



Scorpiops zhui sp. n., a new species of *Scorpiops* Peters, 1861 from Chongqing, China (Scorpiones: Scorpiopidae)

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Abstract

A new species of *Scorpiops* Peters, 1861 is described from Wuxi and Wushan County, Chongqing City, China. The new species is mainly characterized by a moderate size, in relation to the other species of genus, with dark reddish-brown to reddish-black coloration; 15–17 (usually 17) external trichobothria (5 *eb*, 1–2 *esb*, 1–2 *em*, 4 *est*, 4 *et*), 8–11 (usually 10) ventral trichobothria in the pedipalp patella and 4–5 (usually 5) ventral trichobothria on chela; pedipalp chela fingers are scalloped in males and nearly straight in females. With the present description the number of known species of *Scorpiops* recorded from China is raised to 33.

Key words: China, Chongqing, new species, scorpion, *Scorpiops*, taxonomy

Introduction

In recent publications, Kovařík *et al.* (2020) and Štáhlavský *et al.* (2020) revised the family Scorpiopidae Kraepelin, 1905 and synonymized the previously accepted genera of the family Scorpiopidae, excepting *Parascorpiops* Banks, 1928, with the genus *Scorpiops* Peters, 1861. Lourenço & Ythier (2022) reclassified the genera of the family Scorpiopidae, proposed six subgenera of the genus *Scorpiops* (including *Alloscorpiops* Vachon, 1980, *Dasyscorpiops* Vachon, 1974, *Euscorpiops* Vachon, 1980, *Neoscorpiops* Vachon, 1980, *Plethoscorpiops* Lourenço, 2017 and *Scorpiops*), and maintained *Parascorpiops* as a distinct genus of *Scorpiops*.

Scorpiops is the major genus of the family Scorpiopidae, distributed mainly in South and Southeast Asia. In China, the species of *Scorpiops* are found in Hubei Province, Xinjiang Autonomous Region, Xizang (Tibet) Autonomous Region and Yunnan Province (Lv & Di, 2022; Tang, 2022). The new species described here raises the number of known *Scorpiops* species occurring in China to 33, and the total number of currently recognized species for the genus to 107. The particular locality where the new species was collected suggests that further investigation in China is still required for this group.

Materials and methods

The studied specimens were collected by hand and preserved in 75% ethanol. Illustrations and measurements were produced using a Leica M205 stereomicroscope. The photos were taken with a Canon 650D camera and a Leica M205FA stereomicroscope (with a digital color microscope camera Leica DFC495). Measurements (in mm) follow Sissom (1990). Trichobothrial notations are done according to Vachon (1974), and the morphological terminology

mostly follows Hjelle (1990). The terminology of metasomal carination is that of Vachon (1952), and the terminology of pedipalp chela carinae follows Soleglad and Sissom (2001). The studied specimens are deposited in the Museum of Hebei University, Baoding, China (MHBU).

Taxonomic treatment

Family Scorpionidae Kraepelin, 1905

Genus *Scorpiops* Peters, 1861

Scorpiops zhui sp. n.

(Figs. 1–33; Table 1)

Type Material. Holotype male: China, *Chongqing City*, Wuxi County, Nongan Village, 31°21'18.26"N, 109°35'6.33"E, elev. 740m, 29/XI/2021, Lu-Yu Wang & Zhi-Sheng Zhang leg (Ar.-MHBU-ScCQWX21112901).

Paratypes: 2 males and 1 female (Ar.-MHBU-ScCQWX211129, 02–04), same data as for holotype; 1 male and 3 females (Ar.-MHBU-ScCQWX220925, 01–04), Yintiaoling Nature Reserve, Lanying Grand Canyon, 31°26'19.06"N, 109°50'46.30"E, elev. 875m, 25/IX/2022, Lu-Yu Wang & Zhi-Sheng Zhang leg; 2 males (Ar.-MHBU-ScCQWX210719, 01–02), *Chongqing City*, Wushan County, Zhuxian Town, 31°21'39.92"N, 110°06'07.50"E, elev. 1065m, 19/VII/2021, Lu-Yu Wang & Zhi-Sheng Zhang leg.

Etymology. Patronym honors Prof. Ming-Sheng Zhu (Hebei University), who significantly contributed to arachnological studies in China.

