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A NEW SCORPION OF THE GENUS *Buthoscorpio* WERNER, 1936 (SCORPIONES: BUTHIDAE) FROM KERALA, INDIA

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Abstract

A new scorpion species of the genus *Buthoscorpio* Werner, 1936 is described from Chinnar Wildlife Sanctuary, Idukki District, Kerala, India. The new species, *Buthoscorpio chinnarensis* can be distinguished from the other congeners by having (1) carapace with scattered granulation on lateral portions; (2) median eyes situated anteriorly in the ratio 1:2; (3) prominent tubercles present at the basal portion of the pedipalp femur; (4) marginal lamellae of pectines composed of three pieces and middle lamellae comprises seven pieces of sclerites; (5) dorsal carinae present on metasomal segments III–V; (6) subaculear tubercle absent on telson; (7) Pectinal teeth count 14/16 (female paratypes with 17/17 and 16/17 respectively); (8) Metasomal segments I–IV wider than long, segment V longer than wide; (9) arrangement of lateral eyes. After the description of this new species, the total number of known species in the genus is raised to five; four in India and one in Sri Lanka.

Keywords: Chinnar Wildlife Sanctuary, Sri Lanka, taxonomy, Western Ghats

Introduction

Species of the scorpion genus *Buthoscorpio* Werner, 1936 are rare and have a limited distribution represented by three species in India: *Buthoscorpio politus* (Pocock, 1899); *B. rayalensis* Javed, Rao, Mirza, Sanap & Tampal, 2010; *B. indicus* Lourenço, 2012; and one in Sri Lanka: *B. sarasinorum* (Karsch, 1891). The status and taxonomic treatment of the genus has

been dealt with in detail by Lourenço (2012) and Javed *et al.* (2010). Lourenço (2012) suggested that the genus is possibly more diverse than it seems to be. During the recent faunal exploration survey undertaken to the forested tracts of the southern Western Ghats by the Zoological Survey of India (ZSI), three specimens of *Buthoscorpio* were collected from

Chinnar Wildlife Sanctuary, Kerala, India. It is one of the conservation areas lying in the rain shadow part of the Western Ghats in the Idukki District, bordering the state of Tamil Nadu. Detailed examination of the specimens indicate that these show close affinities with the Indian species *Buthoscorpio politus*, but also show distinct characters which clearly suggest a new species, which is described here. With the description of the present new species, the number of species of the genus *Buthoscorpio* is raised to five.

Material and methods

The specimens of the new species were hand collected under the collection permit number WL10-4950/2014 (date: 28.02.2014), and preserved in 70% ethanol. They were compared with the type specimens of *Buthoscorpio rayalensis*, BNHS SC 43–44, also with the descriptions and illustrations of other species provided in Tikader & Bastawade (1983), Javed *et al.*, (2010), and Lourenço (2012). The type specimens of the new species are deposited in the National Zoological collections of ZSI (Western Ghat Regional Centre (ZSIK), Calicut). The specimens were examined with a Leica MZ16 stereoscopic microscope, and photographs were taken by the Leica DFC420 microscope with the aid of the Leica Application Suite V3.6 software. Terminology follows Vachon (1956, 1963) for cheliceral dentition; Stahnke (1970) and Hjelle (1990) for pedipalp segmentation; Vachon (1974) and Sissom (1990) for trichobothrial pattern; and Stahnke (1970) for chela finger dentition, leg segmentation and measurements. Illustrations were made using a Leica camera lucida fitted to the stereoscopic microscope. Museum abbreviations: ZSI, Zoological Survey of India; BNHS, Bombay Natural History Society, India; NCBS, National Centre for Biological Sciences, (Bangalore), India; DST, Department of Science and Technology, New Delhi, India.

Buthoscorpio chinnarensis new species

(Figs.1–5, Table 1, 2)

Holotype: ZSI/WGRC/IR/INV/3603: male (total length 30.3 mm); 2 km north east on route to Surulipatty Tribal colony from Chinnar check post (10° 28' N, 77° 18' E), Chinnar Wildlife Sanctuary, Idukki, Kerala, India (Fig. 1); P. M. Sureshan, 22 May 2014.

Paratypes (2 specimens): ZSI/WGRC/IR/INV/3604A & B: females (total lengths 40.0 mm and 39.7 mm respectively); other details the same as holotype.

