE 0.06, PME–PME 0.10, PME–PLE 0.27. Leg measurements: I 17.31 (4.79, 1.81, 4.34, 4.22, 2.41), II 15.24 (4.18, 1.82, 3.57, 3.64, 2.39), III 14.37 (3.85, 1.77, 3.05, 3.88, 2.13), IV 19.21 (5.04, 1.92, 4.36, 5.47, 2.57).

Palp (Fig. 3). Patellar apophysis absent. Retrolateral tibial apophysis strong and dark, with apex extending beyond tibia. Lateral tibial apophysis short and dark. Cymbial furrow dark, less than 1/2 the length of cymbium. Median apophysis pear-shaped from ventral view, with retrolateral margin sclerotized, distal tip pointed upward. Conductor strongly sclerotized, long and thin, ventral margin arc-shaped, dorsal margin trapezoidal, with prolateral side smooth arc-shaped and retrolateral side truncated; dorsal apophysis of conductor long and sharp. Embolic base nearly rectangular, embolus long and filiform.

Female paratype (Fig. 5D). Same in color and abdominal patterns as male. Chelicerae with three promarginal teeth and two retromarginal teeth. Total length 14.14. Carapace 5.82 long, 3.68 wide, cephalic region 2.82 wide. Abdomen 8.28 long, 5.56 wide. Eye size and interdistance: AME 0.14, ALE 0.26, PME 0.24, PLE 0.27; AME–AME 0.11, AME–ALE 0.08, AME–PME 0.12, ALE–PLE 0.08, PME–PME 0.10, PME–PLE 0.26. Leg measurements: I 13.56 (3.96, 1.53, 3.33, 3.02, 1.94), II 11.89 (3.39, 1.45, 2.82, 2.85, 1.72), III 11.11 (3.30, 1.20, 2.31, 2.81, 1.59), IV 15.42 (3.98, 1.57, 3.45, 4.48, 1.97).