Diagnosis. *Scorpiops zhui* sp. n. differs from all other species in the genus based on the following combination of characters: adult length 53.1–63.4 mm; dark reddish-brown to reddish-black; pectinal teeth count 6–8 (rarely 6) in males and 6 or 7 in females, fulcra present; chelal trichobothrium *Eb*₃, located in proximal half of manus at the same level as *Dt*, chela with 4–5 (usually 5) ventral trichobothria, with an average length/width ratio of 2.7 in males and 2.9 in females; pedipalp chela fingers are scalloped in males and nearly straight in females; patella with 15–17 (usually 17) external trichobothria (5 *eb*, 1–2 *esb*, 1–2 *em*, 4 *est*, 4 *et*), and 8–11 (usually 10) ventral trichobothria; telson elongate.

Description (based on male holotype).

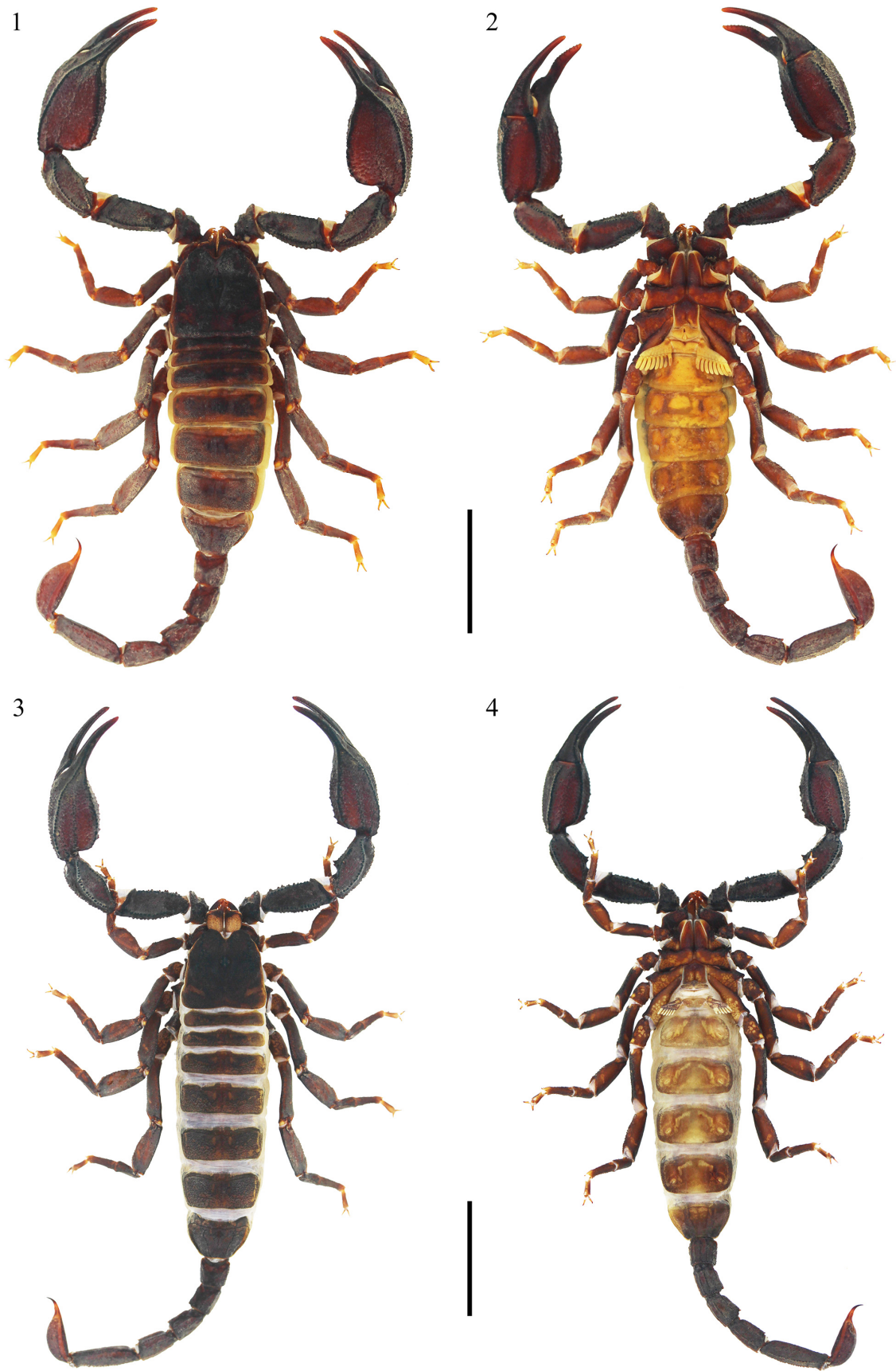
Coloration (Figs 1, 2; after one year of preservation in alcohol). Base color uniformly dark reddish-brown. Carapace dark reddish-brown. Median and lateral ocular tubercles blackish. Tergites are mostly dark reddish-brown. Metasomal segments dark reddish-brown to dark brown; vesicle brown with a reddish aculeus. Chelicerae yellowish-brown; with fingers dark brown gradually lighter toward the tip. Pedipalps reddish black. Legs dark brown. Tarsal claws yellowish brown. Sternum, brown. Sternites light yellowish-brown. Genital operculum and pectines yellow.