Diagnosis: A comparison of the diagnostic characters of each species is provided in Table 2. The new species is distinguished from the closely related congeners of the genus by the following characters: (1) carapace with scattered granulation on lateral portions; (2) median eyes situated anteriorly in the ratio 1:2; (3) prominent tubercles present at the basal portion of the pedipalp femur; (4) marginal lamellae of pectines composed of three pieces and middle lamellae comprises seven sclerites; (5) dorsal carinae present on metasomal segments III–V; (6) subaculear tubercle absent on telson; (7) Pectinal teeth count 14/16 (female paratypes with 17/17 and 16/17 respectively); (8) Metasomal segments I–IV wider than long, segment V longer than wide; (9) arrangement of lateral eyes (Fig. 5B: pl. 4).

Description of holotype: Carapace (Fig. 3A: pl. 2): somewhat lustrous and mostly smooth with scattered granulation at the lateral and postero-median portions; carinae absent; anterior margin with a conspicuous epistome; anterolateral and posterolateral furrows present on either sides of the carapace; posteriomedian furrows present; median ocular tubercle distinctly anterior to the centre of carapace; median eyes are almost equal in size and are separated by a distance slightly less than one ocular diameter; lateral eyes, numbering five, four eyes arranged in a curve; second and third eyes are large and almost equal in size; first eye is smaller than second and third; compared to the size of other eyes, fourth is much smaller than the others; fifth eye is situated just opposite the space between second and third, which is larger than fourth. **Mesosoma** (Fig. 5D: pl. 4): all tergites are lustrous and monocarinated except tergite I without distinct carina; median carinae of tergites II–VII extended from anterior to posterior with the exclusion of pretergites; carina on tergite VII widened at anterior end; minute scattered granulation present in all tergites; granulation is well marked on tergites V–VII; tergite V with granulation at median, posteriomedian, anteriomedian and lateral portions; tergite VI with granulation at median, posteromedian and lateral portions; tergite VII with strong granulation at median,

posteromedian and posterolateral portions; sternites lustrous and smooth with scattered punctuation; presternite present except sternite I; presternite of sternite II is not much developed in the middle; carinae absent on all sternites; stigmata present on sternites I–IV, which are short and oval-like in shape. **Metasoma** (Figs. 3D: pl. 2 & 5C: pl. 4): segments are lustrous with granulation present in segments I–V; dorsally strong granulation present on segments I–IV at anterior, median, posteromedian and posterior portions; slight punctuation present on dorsal surface of all segments; ventrally and laterally all segments are strongly punctuated with weak anterior granulation; dorsal carinae smooth and present in segments III–V; segments I–II with dorsal carina indicated in the anterior; segment III with incomplete carina, which lack posterior tip of the carina; segments IV–V possess complete carinae, which extend from anterior to posterior; setae absent in all segments except segment V with few setae present on lateral and ventral portions. **Telson** (Fig. 3C: pl. 2): vesicle pyriform with short aculeus, which is only 3/4 of the vesicle in size; tubercle and granulation absent; dorsal surface with less punctuation and ventral, lateral surface with thick punctuation; vesicle surface covered ventrally with few short setae; ventrally a dark band present extended from anterior to the base of the aculeus. **Pectines** (Fig. 5E: pl. 4): well developed sclerites, marginal lamellae composed of three pieces with different shapes and sizes; middle lamellae comprise seven pieces with irregular shapes. Minute setae present all over the pectines; pectinal teeth count 14/16, short proximally, lengthening distally and terminating with a short tooth; basal piece composed of single sclerite with anteromedian 'V' shaped depression. **Genital Operculum**: Sclerites longitudinally oval in shape and slightly separated at posterior juncture. **Sternum**: sub pentagonal in shape; anteriorly narrow and posteriorly widened; deep depression present at the centre of the sternum; few short setae present on either sides of the depression. **Chelicerae** (Fig. 5A: pl. 4): movable finger possess two basal (b), median (m), subdistal (sd) and external distal (ed) denticles; immovable finger with basal, median, subdistal and distal (d) denticles; basal denticles of movable finger are very blunt and not much developed; basal piece uniformly reticulated except at the anterior margin. **Pedipalp** (Fig. 3B: pl. 2): slender and small appendages, chela is longer than carapace;

