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# **Baiyuerius**, a new genus of Coelotinae (Araneae, Agelenidae) spiders from China and Vietnam

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# *Baiyuerius*, a new genus of Coelotinae (Araneae, Agelenidae) spiders from China and Vietnam

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## 15 Abstract

Baiyuerius Li, Zhao & Li gen. n., a new genus of the subfamily Coelotinae F. O.
Pickard-Cambridge, 1893 is described, including five new species: B. daxi Li, Zhao & Li sp.
n. (♀), B. pindong Li, Zhao & Li sp. n. (♂), B. tamdao Li, Zhao & Li sp. n. (♀), B. zhuping
Li, Zhao & Li sp. n. (♂), and B. zuojiang Li, Zhao & Li sp. n. (♂♀), from southern China
and the north of Vietnam. Our molecular analysis supports Baiyuerius Li, Zhao & Li gen. n.
as monophyletic and as a sister group of the newly established genus Yunguirius.

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## 23 Keywords

24 Asia, new species, barcode, phylogeny, taxonomy.

## 26 Introduction

27 Agelenidae C. L. Koch, 1837 is one of the top ten largest spider families in the world 28 including 1,374 species in 92 genera. In particular, the subfamily Coelotinae F. O. 29 Pickard-Cambridge 1898 is exceptionally diverse counting 798 species in 38 genera (WSC 2023). This subfamily is widely distributed, occurring in Asia, Europe, and North America. 30 In the last decade, 15 genera have been established to accommodate the Asian coelotine 31 species: Aeolocoelotes Okumura, 2020 (Japan); Curticoelotes Okumura, 2020 (Japan); 32 Dichodactylus Okumura, 2017 (Japan); Flexicoelotes Chen, Li & Zhao, 2015 (China); 33 34 Griseidraconarius Okumura, 2020 (Japan); Guilotes Zhao & Li, 2018 (China); Hengconarius Zhao & Li, 2018 (China); Jishiyu Lin & Li, 2023 (China); Nesiocoelotes 35 Okumura & Zhao, 2022 (Japan); Nuconarius Zhao & Li, 2018 (China); Papiliocoelotes 36 Zhao & Li, 2016 (China); Sinocoelotes Zhao & Li, 2016 (China, Thailand); Sinodraconarius 37 Zhao & Li, 2018 (China); Troglocoelotes Zhao & Li, 2019 (China); Vappolotes Zhao & Li, 38 39 2019 (China) (Chen et al. 2015, 2016; Li, Zhao and Chen et al. 2018, 2019, Li, Zhao and Zhang et al. 2018a, b, 2019; Lin et al. 2023; Okumura 2017, 2020; Okunura and Zhao 2022; 40 41 Zhao and Li 2016). Since Coelotinae are very diverse in East Asia, our research has been

42 continuously focused on the study of the Chinese species under an integrative morphological43 and molecular perspective.

While examining specimens collected from southern China and the north of Vietnam, we suspected that they should belong to a new genus and five putative undescribed species. Therefore, a morphological and phylogenetic analysis, and a comparison with closely related species, was conducted to confirm it. We herein report the results of these analyses, and we describe in detail the new species and the new genus erected to accommodate them.

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### 50 Material and methods

## 51 Sampling and morphological examination

52 All specimens studied in this paper were collected from southern China and northern Vietnam 53 and are deposited in the Institute of Zoology, Chinese Academy of Sciences (IZCAS). 54 Specimens were examined with a LEICA M205C stereomicroscope at IZCAS. Photos were taken with an Olympus C7070 wide zoom digital camera (7.1 megapixels) mounted either on 55 56 an Olympus SZX12 dissecting microscope or on an Olympus BX51 compound microscope. 57 Images from multiple focal ranges were combined using Helicon Focus (Version 6.80) photo 58 stacking software. The epigyne and male palp were dissected for examination. The epigyne 59 was treated in a warm 10% potassium hydroxide (KOH) solution. Images of the left male palp are illustrated. Measurements were obtained with a LEICA M205C stereomicroscope and are 60 given in millimetres. Eye diameters were measured as the maximum distance in either dorsal 61 or frontal views. Leg measurements are given as follows: total length (femur, patella, tibia, 62 metatarsus, tarsus). Terminology follows Wang (2003) and Li et al. (2018a, b). References to 63 64 figures in the cited papers are listed in lowercase (fig. or figs); figures from this paper are noted with an initial capital (Fig. or Figs). Abbreviations used in the text and figures are as 65 follows: 66