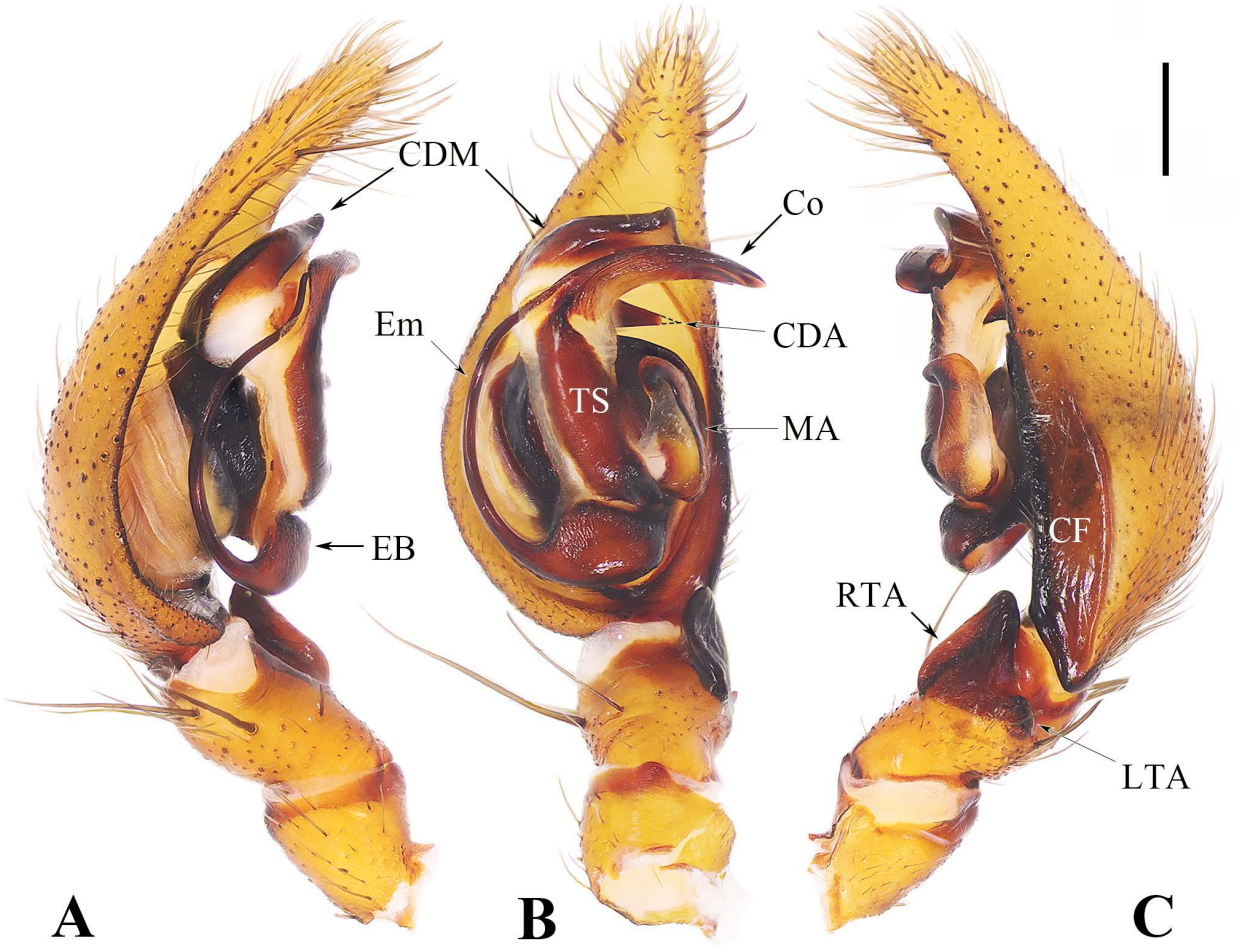

FIGURE 3. *Draconarius kozue* **sp. nov.**, male: **A** male palp, prolateral view **B** ditto, ventral view (Black dashed line indicates broken CDA) **C** ditto, retrolateral view. **Abbreviations:** CDA–dorsal apophysis of conductor, CDM–dorsal margin of conductor, Co–conductor, CF–cymbial furrow, EB–embolic base, Em–embolus, LTA–lateral tibial apophysis, MA–median apophysis, RTA–retrolateral tibial apophysis, TS–tegular sclerite. Scale bar = 0.50 mm.

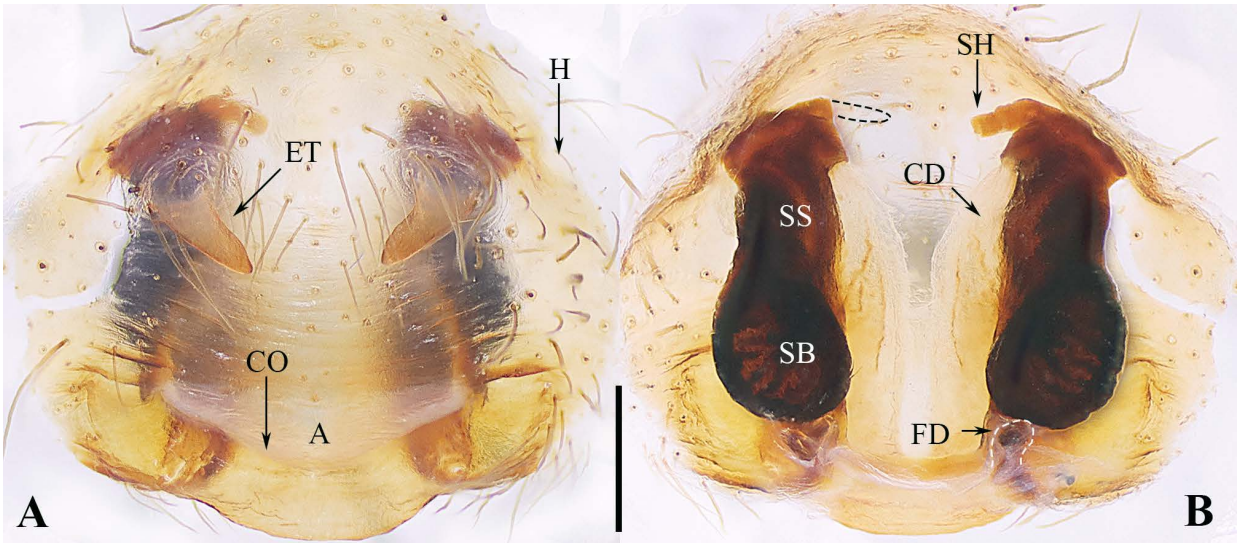

FIGURE 4. *Draconarius kozue* **sp. nov.**, female: **A** epigyne, ventral view **B** vulvae, dorsal view (black dashed line indicates broken spermathecal head). **Abbreviations:** A–atrium, CD–copulatory duct, ET–epigynal tooth, FD–fertilization duct, H–hood, SB–spermathecal base, SH–spermathecal head, SS–spermathecal stalk. Scale bar = 0.50 mm.