movable and immovable fingers are also longer than carapace; patella longer than femur and wider than chela. **Femur**: surface smooth except some prominent basal tubercle, slight granulation dorsally and ventrointernally; carinae less developed. **Patella**: smooth and lustrous without any carina. **Chela**: smooth without any carina; dorsally and laterally with four longitudinal bands; movable and immovable fingers with numerous minute setae; chela finger dentition: movable and immovable fingers each with ten oblique rows of denticles and ten non imbricate oblique rows; extremity of the fingers with two strong accessory granules; both fingers with ten internal lateral granules and ten external lateral granules (Fig. 4G: pl. 3). **Trichobothrial patterns** (Fig. 4 A–F: pl. 3): orthobothriotaxic; type A, femur with α configuration, the angle formed by dorsal trichobothria d_1 , d_3 and d_4 facing towards the exterior side; trichobothria d_5 of patella is distal to d_1 . *Et*, *Est* and *Esb* formed a 'V' shape facing internally in the dorso-exterior aspect of chela; *dt* is the distal trichobothria present on immovable finger of chela; trichobothria v_1 and v_2 transversally on the ventral side of the manus. **Legs**: tibial spur present on legs III–IV; tarsomere I–II with thick setae on ventral surface.

Colour in life: Body is blackish-brown with blackish-brown to yellowish-brown appendages. Prosoma: carapace blackish-brown with some pale brown patches. Mesosoma: tergites blackish-brown with small pale brown to yellow patches on both sides of the median carinae, sternites yellowish-brown, except last segment which is blackish-brown. Metasoma: segments brownish to dark reddish-brown dorsally and blackish ventrally, vesicle yellowish to reddish-brown with aculeus much darker at the tip and a black longitudinal band ventrally in the middle. Pectines pale yellow. Sternum dark brown anteriorly and paler posteriorly. Operculum brownish-yellow in the upper half and yellowish in the lower half. Basal piece brownish-yellow. Chelicera: yellowish-brown with dark reticulate spots on basal piece and with black anterior margin; fingers of chela orange-brown and denticles reddish. Pedipalp blackish-brown to yellowish-brown; chela with four blackish-brown longitudinal lines dorsally. Legs: femur and patella blackish-brown, tibia and tarsomere I yellowish brown and tarsomere II yellow.

Table 1: Morphometric data of the type materials of *Buthoscorpio chinnaensis* sp. nov.; MS, metasomal segment.

Measurement (in mm)	Holotype (male)	Paratype (female)	Paratype (female)
	ZSI/WGRC/IR/INV/3 603	ZSI/WGRC/IR/INV/3 604A	ZSI/WGRC/IR/INV/3 604B
Total length	30.27	40.02	32.70
Carapace length	3.65	4.04	3.57
Anterior width of carapace	2.23	2.42	2.07
Posterior width of carapace	3.82	4.05	3.30
Mesosomal length	10.30	13.1	10.83
Length of MS I	1.84	2.76	2.22
Width of MS I	3.11	3.25	2.94
Depth of MS I	2.28	2.27	2.22
Length of MS II	2.28	3.31	2.79
Width of MS II	3.21	3.37	3.01
Depth of MS II	2.32	2.35	2.32
Length of MS III	2.52	3.63	3.01
Width of MS III	3.27	3.49	3.11
Depth of MS III	2.46	2.46	2.34
Length of MS IV	2.96	3.90	3.27
Width of MS IV	3.15	3.40	2.97
Depth of MS IV	2.49	2.51	2.36
Length of MS V	3.49	4.44	3.52
Width of MS V	2.92	3.14	2.74
Depth of MS V	2.40	2.44	2.25
Telson length	3.24	4.79	3.48
Vesicle length	2.31	2.33	2.15
Vesicle width	1.55	2.06	1.56
Vesicle depth	1.51	1.49	1.22
Femur length	3.26	3.99	3.55
Femur width	0.93	1.03	0.87
Femur depth	0.76	0.71	0.36
Patella length	3.98	5.02	3.65
Patella width	1.34	1.34	1.17
Patella depth	0.82	0.88	0.56
Chela length	5.87	6.66	5.69
Chela width	1.13	1.03	1.04
Chela depth	0.90	0.96	0.60
Movable finger length	4.15	4.94	4.00
Immovable finger length	4.18	4.86	4.09

Etymology: The specific epithet refers to the type locality of this species, Chinnar, formed here as a participle, in the genitive case.