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Α	atrium;	Hy	hypophysis;
ALE	anterior lateral eye;	LTA	lateral tibial apophysis;
ALE-PLE	distance between ALE and PLE;	MA	median apophysis;
AME	anterior median eye;	PA	patellar apophysis;
AME-ALE	distance between AME and ALE;	PES	posterior epigynal sclerite;
AME-AME	distance between AME and AME;	PLE	posterior lateral eye;
AME-PME	distance between AME and PME;	PME	posterior median eye;
С	conductor;	PME-PLE	distance between PME and PLE;
CD	copulatory duct;	PME-PME	distance between PME and PME;
CDA	dorsal apophysis of conductor;	RTA	retrolateral tibial apophysis;
CF	cymbial furrow;	S	spermatheca;
CO	copulatory opening;	SB	spermathecal base;
Е	embolus;	SE	swell of epigyne;
EB	embolic base;	ST	subtegulum;
FD	fertilization duct;	Т	tegulum.
н	hood;		

68

## 69 Laboratory protocols and Phylogenetic analyses

70 The DNA barcodes of the putative new species were obtained to test the species boundaries. 71 A partial fragment of the mitochondrial cytochrome oxidase subunit I (COI) gene was the LCO1490-oono 72 amplified and sequenced using primers: (5'-CWACAAAYCATARRGATATTGG-3') and HCO2198-zz 73 74 (5'-TAAACTTCCAGGTGACCAAAAAATCA-3'). Extraction, amplification and 75 sequencing methods followed Zhao and Li (2017), Zhao et al. (2020) and Okumura and Zhao (2022). The molecular dataset consisted in eight genes of 77 species (supplementary 76 77 Table S1), including 73 species in 33 known genera of Coelotinae (with 27 type species from different genera) as the ingroup, and three species of Ageleninae and one species of 78 Amaurobiidae as the outgroup, which were published recently (Li et al. 2023, paper 79 submitted and under review), and three novel sequences (Table 1). 80

81 Phylogenetic relationships were inferred using both maximum likelihood (ML) and 82 Bayesian inference (BI). First, the best-fit partitioning schemes and models for the ML and BI analyses were selected using PartitionFinder v2.1.1 (Lanfear et al. 2012). ML analysis 83 84 was conducted in RAxML v8.0.0 (Stamatakis 2006) using the substitution model GTRCAT for all partitions (partitioned by genes). A rapid bootstrap of 1000 replicate ML inferences 85 86 was performed to determine the best-scoring ML tree and nodal support. ML analysis was 87 also conducted in IQ-TREE (Nguyen et al. 2015) by using the ModelFinder function (-m MFP+MERGE) to select the best-fit model for each partition, and the option "-bb 1,000" to 88 89 estimate the nodal support values. BI analyses were conducted in MrBayes v3.2.2 (Ronquist and Huelsenbeck 2003) with posterior distributions estimated by Markov chain Monte Carlo 90 91 (MCMC) sampling. The corresponding model for each partition was selected. Two 92 simultaneous runs with four MCMC chains were performed for 10 million generations to 93 ensure that the average standard deviation of split frequency was below 0.01 and to get a 94 well-supported consensus tree.

95 96

Species	Voucher code	GenBank	Sequence	Collection localities
		accession number	length	
<i>B. daxi</i> <b>sp. n.</b>	IZCAS-Ar44390	available soon		Guilin City, Guangxi Zhuang
	(LB084)			Autonomous Region, China
B. pindong <b>sp. n.</b>	IZCAS-Ar44392	available soon		Qingyuan City, Guangdong
	(LB172)			Province, China
<i>B. tamdao</i> <b>sp. n.</b>	IZCAS-Ar44393	KY778894	1194bp	Hanoi City, Vietnam
	(ZZ495)			
B. zhuping sp. n.	IZCAS-Ar44394	KY778886	613bp	Kaili City, Guizhou Province,
	(ZZ124)			China
B. zuojiang <b>sp. n.</b>	IZCAS-Ar44395	available soon		Chongzuo City, Guangxi Zhuang
	(LB070)			Autonomous Region, China