Prosoma (Figs 5, 6). Carapace with sparse, fine granulations; lateral furrow broad; anterior median furrow broad and moderately deep; posterior median furrow deep; Median eyes situated anteriorly in relation to the center of carapace; three pairs of lateral ocelli with the posterior one very small. Median ocular tubercle with granules and a deep median furrow. Lateral ocular tubercle with some coarse granules around lateral eyes.

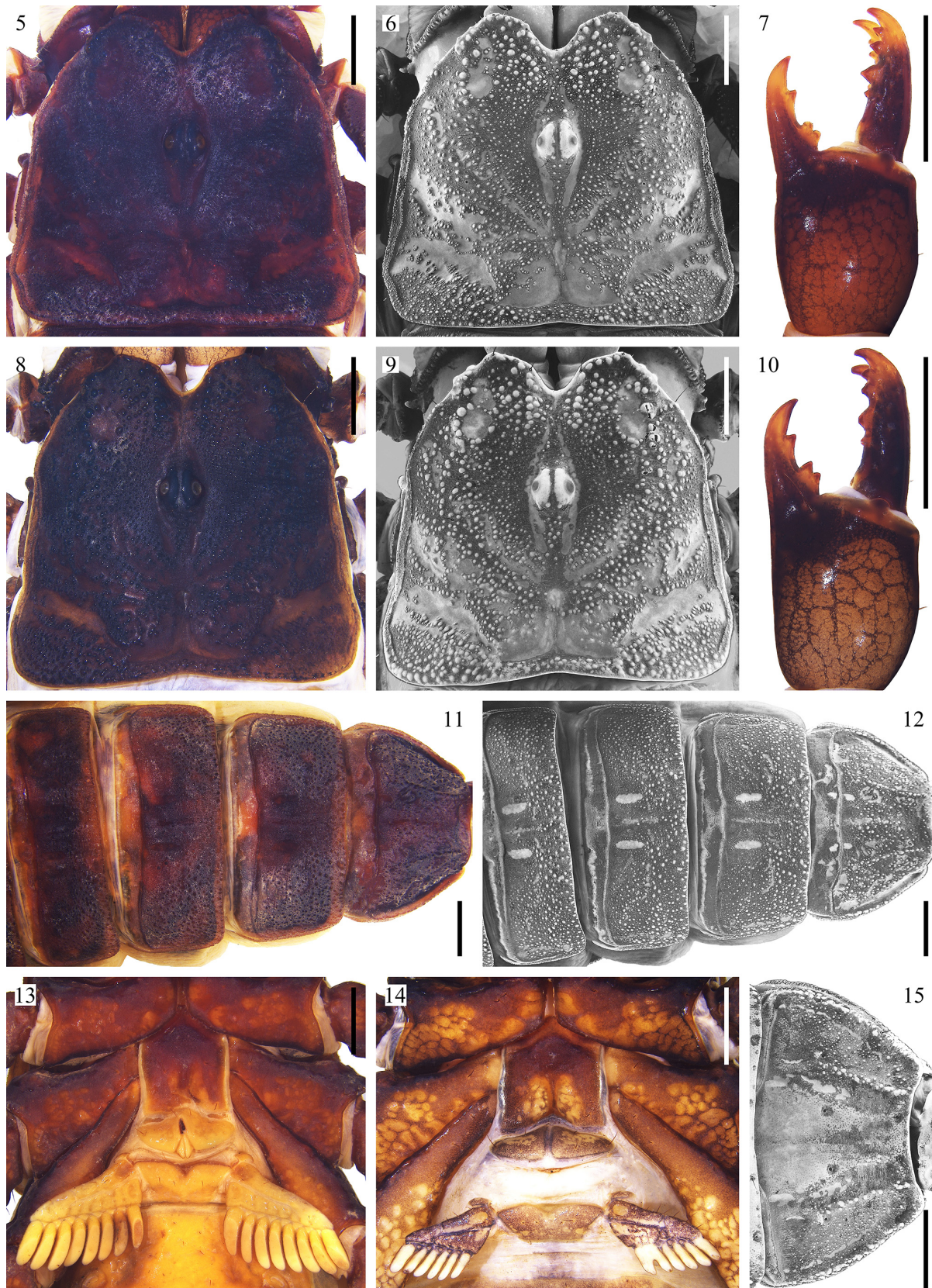
Chelicerae (Fig.7). Dorsally with an irregular variegated pattern, ventrally with long hairs. Fixed finger of chelicera with three large triangular teeth on inner margin; ventral of movable finger with five teeth on inner margin, dorsal of movable finger with four teeth on inner margin.