Sexual dimorphism: The total length of the male is 30.3 mm and the females 40.0 and 39.7 mm respectively. The male specimen has a swollen mesosoma when compared to that of the female and the carapace is without distinct granulation. In the male, carinae on femur of pedipalp less developed but the female has well developed carinae. The movable fingers of the male pedipalp possess 10 rows of denticles with an additional single internal and external denticle at the bottom whereas in the female additional denticles are absent.

Habitat: Specimens of the present study were collected by day search in the Chinnar Wildlife Sanctuary from a locality which lies about 2 km northeast on the way to the Surulipatty Tribal settlement from the Chinnar check post. The vegetation consists of scrub jungle dominated by thorny species mainly of *Opuntia stricta* (Cactaceae), *Euphorbia* sp. (Euphorbiaceae), *Capparis* sp. (Capparaceae), and *Acacia* sp. (Fabaceae). The specimens were found under a boulder showing the peculiar posture of holding the metasoma over the mesosoma giving the appearance of beetles.

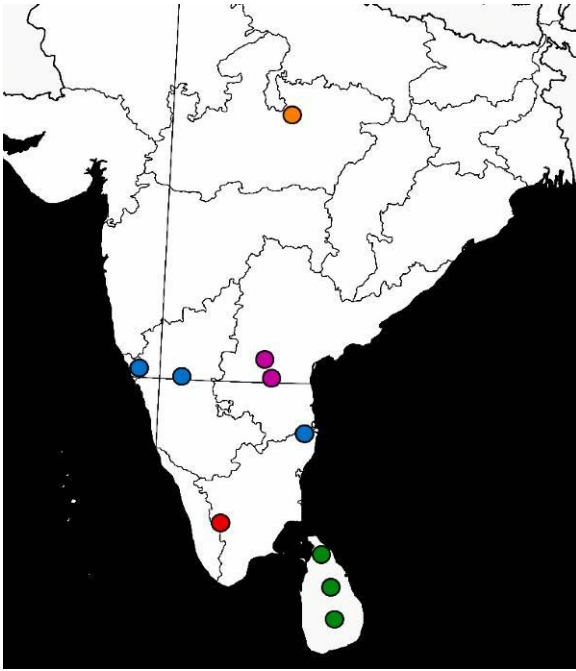


Figure 1: Map showing the current distribution of *Buthoscorpio* genus, modified after Lourenço (2012), *B. sarasinorum* (green), *B. politus* (blue), *B. rayalensis* (purple), *B. indicus* (orange), and *B. chinnarensis* sp. nov. (red) in India and Sri Lanka.

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A NEW SCORPION OF THE GENUS *Buthoscorpio* FROM INDIA

Table 2: Diagnostic character comparison of the species of *Buthoscorpio*, “?”= character could not be evaluated from literature.

Character	<i>B. chinnarensis</i>	<i>B. politus</i>	<i>B. rayalensis</i>	<i>B. indicus</i>	<i>B. sarasinorum</i>
Granulation on the carapace	scattered on lateral portions	sparsely in the median depression and lateral portions	sparsely on lateral portions	absent	absent
Position of the median eyes in females	anteriorly in the ratio 1:2	anteriorly in the ratio 1:1	anteriorly in the ratio 1:3	?	anteriorly in the ratio 1:2
Tubercles on the basal portion of pedipalp femur	34 prominent tubercles present	absent	absent	absent	absent
Marginal lamellae composition of pectines	three pieces and middle lamellae comprises seven pieces of sclerites	three pieces and middle lamellae comprises six pieces of sclerites	four pieces and middle lamellae comprises seven pieces of sclerites	?	three pieces and middle lamella comprises six to seven pieces of sclerites
Dorsal carinae on metasomal segments III–V	present	absent	present	Weakly marked	weakly present on posterior portion of segments I–II
Subaculear tubercles on telson	absent	Weakly present	absent	weakly present	absent
Pectinal teeth in females	16–17/17	15/15	17/17	16/15	16/15
Metasomal segments I–IV	wider than long	?	wider than long	wider than long	wider than long
Metasomal segment V	longer than wide	?	longer than wide	longer than wide	longer than wide
Arrangement of lateral eyes	First four eyes curve like and fifth opposite to the space between second and third eyes	First four eyes curve like and fifth opposite to the third eye	First four eyes slight curve like and fifth opposite to the space between second and third eyes	?	First three eyes in straight line and fifth opposite to the space between second and third eyes
Median eyes separation	Slightly less than one ocular diameter	?	?	One ocular diameter	slightly less than one ocular diameter
Chela fingers non imbricate oblique rows of granules	10/10	11/11	10/10	11/11	11/11