97

## 98 **Results and discussion**

99 The five species of the new genus share similar external genital morphology such as: a long100 femur (more than 3 times longer than patella), a short patella (about half the length of tibia),

101 a bent tibia, the base of cymbium with one or two hypophyses, a wide E having a wider

anterior part, a large CDA with a jagged margin; an epigyne lacking epigynal teeth, an
atrium located anteriorly over the SE and PES between two swells of the epigyne, S small
(shorter than 1/4 the length of CD) and located posteriorly, close to each other, which
anterior part fist-like.

Our phylogenetic analyses all infer similar tree topologies (Fig. 1) and strongly support
 *Baiyuerius* gen. n. as a monophyletic clade (ML bootstrap = 100 and 95; BI posterior
 probability = 1.00).

Geographically, the species belonging to *Baiyuerius* gen. n. show a narrow distribution in southern China and the north of Vietnam (Fig. 8). Zoogeographic studies suggest that the genus-level distribution of coelotine spiders is regional, and that the divergence and formation of these monophyletic genera are closely linked to geological and climatic events that occurred during the Neogene in Eurasia (Zhao and Li 2017; Zhao *et al.* 2020, Zhao *et al.* 2022).

Based on these results, taking into account the morphological comparison, phylogenetic
analyses, and zoogeographic considerations, the new genus *Baiyuerius* gen. n. is established
herein.

118

119 Taxonomy

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122

121 Family Agelenidae C.L. Koch, 1837

- 123 Subfamily Coelotinae F.O. Pickard-Cambridge, 1893
- 124

125 Genus Baiyuerius Li, Zhao & Li, gen. n.

126 Figs. 2–8

127

**Type species.** *Baiyuerius zuojiang* Li, Zhao & Li, sp. n., from Chongzu, Guangxi Zhuang
Autonomous Region, China.

Etymology. The generic name is derived from the pinyin word "Baiyue", referring to Baiyue region where the new genus is distributed. Baiyue is a loose term which can be backdated turning the first millennium BC and was used to denote various populations who inhabited southern China and northern Vietnam. The postfix "-rius" refers to the postfix commonly used in the genera of the *Sinodraconarius* clade. The gender is masculine.

135 Diagnosis. The morphological characteristics of Baiyuerius gen. n. resemble those of the genera Hengconarius, Nuconarius, Sinodraconarius and the newly established genus 136 137 Yunguiriu, included in the Sinodraconarius clade: the dark colour of the carapace, chelicerae with three promarginal and two retromarginal teeth, the palp of male with two tibial 138 apophyses, length of CF less than half length of cymbium, the epigyne with different shapes 139 of PES, lack of epigynal teeth. Nevertheless, Baiyuerius gen. n. can be distinguished from 140 141 all the other genera of the Sinodraconarius clade by the male palp having a thick and 142 enlarged PA, extending equal to or over half of the tibia, the CDA large and with different 143 shapes; the female epigyne having a large atrium occupying more than or equal to 1/4 of the female epigyne, and the spermathecae close to each other, with the only exception of 144 Yunguirius gen. n. (established by Li, Zhao and Li in Li et al. 2023, paper submitted and 145

under review). *Baiyuerius* gen. n. can be distinguished from *Yunguirius* by the following
characters of the male palp and epigyne: PA thick, more than 2 times longer than wide vs.
PA thin, finger-like; the base of cymbium enlarged, with 1 or 2 hypophyses vs. the base of
cymbium without any hypophysis; an atrium located anteriorly and occupying less than or
equal to 1/2 of the epigyne vs. atrium located centrally and occupying more than 1/2 of the
epigyne.