Mesosoma. Tergites densely covered with a thin granulation, posterior portion of tergites with bigger granules; tergites II to VII with a median carina; tergite VII with two pairs of lateral carinae (Figs 11, 12). Sternum pentagonal with few setae (Fig. 13). Pectinal teeth count 8-8, fulcra present (Fig. 13). Genital operculum subtriangular with genital papillae protruding and few setae (Fig. 13). Sternites III to VI smooth and shiny with few setae; segment VII ventrally with two weak carinae and few setae (Fig. 15).

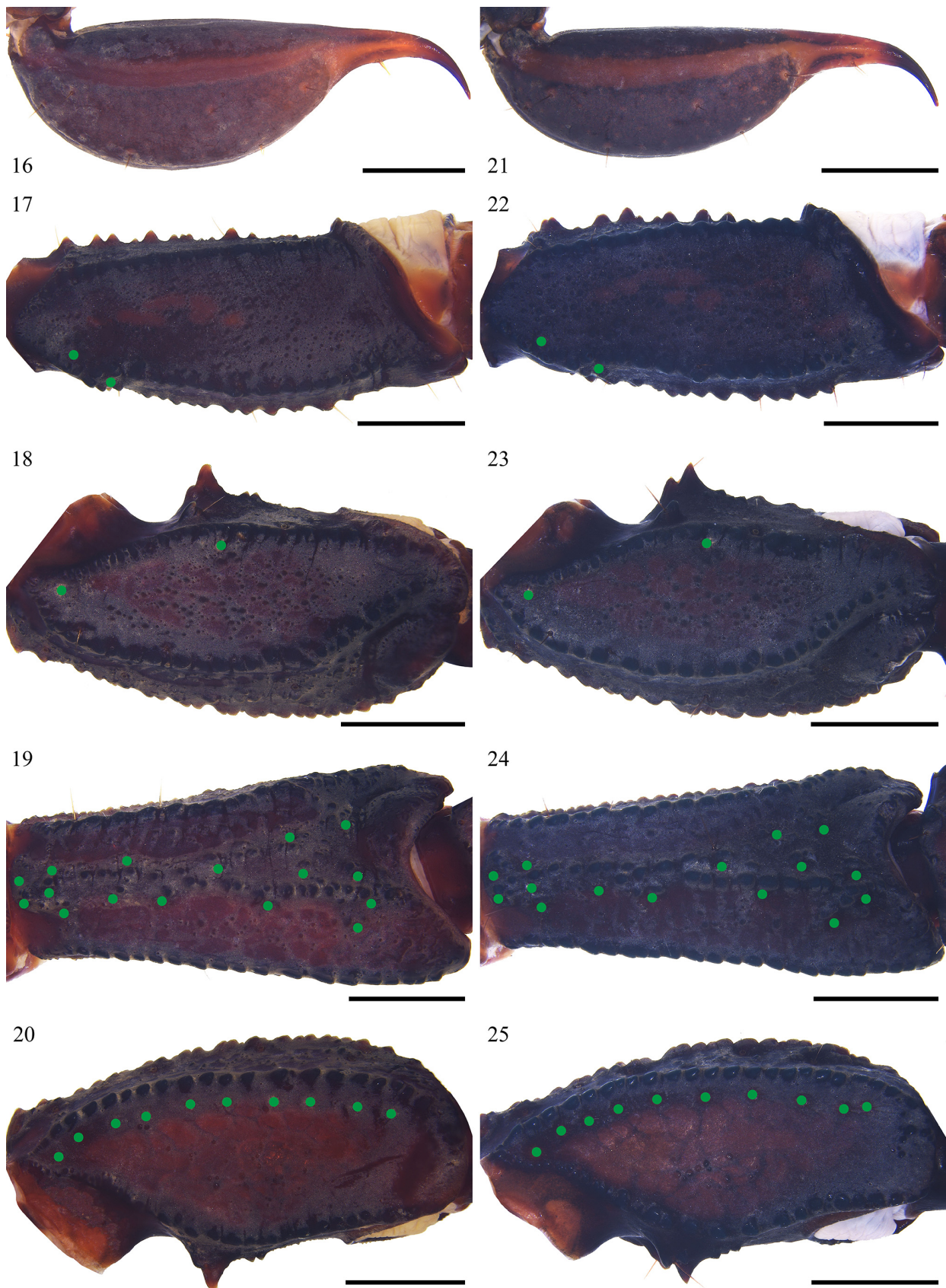
Metasoma. Integument is coarse, segments II to V longer than wide; segments I to V with respectively 10-8-8-8-7 granular carinae; segments II to IV with a pair of vestigial lateral carinae; all carinae granular; on segment V, ventral carinae with larger serration. Vesicle is coarse but without granules, with few setae (Fig. 16).