PLATE 1

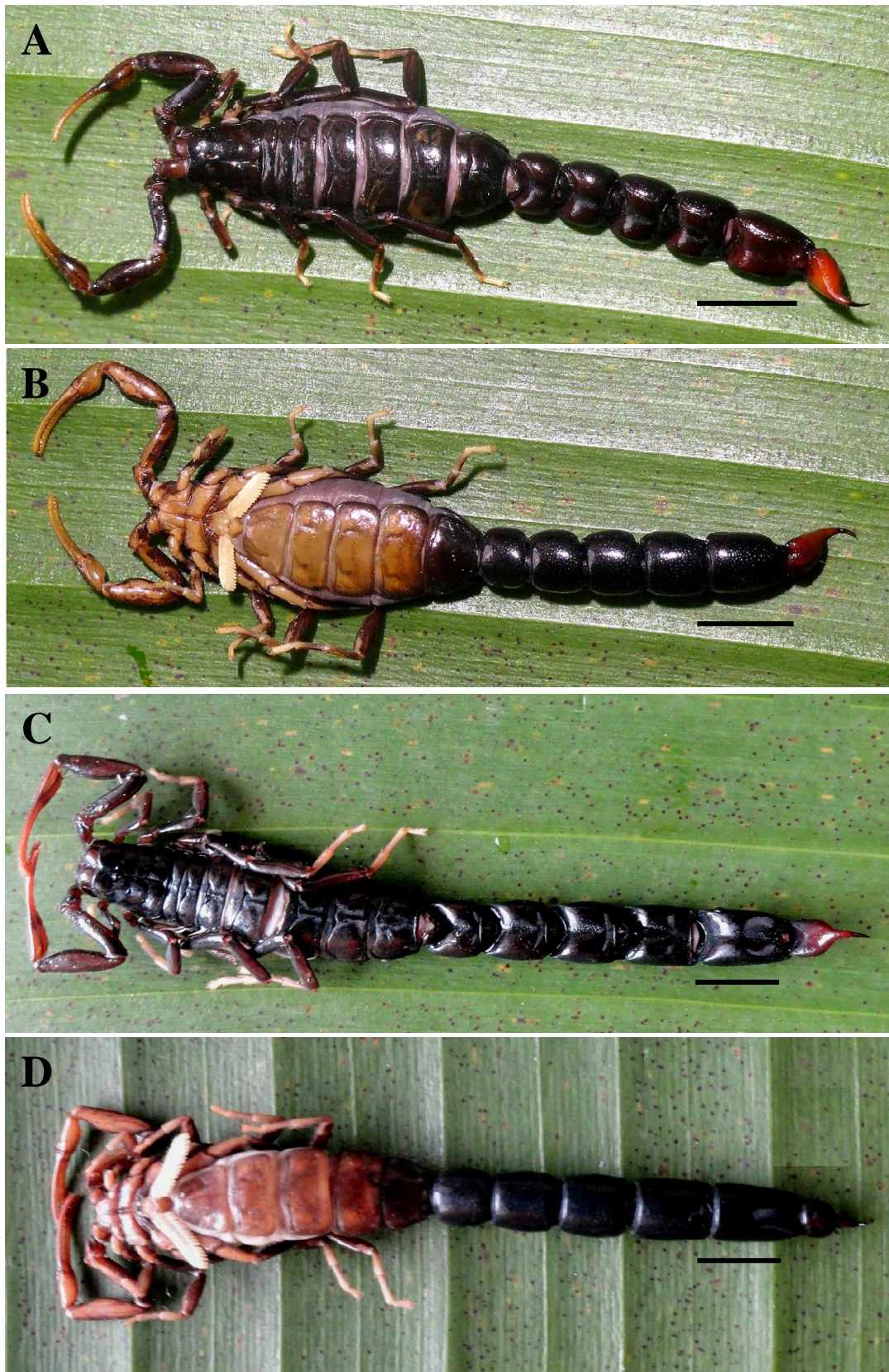


Figure 2: *Buthoscorpio chinnarensis* sp. nov. holotype male (A) dorsal view, (B) ventral view; paratype female (C) dorsal view, (D) ventral view (scale: 5 mm)