152 **Description.** Medium-sized, total lengths from 8.60 to 11.98. Carapace black turning brown or green grey turning yellow grey, pear-shaped, with longitudinal fovea and darker 153 radial grooves; chelicerae of the same colour as the anterior carapace, with three 154 promarginal and two retromarginal teeth; endites and labium dark brown or green grey, 155 anteriorly white with black hairs; sternum brown or milk-white, longer than wide. Abdomen 156 yellow green, covered with green grey hairs, with two pairs of apodemes and four darker 157 158 chevron-like markings. Spinnerets lighter than sternum. Leg formula 4 > 1 > 2 > 3. Male palp: femur more than 3 times than patella, patella approx, half of tibia, PA finger-like, long 159 half of tibia and extending over patella, RTA rectangular and lamellar, extending beyond 160 tibia, LTA of the same shape as PA but thinner and shorter, MA spoon-shaped, length of CF 161 162 shorter than 1/2 length of cymbium, with an enlarged base, the base of cymbium with 1 or 2 163 hypophyses, E widen and slightly elongated, the anterior part the widest, CDA large, with different shapes, in some cases bearing a jagged margin; Female epigyne: epigynal teeth 164 165 absent, atrium located anteriorly, over the ES, internally milk-white, PES between two swollen parts of epigyne, CD beginning at the posterior margin of epigyne, extended 166 anteriorly, CO located anterolaterally, S small and located posteriorly, smaller than 1/4 the 167 168 length of CD, anterior part fist-like, SB close to each other, FD originating from inside of spermatheca. 169

170 Distribution. Guizhou and Guangdong Province, Guangxi Zhuang Autonomous171 Region, China, and Hanoi City, Vietnam (Fig. 8).

172

## 173 Baiyuerius daxi Li, Zhao & Li sp. n.

- 174 Figs. 2, 8
- 175

176Type material. Holotype  $\bigcirc$  (IZCAS-Ar44390) (LB084): China: Guangxi Zhuang177Autonomous Region: Guilin City: Yongfu County, Daxi Village, Fushouyan Cave,178N24.9704°, E110.1463°, elevation: 308m, 4.I.2018, Z. Chen leg. Paratype: 1 $\bigcirc$ 179(IZCAS-Ar44391) (YX562): Yongfuyan Cave (near Fushouyan Cave), N24.9731°,180E110.1417°, elevation: 236±3m, 24.X.2019, Z. Chen leg.

181 Etymology. The new species is named after the type locality, the Daxi Village; noun in182 apposition.

**Diagnosis.** *Baiyuerius daxi* sp. n. resembles *B. zuojiang* sp. n. by color of chelicerae, spinnerets and legs, shape of CD and atrium. It can be distinguished from the latter by the following combination of characters: atrium larger, occupying half of the epigyne (Fig. 2A), vs. atrium occupying only 1/3 of epigyne in the latter species (Fig. 7A); hoods located near the posterior part (Fig. 2A) vs. hoods located near the anterior part in the latter (Fig. 7A); shape of PES pentagonal (Fig. 2A) vs. rhomboid PES in the latter (Fig. 7A); CD covering half of the S (Fig. 2B) vs. S covering 1/4 of the CD in the latter (Fig. 7B).

Description. Female (holotype) (Fig. 2). Total length 11.98. Carapace 6.02 long, 3.51 190 wide. Abdomen 5.96 long, 4.29 wide. Eye sizes and interdistances: AME: 0.11, ALE: 0.16, 191 PME: 0.14, PLE: 0.15; AME-AME: 0.06; AME-ALE: 0.09; AME-PME: 0.04; ALE-PLE: 192 0.04; PME-PME: 0.05; PME-PLE: 0.16. Leg measurements: I: 12.87 (4.02, 1.29, 3.03, 2.61, 193 194 1.92); II: 11.41 (3.68, 1.27, 2.26, 2.35, 1.85); III: 10.29 (3.04, 1.22, 2.03, 2.42, 1.58); IV: 195 13.64 (4.29, 1.36, 2.85, 3.15, 1.99). Leg formula 4 > 1> 2 > 3. Carapace black turning brown, chelicerae black, endites and labium brown, sternum, spinnerets, and legs yellow-brown. 196 197 Female epigyne (Fig. 2A, B): Atrium glasses-shaped, occupying half of epigyne, PES near pentagonal, externally wrinkled and enlarged, CD originating posteriorly, extending first 198 posteriorly then anteriorly, 4 times longer than wide, CO located anterolaterally, S coiled, 199 200 touching each other, anteriorly covered by CD, FD separate from each other, about 2.5 times 201 longer than wide. 202

