

A new species of *Janalychas* Kovařík, 2019 (Scorpiones: Buthidae) from the Deccan Peninsula, India

Новый вид скорпионов рода *Janalychas* Kovařík, 2019 (Scorpiones: Buthidae) с полуострова Декан, Индия

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KEY WORDS: integrative taxonomy, morphology, phylogeny, scorpion, taxonomy, Telangana.

КЛЮЧЕВЫЕ СЛОВА: интегративная таксономия, морфология, филогения, скорпион, таксономия, штат Телингана.

ABSTRACT. A novel buthid scorpion of the genus *Janalychas* Kovařík, 2019 is described from the Amrabad Tiger Reserve, Telangana, based on an integrative approach combining morphological and molecular data for South Asian representatives. Morphologically, the new species is most similar to *J. farkasi* (Kovařík, 1997) from Nepal, but can be distinguished by the presence of a single carina on the mesosomal tergites (vs. three in *J. farkasi*) and the presence of denticles on sternite V. It can also be readily differentiated from its Indian congeners by a unique combination of morphological traits and its characteristic yellow, patterned coloration.

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РЕЗЮМЕ. На основании интегративного подхода, сочетающего морфологические и молекулярные данные, в сравнении с южноазиатскими представителями рода, дано описание нового вида скорпионов-бутид рода *Janalychas* Kovařík, 2019 из тигрового заповедника Амрабад, штат Телингана. Морфологически, новый вид наиболее сходен с *J. farkasi* (Kovařík, 1997) из Непала, отличаясь наличием одного киля на тергитах мезосомы (против трех у *J. farkasi*) и наличием зубчиков на пятом стерните. Он также легко отличается от других индийских представителей рода уникальным сочетанием морфологических признаков и желтой окраской с характерным рисунком.

Introduction

Despite recent progress, the taxonomy and spatial distribution of scorpions in India remain inadequately documented. Till date, 158 recognized species currently represent the country [Mohapatra, 2025], and this number

has steadily increased with the application of molecular systematics and renewed research interest. However, significant impediments persist in scorpion taxonomy, largely owing to their cryptic morphology and venomous nature, compounded by limited access to type material housed in national museums and personal collections [Mirza, 2020]. The genus *Lychas* C.L. Koch, 1845 is one of the diversely distributed scorpion genera in the world, owing to its presence from the Afrotropical, the Palearctic and the Indomalayan realm [Kovařík, 1997]. Kovařík [2019] divided *Lychas sensu lato* into four genera based on major morphological characters. Seven subordinate taxa have been placed under the genus *Janalychas* Kovařík, 2019, namely *J. albimanus* (Henderson, 1919), *J. farkasi* (Kovařík, 1997), *J. heurtaulatae* (Kovařík, 1997), *J. laevifrons* (Pocock, 1897), *J. shoplandi* (Oates, 1888), *J. srilankensis* (Lourenço, 1997) and *J. tricarinatus* (Simon, 1884) based on diagnostic characters such as the presence of an elongated tibial spur on legs III and IV, and longitudinal furrow along the lateral side of telson in males [Kovařík, 2019]. Later, Mirza [2020] described two new species from the *J. tricarinatus* species complex, distributed in the Western Ghats of India, namely — *J. granulatus* Mirza, 2020 from Maharashtra and *J. keralaensis* Mirza, 2020 from Kerala. Presently, this genus comprises nine species, five distributed in India (*J. albimanus*, *J. granulatus*, *J. keralaensis*, *J. laevifrons* and *J. tricarinatus*), one in Sri Lanka (*J. srilankensis*), two in Nepal (*J. farkasi* and *J. heurtaulatae*) and one in Myanmar (*J. shoplandi*) [Rein, 2025]. The genus is widely distributed in India, yet understudied [Mirza, 2020].