PLATE 2

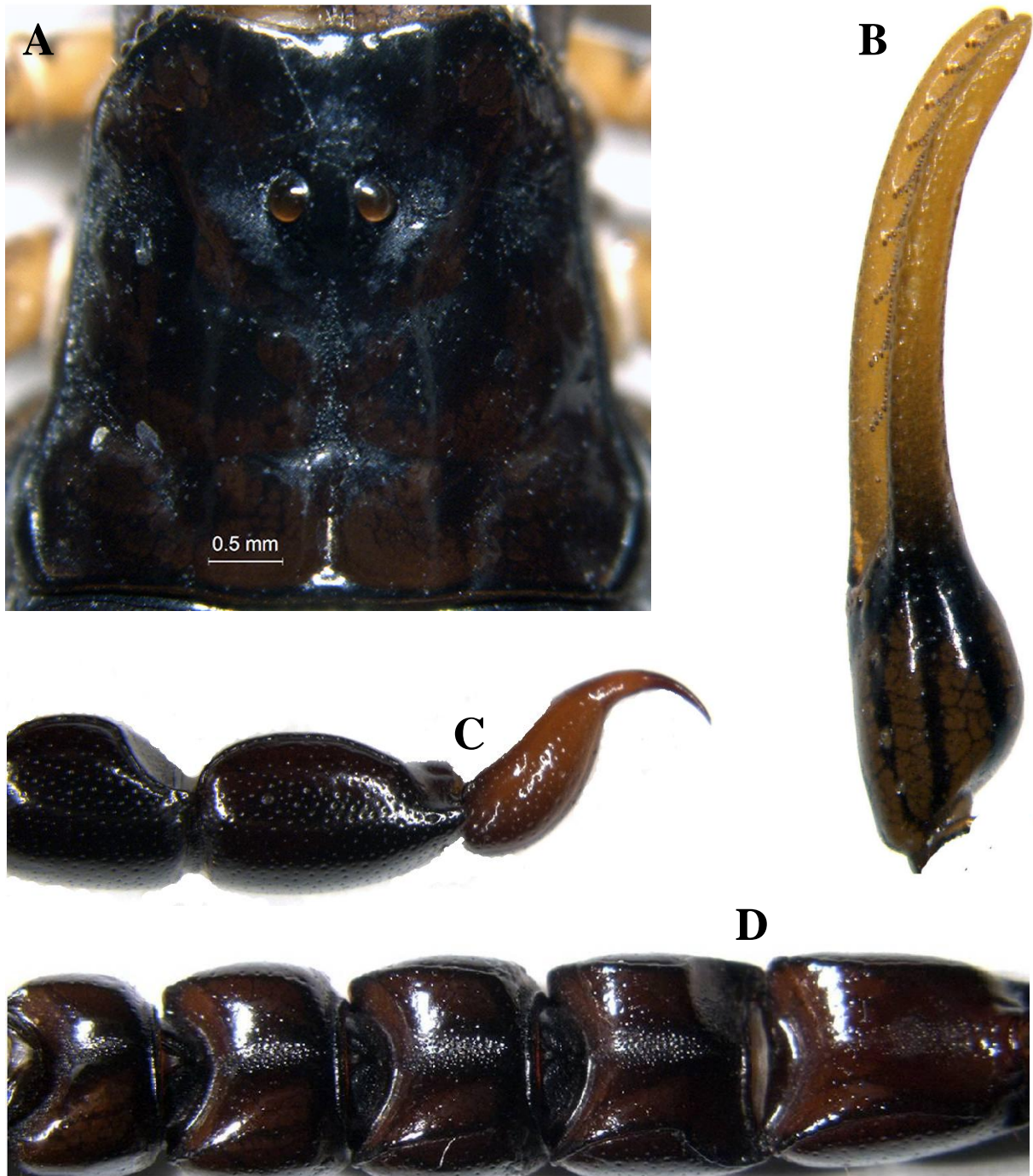


Figure 3: *Buthoscorpio chinnarensis* sp. nov. holotype male (A) dorsal view of carapace, (B) dorsal view of chela of pedipalp, (C) lateral view of segment “V” with telson of metasoma, (D) metasomal segments.