- Male. Unknown.
- 203 204

207

## Distribution. Guangxi Zhuang Autonomous Region, China (Fig. 8).

#### Baiyuerius pindong Li, Zhao & Li sp. n. 205

206 Figs. 3, 8

**Type material. Holotype** ♂ (IZCAS-Ar44392) (LB172): China: Guangdong Province: 208 209 Qingyuan City: Yangshan County, Shuikou Ancient Town, Pindong Village, N24.3987°, E112.7433°, elevation: 553±3.2m, 8.I.2019, Z. Zhao and Z. Chen leg. 210

**Etymology.** The new species is named after the type locality, the Pindong Village; 211 noun in apposition. 212

213 Diagnosis. Baiyuerius pindong sp. n. can be distinguished from the other species of the 214 new genus by the following combination of characters: LTA concave and large, wider than long (Fig. 3C), vs. LTA with the similar shape of PA, longer than wide in other species (Figs. 215 216 5C, 6C); MA brown, with dark brown margins (Fig. 3B), vs. white with only dark brown 217 distal margin in B. zhuping sp. n. (Fig. 5B), or all brown in B. zuojiang sp. n. (Fig. 6B); the 218 cymbial base bearing two hypophyses (Fig. 3C), vs. having a single hypophysis in other 219 species (Figs. 5C, 6C).

Description. Male (holotype). Total length 10.06. Carapace 5.42 long, 3.53 wide. 220 Abdomen 4.64 long, 2.96 wide. Eye sizes and interdistances: AME: 0.12, ALE: 0.15, PME: 221 222 0.15, PLE: 0.15; AME-AME: 0.06; AME-ALE: 0.09; AME-PME: 0.07; ALE-PLE: 0.04; 223 PME-PME: 0.04; PME-PLE: 0.15. Leg measurements: I: 14.36 (4.13, 1.74, 3.06, 3.17, 2.26); II: 13.14 (3.59, 1.73, 2.76, 3.14, 1.92); III: 11.21 (3.14, 1.34, 1.92, 3.12, 1.69); IV: 15.37 224 225 (4.43, 1.76, 3.14, 4.12, 1.92). Leg formula 4 > 1 > 2 > 3. Carapace black turning dark brown, chelicerae, endites, and labium dark brown, sternum brown, longer than wide, spinnerets 226 yellow-brown, legs dark brown turning yellow-brown. Male palp (Fig. 3): tibia short, its 227 length only twice the width, PA dark brown, about 3 times longer than wide, extending over 228 229 half of tibia, heading anterolaterally at 1/8 of its length, RTA originating from 1/3 of tibia, 230 LTA enlarged, human-ear-like, MA spoon-shaped, length of CF about 1/2 length of cymbium, 231 E originating at 7 o'clock, widen, narrowing in the second half, covered by C for 2/3 of its length, SB black, 2 times longer than wide, C translucent, with a jagged and transparent 232 margin and wrinkles, CDA black and strongly expanded, leaf-like, with a jagged margin. 233

**Female.** Unknown.

**Distribution.** Guangdong Province, China (Fig. 8).

236

237 Baiyuerius tamdao Li, Zhao & Li sp. n.

- 238 Figs. 4, 8
- 239

Type material. Holotype ♀ (IZCAS-Ar44393) (ZZ495): Vietnam: Hanoi City: Tam Dao
National Park (field), N21.4720°, E105.6364°, elevation: 1023m, 31.X.2012, H. Zhao and Z.
Chen leg.

**Etymology.** The new species is named after the type locality, the Tam Dao NationalPark; noun in apposition.

245 **Diagnosis.** Baiyuerius tamdao sp. n. can be distinguished from the other congeners by 246 the following combination of characters: atrium occupying a quarter of the epigyne (Fig. 4A) vs. atrium covering about a third (Fig. 7A) or half (Fig. 2A) of the epigyne in other species; 247 hoods located centrally (Fig. 4A) vs. hood located near the anterior part (Fig. 7A) or 248 posteriorly (Fig. 2A) in other congeners; CD extending along a semicircle, anteriorly 249 250 overlapping to each other (Fig. 4B) vs. CD extending along the sclerotic margin of the 251 atrium with the anterior part separated from each other in other congeners (Figs. 2B, 7B); SE 252 spherical and uniformly yellow (Fig. 4B), vs. SE long-eggplant-shaped, with brown margin 253 in other congeners (Figs. 2B, 7B).