Most of the Indian scorpions were described by colonial naturalists during pre-independence [Tikader, Bastawade, 1983]. New discoveries in recent years have only focused on the the Western Ghats and Himalayan region. Buthid inventories in the Deccan Peninsula biogeographic zone [Rodgers, Panwar, 1988] are limited to genus *Buthoscorpio* [Javed *et al.*, 2010; Lourenço, 2012],

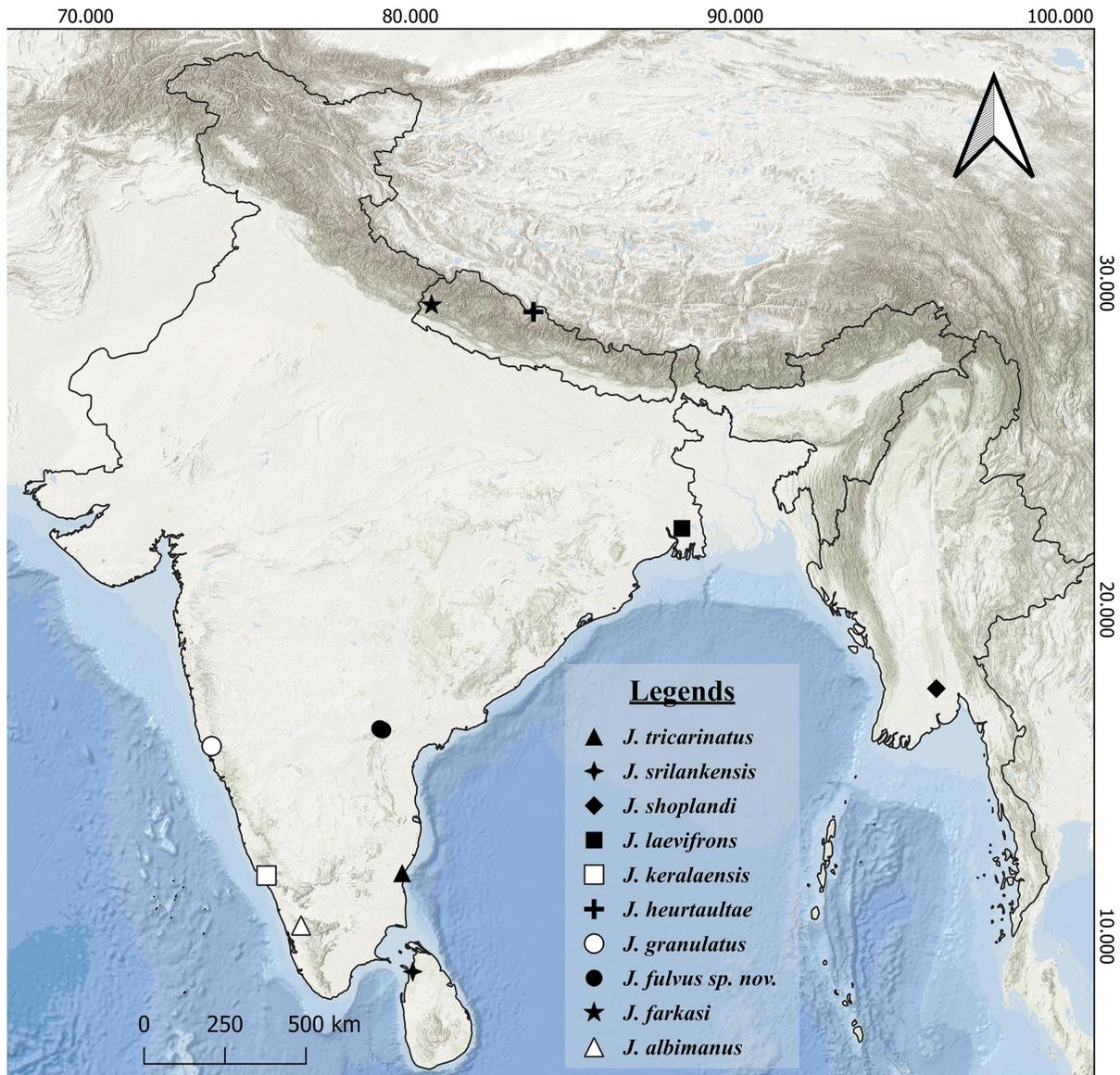


Fig. 1. Map showing the type locality of *Janalychas fulvus* sp.n. and congeners in South-east Asia.

Рис. 1. Карта типового местонахождения *Janalychas fulvus* sp.n. и находок представителей рода в Юго-Восточной Азии.