Epigyne (Fig. 4). Epigynal plate hexagonal and moderately sclerotized, uplifted centrally. Epigynal teeth situated medially, on the uplifted ridge. Atrium invert triangular, posteriorly situated and large, anterior margin incomplete. Copulatory openings situated posteriorly of atrium. Posterior margin of epigyne strongly sclerotized. Hoods weak, situated laterally. Copulatory ducts long, subequal to the length of spermatheca, originated posteriorly. Spermathecae strongly sclerotized, each with a spherical base and an anteriorly situated head pointed inward. Fertilization ducts situated posteriorly.

Distribution: China (Zhejiang).

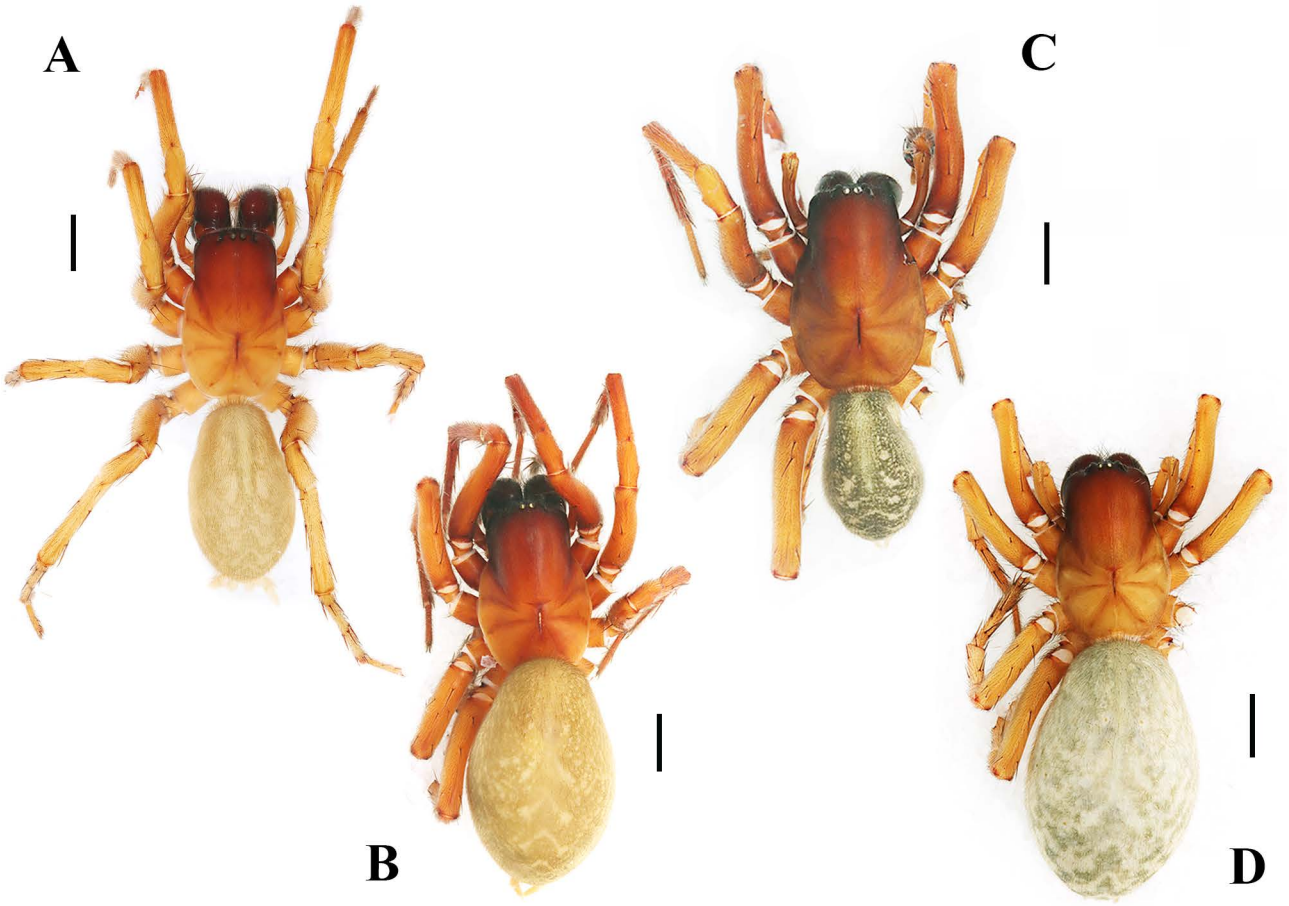

FIGURE 5. Habitus of *Draconarius* spp., dorsal views: **A** *D. aspinatus*, female **B** *D. chenhaojuni* **sp. nov.**, female holotype **C** *D. kozue* **sp. nov.**, male holotye **D** ditto, female paratype. Scale bars = 1.00 mm.