Description. Female (holotype) (Fig. 4). Total length 10.94. Carapace 5.86 long, 3.61 254 wide. Abdomen 5.08 long, 3.34 wide. Eye sizes and interdistances: AME: 0.11, ALE: 0.23, 255 256 PME: 0.22, PLE: 0.26; AME-AME: 0.05; AME-ALE: 0.14; AME-PME: 0.09; ALE-PLE: 257 0.02; PME-PME: 0.06; PME-PLE: 0.23. Leg measurements: I: 13.87 (3.81, 1.69, 3.42, 2.80, 2.15); II: 12.44 (3.74, 1.60, 2.72, 2.41, 1.97); III: 10.07 (3.12, 1.53, 2.03, 1.96, 1.43); IV: 258 14.11 (4.31, 1.83, 3.19, 2.93, 1.85). Leg formula 4 > 1 > 2 > 3. Carapace green grey turning 259 260 yellow grey, chelicerae, endites, and labium grey, sternum, spinnerets, and legs milk-white, 261 legs covered with green grey hairs. Female epigyne (Fig. 4A, B): Atrium inverted triangular, 262 occupying 1/4 of epigyne, PES distally enlarged, about 3 times longer than wide, external 263 margins yellow-brown, SE distinct, CD located centrally, extending anteriorly then curved inward, U-shaped, CO located centrally, on both sides of the midline, S coiled to fist-like, 264 about 1/6 of length of CD, FD slender and transparent, 5 times longer than wide. 265

- 266 Male. Unknown.
- 267 **Distribution.** Hanoi City, Vietnam (Fig. 8).
- 268

269 Baiyuerius zhuping Li, Zhao & Li sp. n.

270 Figs. 5, 8

271

Type material. Holotype ♂ (IZCAS-Ar44394) (ZZ124): China: Guizhou Province: Kaili
City: Zhenyuan County, Yangping Town, Zhuping Village, Zhangjiawan Cave, N27.0528°,
E108.7406°, elevation: 578m, 17.XII.2011, Z. Zha and Z. Chen leg.

Etymology. The new species is named after the type locality, the Zhuping Village;noun in apposition.

**Diagnosis.** *Baiyuerius zhuping* sp. n. can be distinguished from all other congeners by the following combination of characters: MA with three lobes (Fig. 5B) vs. MA lacking any lobes in the other species (Figs. 3B, 6B); flat margin of C (Fig. 5A–B) vs. jagged margin of C in the other species (Figs. 3A–B, 6A–B); CDA small, nearly squared (Fig. 5A) vs. strongly swollen CDA in the other species (Figs. 3A, 6A).

282 Description. Male (holotype). Total length 9.51. Carapace 4.93 long, 2.86 wide. Abdomen 4.58 long, 3.15 wide. Eye sizes and interdistances: AME: 0.11, ALE: 0.14, PME: 283 0.13, PLE: 0.13; AME-AME: 0.03; AME-ALE: 0.06; AME-PME: 0.05; ALE-PLE: 0.04; 284 PME-PME: 0.04; PME-PLE: 0.09. Leg measurements: I: 10.76 (2.91, 0.92, 2.74, 2.54, 1.65); 285 II: 9.89 (2.98, 0.92, 2.14, 2.21, 1.64); III: 8.64 (2.61, 0.83, 1.81, 2.03, 1.36); IV: 11.23 (3.18, 286 0.95, 2.81, 2.68, 1.61). Leg formula 4 > 1 > 2 > 3. Carapace black turning dark brown, 287 288 chelicerae, endites, and labium dark brown, sternum brown, longer than wide, spinnerets 289 yellow-brown, legs dark brown turning yellow-brown. Male palp (Fig. 5): patella about half length of its very bent tibia, PA brown turning dark brown, more than 2 times longer than 290 wide, extending over 2/3 of tibia, slightly heading anterolaterally at 1/8, RTA originating 291 from the base of the tibia, LTA finger-like, heading posterolaterally, MA spoon-shaped, with 292 293 three black lobes, length of CF about 1/2 length of cymbium, E originating at 7 o'clock, first 294 2/5 widen, and then narrowing, covered by C for 4/5 of its length, SB concave and dark 295 brown, 2 times wider than long, C membranous and yellow-brown, with a smooth and 296 wrinkled surface and flat margin, CDA translucent and square.