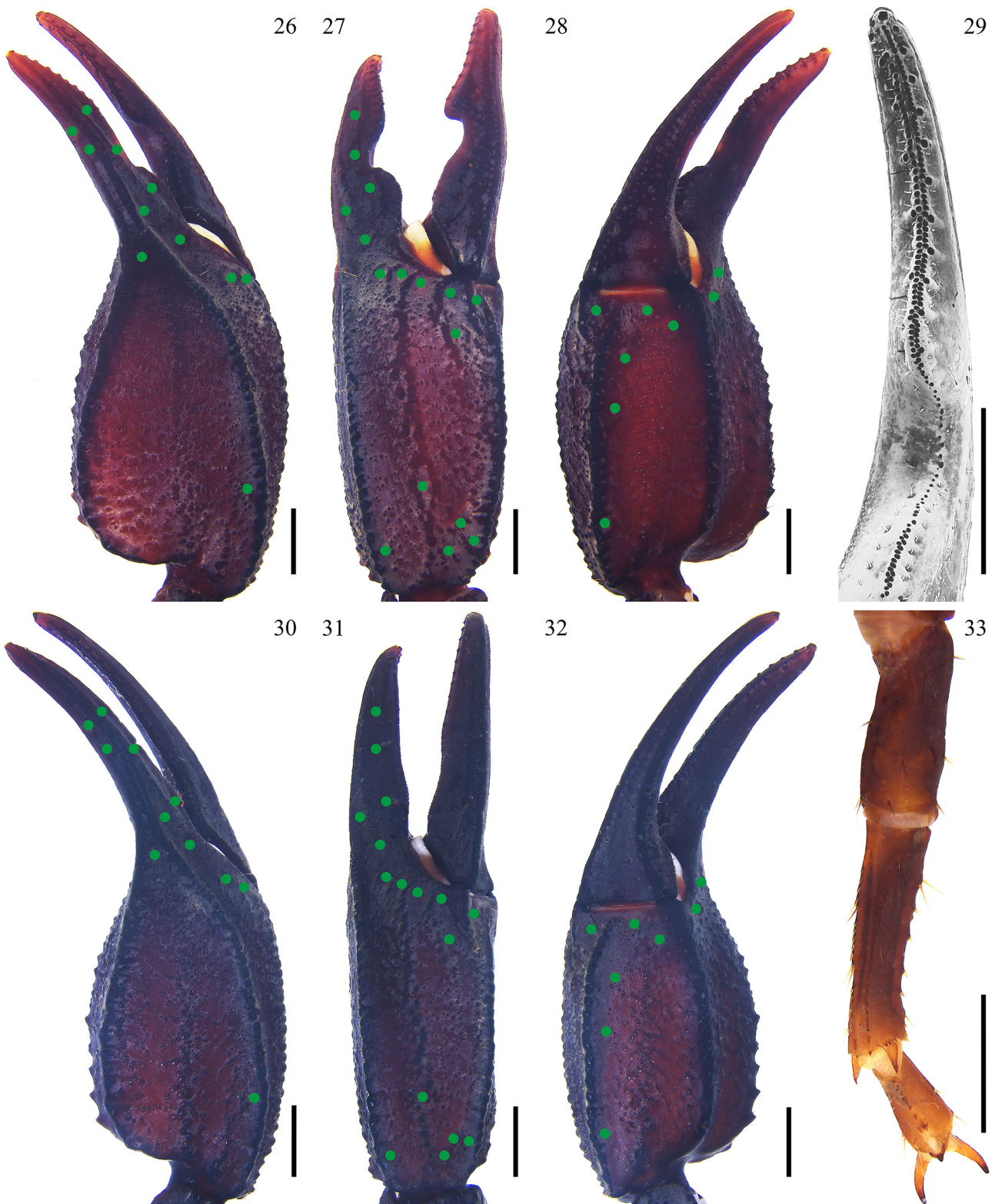
FIGURES 1–4. *Scorpiops zhui* sp. n. from Wuxi County. **FIGURES 1–2.** Male holotype (Ar.-MHBUScCQWX21112901), dorsal (1) and ventral (2) views. **FIGURES 3–4.** Female paratype (Ar.-MHBUScCQWX22092501), dorsal (3) and ventral (4) views. Scale bar: 12 mm.