PLATE 3

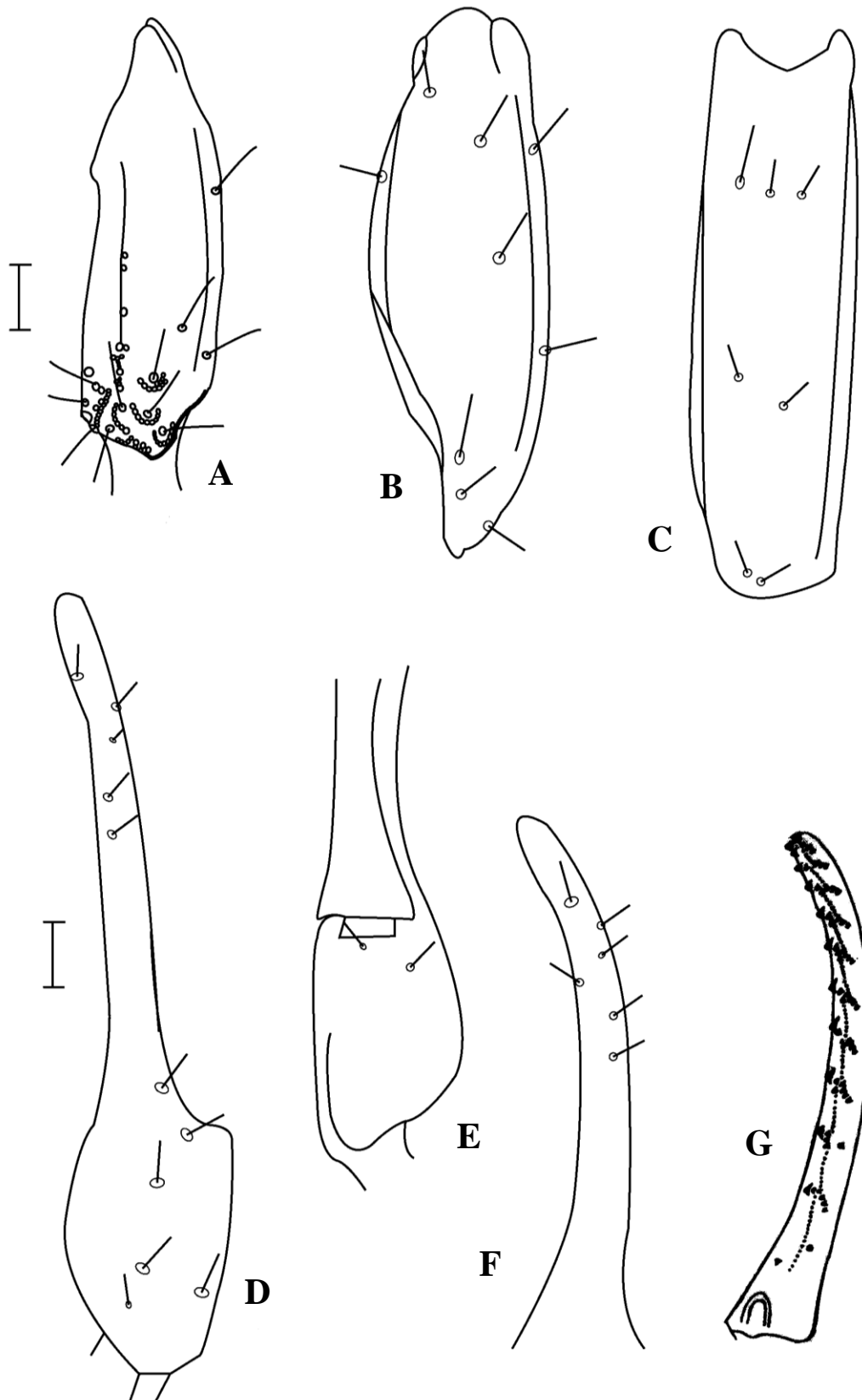


Figure 4: *Buthoscorpio chinnaensis* sp. nov. holotype male, trichobothrial pattern (A) dorsal aspect of femur, (B) dorsal aspect of patella, (C) external aspect of patella, (D) dorso-external aspect of chela, (E) ventral aspect of chela, (F) dorsal aspect of chela fixed finger, (G) dentate margin of movable finger of chela (scale: 1 mm).