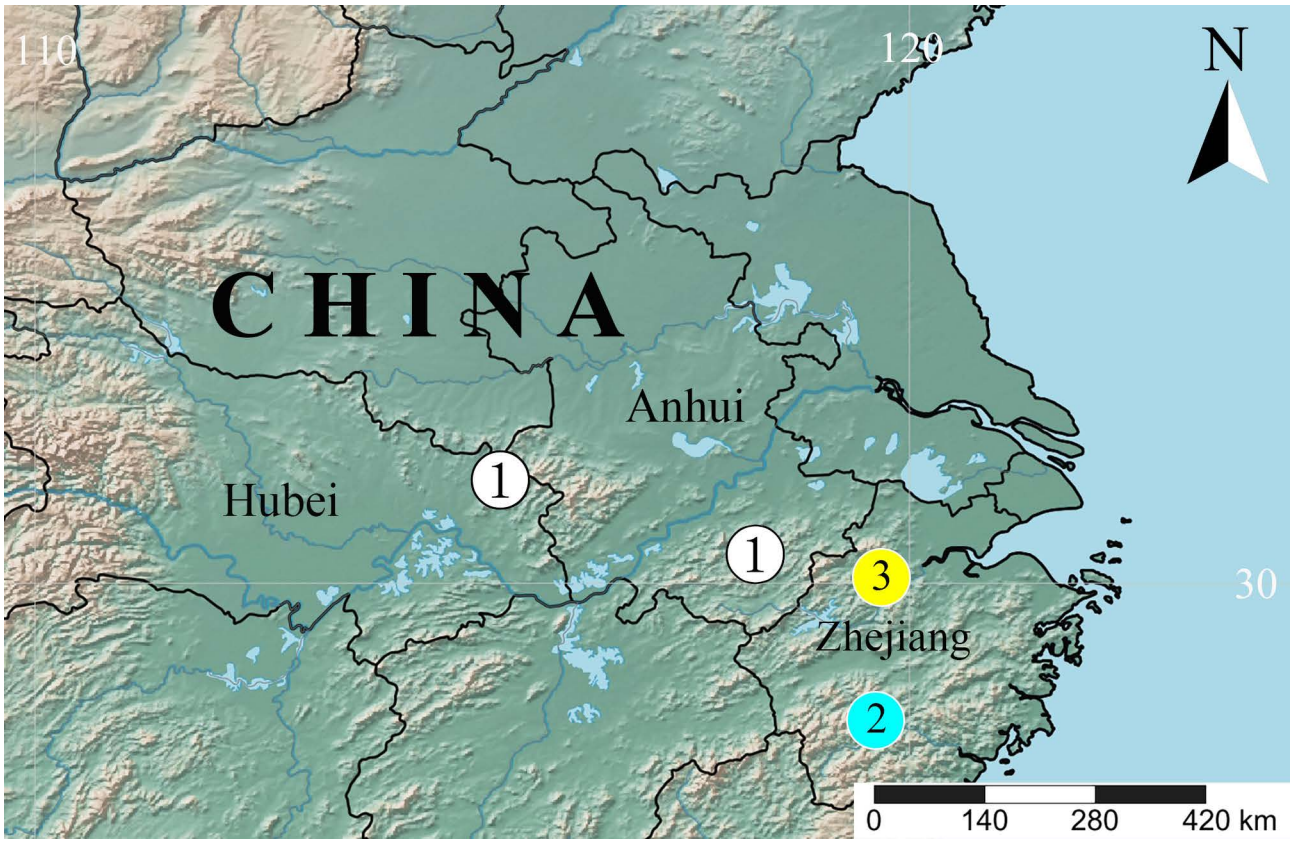

FIGURE 6. Collected localities of the two new species and a new provincial record of *Draconarius* in China: **1** *D. aspinatus* **2** *D. chenhaojuni* **sp. nov. 3** *D. kozue* **sp. nov.**

Acknowledgements

We thank Hui-Hang Cai (Zhejiang), Hao-Jun Chen (Zhejiang) and the local collector (Hubei) for their help in field works. The manuscript benefited from comments by the subject editor Ye-Jie Lin (Imperial College London, United Kingdom).

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Additional information

Author contributions: Conceptualization, Resources, Visualization, Writing–original draft, Writing–review and editing: F-B Yu & M Wei.

Conflict of interest: The authors have declared that no competing interests exist.

Data availability: All of the data that support the findings of this study are available in the main text.

Ethical statement: No ethical statement was reported.

Funding: This study was self-funded by the authors.