FIGURES 5–15. *Scorpiops zhui* sp. n. from Wuxi County. **FIGURES 5–7, 11–13, 15.** Male holotype (Ar-MHBU-Sc-CQWX21112901), carapace (5), carapace under UV light (6), chelicerae dorsal (7), tergites dorsal (11), tergites dorsal under UV light (12) sternoplectinal area (13), and sternite VII (15) views. **FIGURES 8–10, 14.** Female paratype (Ar-MHBU-Sc-CQWX22092501), carapace (8), carapace under UV light (9), chelicerae dorsal (10), and sternoplectinal area (14) views. Scale bars: 2 mm.



FIGURES 16–25. *Scorpiops zhui* sp. n. from Wuxi County. **FIGURES 16–20.** Male holotype (Ar.-MHBU-ScCQWX21112901), telson lateral (16) view, pedipalp femur dorsal (17) view, pedipalp patella dorsal (18), external (19), and ventral (20) views. **FIGURES 21–25.** Female paratype (Ar.-MHBU-ScCQWX22092501), telson lateral (21) view, pedipalp femur dorsal (22) view, pedipalp patella dorsal (23), external (24), and ventral (25) views. Trichobothria indicated by green dots. Scale bar: 2 mm.



FIGURES 26–33. *Scorpiops zhui* sp. n. from Wuxi County. **FIGURES 26–29, 33.** Male holotype (Ar.-MHBUScCQWX21112901), pedipalp chela dorsal (26), external (27) and ventral (28) views, dentate margin of movable finger under UV light (29), and right leg I, retrolateral views (33). **FIGURES 30–32.** Female paratype (Ar.-MHBUScCQWX22092501), pedipalp chela dorsal (30), external (31) and ventral (32) views. Trichobothria indicated by green dots. Scale bar: 2 mm.

Pedipalps. Tegument not smooth with granulations and a few setae, especially on dorsal surface which is densely granulated. Femur with dorsointernal, dorsoexternal, ventroexternal, ventrointernal carinae crenulated, external and internal carinae crenulated (Fig. 17). Patella with granules on the dorsointernal, dorsoexternal, ventrointernal,

ventroexternal, and external carinae; two spinoid granules present on the internal surface (Figs 18–20). Trichobothrial pattern of type C, neobothriotaxic (Vachon, 1974); patella with 16 external trichobothria (5 *eb*, 2 *esb*, 1 *em*, 4 *est*, 4 *et*), 10 (left) and 9 (right) ventral trichobothria (Fig. 20). Chela with five ventral trichobothria, all carinae are granular and coalesced except the dorsal secondary, subdigital, dorsal internal, interomedian, and ventromedian carinae vestigial; movable fingers, and fixed fingers with scalloped margins, a pronounced lobe in the movable finger and a corresponding notch in the fixed fingers (Figs 26–29).

Legs. Integument coarse with few setae. Trochanter dorsal surface with some small granules. Femur dorsal surface densely granular. Patella dorsal surface densely granular. Tibiae without spurs (Fig. 33). Basitarsus with more setae, spurs, and two lateral pedal spurs; legs I–II with rows of spines on ventrolateral surface (Fig. 33). Tarsus with row of short, stout median ventral spinules (Fig. 33). Tarsal ungues curved and hook-like (Fig. 33).