Charmus [Joshi *et al.*, 2025], *Compsobuthus* [Waghe *et al.*, 2022], *Hottentotta* [Kovařík, 2007; Lourenço, 2015], *Isometrus* [Sulakhe *et al.*, 2020; Deshpande *et al.*, 2022; Bandgar *et al.*, 2024; Deshpande *et al.*, 2024], *Orthochirus* [Zambre *et al.*, 2011] and *Reddyanus* [Kovařík, 2003]. The scorpion fauna of Telangana is currently represented by 13 species, including eight species of the family Buthidae, one species of Hormuridae, and four species of Scorpionidae [Mohapatra, 2021; Ramakrishna, Srinivasulu, 2021]. The diversity of scorpions in the state has been documented in several studies [Kovařík, 2003; Rao *et al.*, 2005; Javed *et al.*, 2010b, c; Mohapatra, 2021, 2024; Ramakrishna, Srinivasulu, 2021]. Of these, two species are known to be endemic to Telangana: *Reddyanus khammamensis* (Kovařík, 2003) and *Buthoscorpio rayalensis* Javed, Rao, Mirza, Sanap et Tampal, 2010. During a faunal expedition in the Central Plateau Prov-

ince (6D) of the Deccan Peninsula, we came across an interesting scorpion exhibiting characters to those of the species belonging to the genus *Janalychas* from Amrabad Tiger Reserve, Telangana, India. We report this as a new species using an integrative taxonomic approach, using both morphological and molecular evidence.

Material and methods

Individuals in the field were located with the aid of an ultraviolet headlamp (Caperlan Moonlight 500) and were collected with forceps. Live animals were photographed with a Nikon D7500 camera+105mm Micro lens. Specimens were later euthanized, and fresh tissue samples were collected before fixing in 4% formalin solution. Later, the fixed specimens were stored in 70% ethanol and deposited in the National Zoological Collection of Zoological Survey of India, Kolkata. Specimens were measured with the help of a digital calliper (Mitutoyo