- 297
- 298

Female. Unknown.

Distribution. Guizhou Province, China (Fig. 8).

299

300 Baiyuerius zuojiang Li, Zhao & Li sp. n.

- 301 Figs. 6–8
- 302

303Type material. Holotype  $\Diamond$  (IZCAS-Ar44395) (LB070): China: Guangxi Zhuang304Autonomous Region: Chongzuo City: Jiangzhou District, Tuolu Town, Zuojiang Overseas305Chinese Farm, an Unnamed Cave, N22.6155°, E107.6494°, elevation: 107±3m, 12.XII.2017,306Z. Chen leg. Paratypes:  $1 \Diamond 4 \heartsuit \diamondsuit$  (IZCAS-Ar44396–Ar44400) (LB070): same data as307holotype.

308 Etymology. The new species is named after the type locality, the Zuojiang Overseas309 Chinese Farm; noun in apposition.

310 **Diagnosis.** The males of *Baiyuerius zuojiang* sp. n. can be distinguished from males of other congeners by the following combination of characters: length of CF about 1/3 of the 311 312 cymbial length (Fig. 6C) vs. length of CF about 1/2 of the cymbial length in other species (Figs. 3C, 5C); MA coiled to spoon-shaped, with a jagged margin (Fig. 6B), vs. MA flat 313 with dark margin in B. pindong sp. n. (Fig. 3B), or petal-like, with dark lobes in B. zhuping 314 sp. n. (Fig. 5B). Females of B. zuojiang sp. n. resembles that of B. daxi sp. n., but it can be 315 316 distinguished from the latter by the following combination of characters: atrium occupying 317 1/3 of the epigyne (Fig. 7A), vs. atrium occupying half of epigyne in the latter species (Fig. 318 2A); hoods located anteriorly (Fig. 7A) vs. hoods located posteriorly in the latter (Fig. 2A); 319 shape of PES rhomboid (Fig. 7A) vs. pentagonal PES in the latter (Fig. 2A); S covering 1/4 of the CD (Fig. 7B) vs. CD covering half of the S in the latter (Fig. 2B). 320

Description. Male (holotype) (Fig. 7C). Total length 8.62. Carapace 4.59 long, 2.93 321 wide. Abdomen 4.03 long, 4.58 wide. Eye sizes and interdistances: AME: 0.11, ALE: 0.14, 322 PME: 0.12, PLE: 0.15; AME-AME: 0.04; AME-ALE: 0.07; AME-PME: 0.04; ALE-PLE: 323 0.02; PME-PME: 0.02; PME-PLE: 0.11. Leg measurements: I: 10.94 (3.34, 1.07, 2.52, 2.42, 324 325 1.59); II: 10.66 (3.32, 1.03, 2.06, 2.47, 1.78); III: 8.73 (2.62, 1.04, 1.57, 2.02, 1.48); IV: 326 12.06 (3.44, 1.16, 2.48, 3.26, 1.72). Leg formula 4 > 1> 2 > 3. Carapace black turning dark brown, chelicerae, endites, and labium dark brown, sternum brown, longer than wide, 327 spinnerets yellow-brown, legs dark brown turning yellow-brown. Male palp (Fig. 6): patella 328 about 1/4 of its slightly bent tibia, PA brown, with 2.5 times longer than wide, extending 329 over half of tibia, heading posterolaterally at 1/8 of its length, RTA originating from half of 330 tibia, LTA finger-like, heading ventrally, MA coiled to spoon-shaped from centre, anterior 331 332 margin jagged, length of CF about 1/3 length of cymbium, with 1 hypophysis, E dark brown 333 turning black, originating at 6 o'clock, first 1/4 widen, then narrowing, covered by C for 3/4 of its length, SB 2 times longer than wide, C translucent, with a jagged margin and wrinkles, 334 335 connected to CDA by a jagged membrane, CDA translucent and brown, covered by 336 membrane.