Variation. Illustrations of an adult female are provided (Figs 3, 4, 8–10, 14, 21–25, 30–32). The coloration of adult females is darker than that of male; carapace, tergites, and metasoma reddish-black; vesicle dark reddish-brown. Number (left/right) of trichobothria on the ventral surface of the pedipalp chela: females with 5/5 ($n = 3$), 5/4 ($n = 1$) and 4/5 ($n = 1$), males with 5/5 ($n = 4$), 4/5 ($n = 1$). Number (left/right) of trichobothria on the ventral surface of the pedipalp patellae: females with 10/9 ($n = 1$), 8/10 ($n = 1$), 11/10 ($n = 1$), 9/10 ($n = 1$) and 10/10 ($n = 1$), males with 10/9 ($n = 1$), 10/10 ($n = 2$), 8/10 ($n = 1$) and 11/10 ($n = 1$). Number (left/right) of pectinal teeth: females with 6/6 ($n = 2$), 7/7 ($n = 2$) and 7/6 ($n = 1$), males with 8/8 ($n = 2$), 7/8 ($n = 1$), 7/7 ($n = 1$) and 7/6 ($n = 1$).

Sexual dimorphism: Chela with an average length/width ratio of 2.9 in females ($n = 5$) and 2.7 in males ($n = 5$). Males pectinal teeth significantly larger than females. Pedipalp chela fingers are scalloped in males and nearly straight in females.

Measurements. See Table 1.

Habitat. Found under stones in mountain forest.

Known distribution. Known only from Wuxi and Wushan Counties, Chongqing City, China (Fig. 34).