PLATE 4

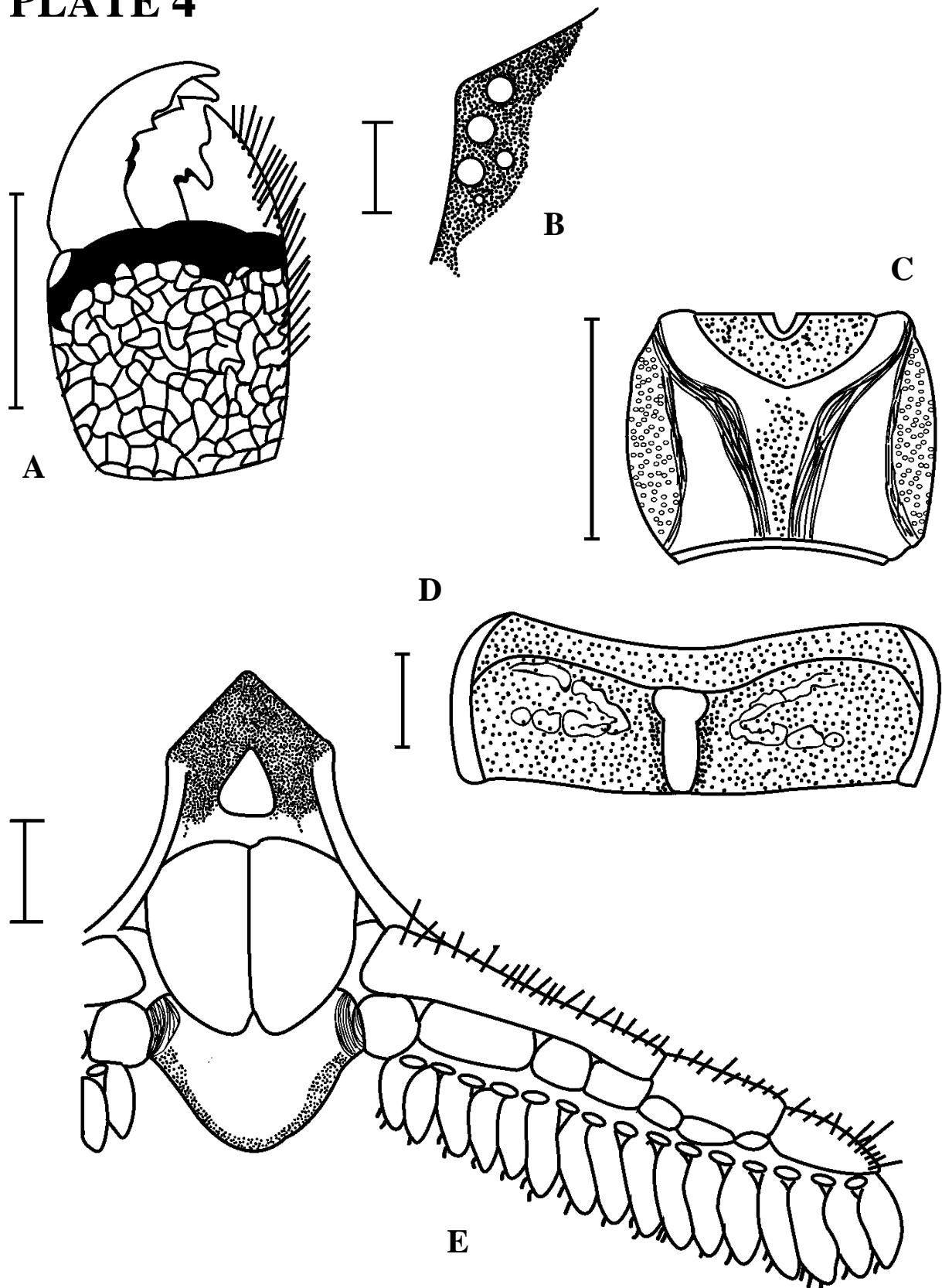


Figure 5: *Buthoscorpio chinnarensis* sp. nov. holotype male, (A) dorsal view of chelicerae, (B) arrangement of lateral eyes, (C) segment II of metasoma (D) tergite IV of mesosoma, (E) sternum, genital operculum and pectine (scale: 1 mm).