337 Female. (IZCAS-Ar44398) (Fig. 7A-7C, 7E-7F). Total length 9.58. Carapace 4.89 338 long, 2.77 wide. Abdomen 4.69 long, 3.01 wide. Eye sizes and interdistances: AME: 0.10, ALE: 0.15, PME: 0.14, PLE: 0.13; AME-AME: 0.06; AME-ALE: 0.08; AME-PME: 0.04; 339 340 ALE-PLE: 0.04; PME-PME: 0.04; PME-PLE: 0.17. Leg measurements: I: 10.31 (3.38, 1.09, 2.22, 2.13, 1.49); II: 9.49 (2.74, 1.03, 2.10, 1.97, 1.65); III: 7.48 (2.24, 0.82, 1.21, 1.84, 1.37); 341 IV: 10.72 (3.13, 1.13, 2.43, 2.69, 1.34). Leg formula 4 > 1> 2 > 3. Carapace black turning 342 dark brown, chelicerae black, endites and labium dark brown, sternum brown, spinnerets and 343 legs yellow-brown. Female epigyne (Fig. 7A–7C): Atrium glasses-shaped, occupying 1/3 of 344 345 epigyne, with sclerotized lateral margins, PES rhomboid, with lateral margin posteriorly black turning brown anteriorly, externally enlarged, milk-white, CD originating posteriorly 346 347 and extending anteriorly, about 6.5 times longer than wide, S about 1/4 of length of CD, SB 348 close to each other, anteriorly fist-like, FD transparent, heading laterally, about 3.5 times 349 longer than wide.

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Distribution. Guangxi Zhuang Autonomous Region, China (Fig. 8).

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429 Figure 1. Phylogenetic trees. A and B Maximum Likelihood (ML) trees computed by IQ-TREE;

430 C and D ML trees computed by RAxML; E and F Bayesian trees computed by MrBayes. Support
431 values for major nodes are shown. The scale bar corresponds to the expected number of
432 substitutions per site. Asterisks indicate the type species of each genus.

433



Figure 2. Epigyne and habitus of *Baiyuerius daxi* sp. n. A Epigyne, ventral view; B Vulva,
dorsal view; C Female habitus, dorsal view; D Female habitus, ventral view; E Female habitus,
lateral view. Scale bar equal for C–E.



Figure 3. Left male palp of *Baiyueensis pindong* sp. n. A Prolateral view; B Ventral view; C
Retrolateral view (red arrows = hypophyses of cymbium). Scale bar equal for A–C.

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Figure 4. Epigyne and habitus of *Baiyuerius tamdao* sp. n. A Epigyne, ventral view; B Vulva,
dorsal view; C Female habitus, dorsal view; D Female habitus, ventral view; E Female habitus,
lateral view. Scale bar equal for C–E.



448 Figure 5. Left male palp of *Baiyueensis zhuping* sp. n. A Prolateral view; B Ventral view; C

449 Retrolateral view (red arrow = hypophysis of cymbium). Scale bar equal for A–C.



452 Figure 6. Left male palp of *Baiyueensis zuojiang* sp. n. A Prolateral view; B Ventral view; C

453 Retrolateral view (red arrow: hypophysis of cymbium). Scale bar equal for A–C.



456 Figure 7. Epigyne and habitus of *Baiyueensis zuojiang* sp. n. A Epigyne, ventral view; B Vulva,
457 dorsal view; C Male habitus, dorsal view; D Female habitus, dorsal view; E Female habitus,
458 ventral view; Scale bar equal for C–E.



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462 Figure 8. Localities of *Baiyuerius* species in China. | *B. daxi* sp. n. 2 *B. pindong* sp. n. 3 *B.* 

463 *tamdao* sp. n. **4** *B. zhuping* sp. n. **5** *B. zuojiang* sp. n.