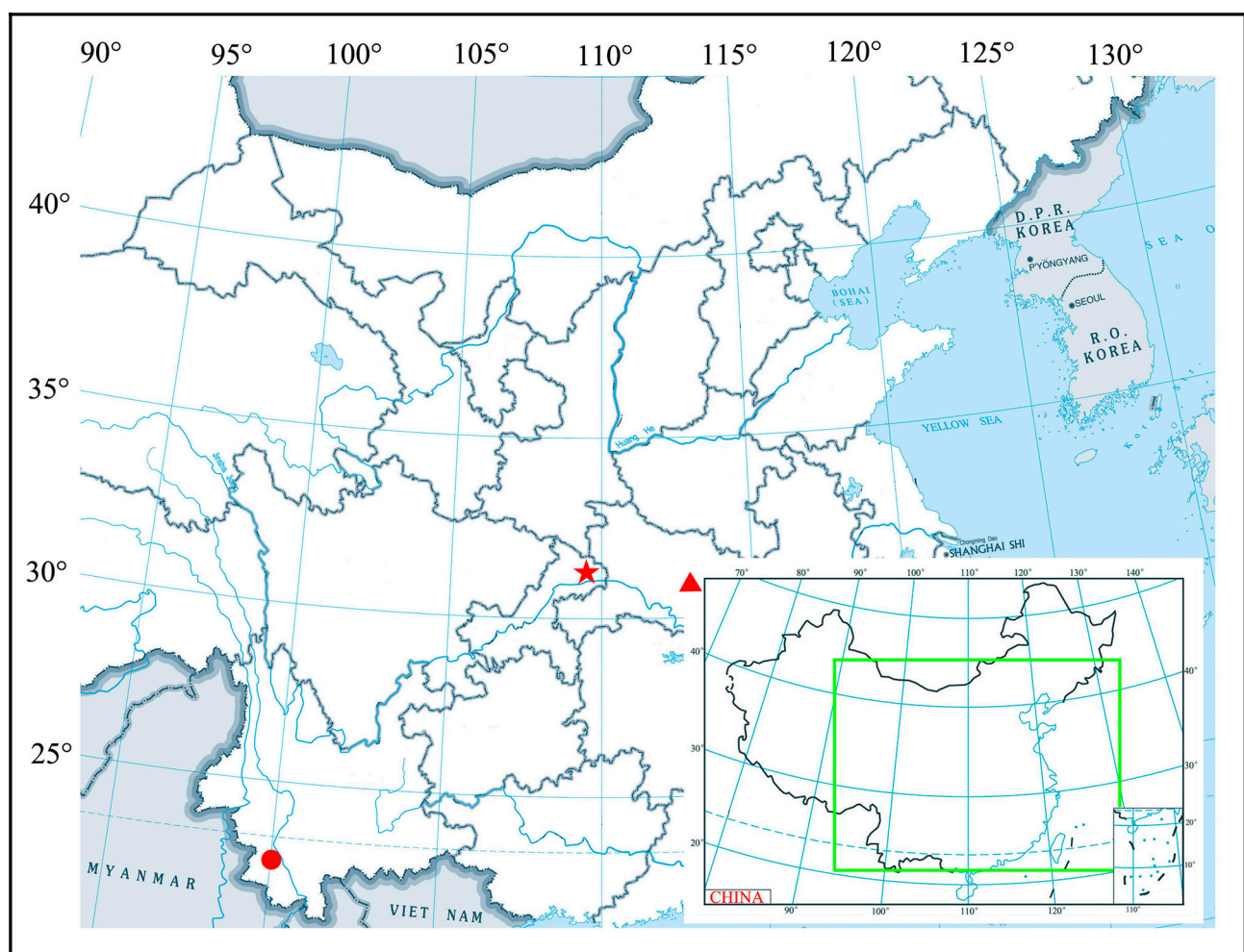


FIGURE 34. Distribution map of *Scorpiops zhui* sp. n. (star), *S. sp.* (triangle), and *S. puerensis* (circle).

TABLE 1. Measurements of holotype and paratype specimens (in mm).

Species Contents	<i>Scorpiops zhui</i> sp. n.	
Sex	Male ScCQWX21112901	Female ScCQWX22092501
Total length:	63.4	59.6
Carapace:		
– Length	9.0	8.9
– Anterior width	5.7	5.6
– Posterior width	10.1	9.4
Mesosomal segments:		
– Length	21.3	20.3
Metasomal segment I:		
– Length	3.3	3.2
– Width	3.6	3.0
– Depth	3.0	2.8
Metasomal segment II:		
– Length	3.8	3.6
– Width	3.2	2.8
– Depth	3.0	2.4
Metasomal segment III:		
– Length	4.1	4.1
– Width	2.9	2.6
– Depth	2.8	2.3
Metasomal segment IV:		
– Length	5.0	4.4
– Width	2.8	2.4
– Depth	2.7	2.4
Metasomal segment V:		
– Length	8.0	7.4
– Width	2.7	2.2
– Depth	2.6	2.3
Telson:		
– Length	8.9	7.7
– Width	2.8	2.4
– Depth	3.0	2.3
Pedipalp femur:		
– Length	8.6	8.1
– Width	3.5	3.3
– Depth	2.9	2.7
Pedipalp patella:		
– Length	7.5	7.2
– Width	4.2	4.0
– Depth	3.8	3.4
Chela:		
– Length	18.0	15.4
– Width (manus)	6.7	5.3
– Depth (manus)	5.2	4.3
Movable finger:		
– Length	10.4	9.9

Relationships. *Scorpiops zhui* sp. n. can be distinguished from other *Scorpiops* species from China, and in particular from *Scorpiops* sp. (Di *et al.*, 2011; named as “*Scorpiops jingshanensis*” by Li *et al.*, 2016; currently as a nomem dubium followed ICZN) from Jingshan County (Hubei Province) the most geographically close species of the genus by the following features: (i) pedipalp chela usually with 5 ventral trichobothria, only 4 are observed for *S.* sp.; (ii) pedipalp patella usually with 10 ventral trichobothria, while 8 are observed for *S.* sp.; (iii) pectinal fulcra

present in the new species but absent in *S. sp.* *Scorpiops zhui* **sp. n.** can also be distinguished from another species of the genus *Scorpiops*, occurring in Yunnan, *Scorpiops puerensis* (Di *et al.*, 2010) by the following features: (i) pedipalp patella with 15–17 external trichobothria, while 18 in *S. puerensis*; (ii) pedipalp chela usually with 5 ventral trichobothria, versus 4 in *S. puerensis*; (iii) in the new species chelal trichobothrium Eb_3 is located in proximal half of manus at the same level of *Dt*, while in *S. puerensis* trichobothrium Eb_3 is located in the distal half of manus between trichobothria *Dt* and *Est*.

Remark. Lourenço & Ythier (2022) reviewed the research history of the family Scorpiopidae and thought that the division of subgenera of the family Scorpiopidae had a didactical importance, but only morphology was concerned. Based on modern taxonomic requirements, the molecular evidence is necessary for the delimitation of subgenera. However, there is no related report. Followed the morphological and molecular phylogeny we created (unpublished), *Scorpiops zhui* **sp. n.** can't be classified into any subgenus. Therefore, we haven't placed this species in any subgenus at present.

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