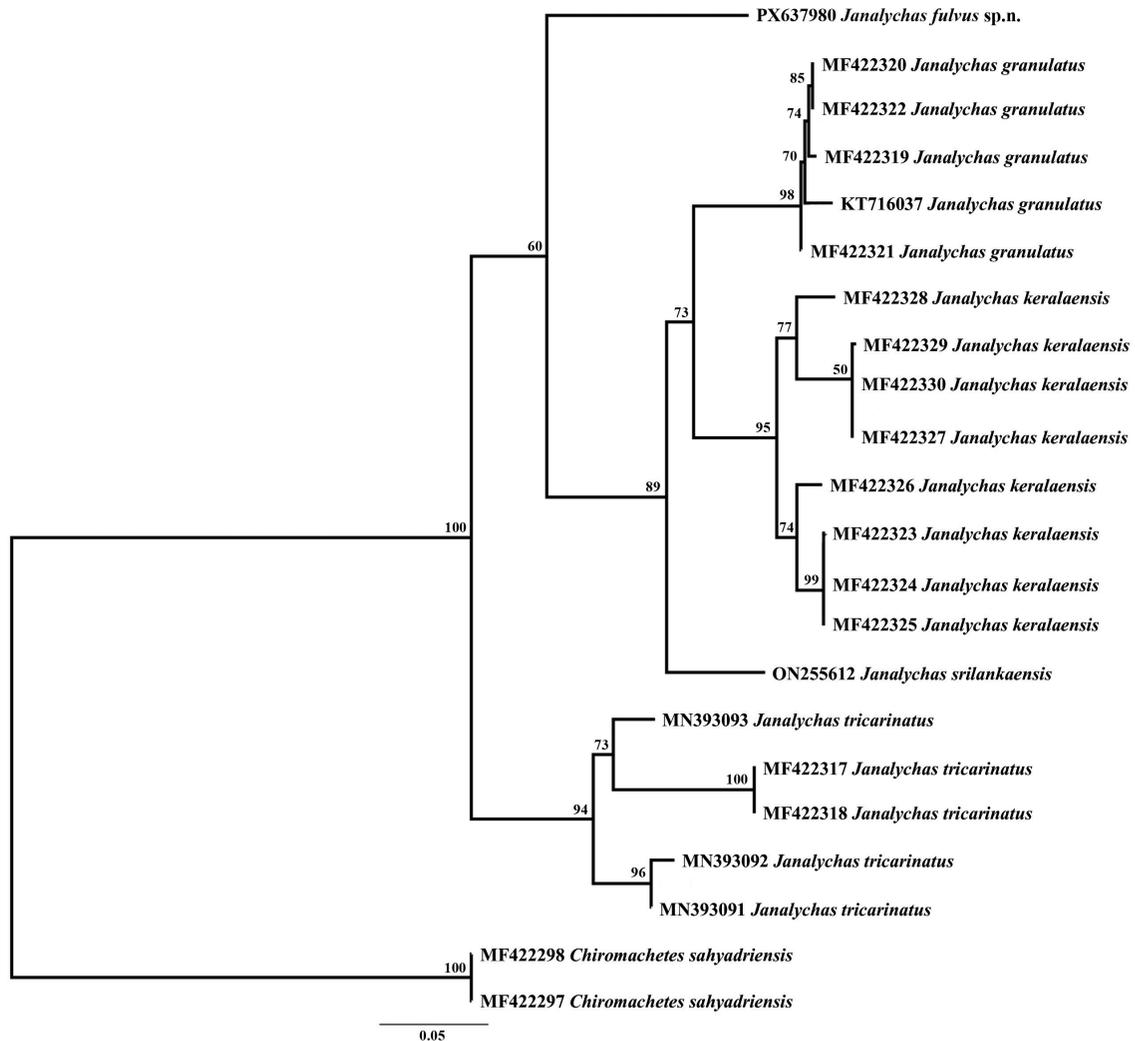


Fig. 2. Maximum Likelihood phylogeny of selected members of the genus *Janalychas* Kovařík, 2019 based on mitochondrial COI gene.

Рис. 2. Филогения некоторых представителей рода *Janalychas* Kovařík, 2019, с использованием метода максимального правдоподобия, по данным митохондриального гена COI.

500-171-20 CD-6" CX) with an error of 0.01 mm. All the morphometric data has been provided in Table 3. Specimens were examined under a Leica stereomicroscope. Photographs of the specimens were taken using a Mirrorless camera system (Nikon Corp.) equipped with a macro lens (Laowa 90 mm 2x ultra macro). Descriptive terms and abbreviations follow Stahnke [1971] and Sissom [1990].

Molecular Analysis

Genomic DNA was extracted from the leg muscle tissue and chelicera muscle tissue with the help of Qiagen DNeasy tissue kit according to the protocols standardized by the manufacturer. The Cytochrome c oxidase subunit I (COI) was amplified using primers LCO 1490 and HCO 2198 [Folmer *et al.*, 1994]. A 25 μ l of reaction mixture was prepared using DNA template 5 μ l, forward primer (LCO 1490) 1 μ l, reverse primer (HCO 2198) 1 μ l, master mix 12.5 μ l and nuclease-free water 5.5 μ l. The amplification was performed using the Thermo fisher sci-

entific ABS (Applied Biosystem) PCR machine, keeping the initial denaturation temperature 94 °C for 3 min, denaturation temperature at 94 °C for 30 sec, annealing temperature at 55 °C for 45 sec, elongation temperature at 72 °C for 1 min for 35 cycles and the final extension temperature at 72 °C for 10 min followed by an indefinite hold at 4 °C. The sequencing was performed by the Sanger sequencing method at Barcode Biosciences Pvt Ltd., Bengaluru, Karnataka, India. The consensus sequence was constructed using BioEdit software 7.7 [Hall, 1999] and the sequence was uploaded to the National Center for Biotechnology Information (NCBI) for the obtainment of an accession number. The available COI nucleotide sequences of congeners were retrieved from the NCBI website. The details are provided in Table 2. The COI nucleotide sequences of species *Chiromachetes sahyadriensis* Mirza, Sanap et Zambre, 2015 were considered as out group. The Kimura-2-Parameter distance was calculated, and the Maximum Likelihood (ML) tree was constructed with a bootstrap value of 1000. The best nucleotide substitution model TN93+G was used for phylogeny construction using software MEGA 12 [Kumar *et al.*, 2024].

Table 1. Inter-specific uncorrected raw genetic distances among species of genus *Janalychas*.
Таблица 1. Межвидовые невыровненные сырые генетические дистанции в роде *Janalychas*.

	Species	1	2	3	4	5
1	<i>Janalychas fulvus</i> sp.n.					
2	<i>Janalychas granulatus</i>	12.1–12.2%	0.5–1.7%			
3	<i>Janalychas keralaensis</i>	12.6–13.4%	7.1–9.4%	0.5–4.9%		
4	<i>Janalychas srilankaensis</i>	13%	8.7–9.3%	8.5–9.6%	0%	
5	<i>Janalychas tricarinatus</i>	12.9–15.9%	14.7–18.6%	15.2–17.7%	14–6.9%	0.4–9.8%

Results

Taxonomic account

Buthidae C.L. Koch, 1837

Janalychas Kovařík, 2019

Janalychas fulvus sp.n.

Figs 3–10.

Lychas sp. — Mohapatra, 2024.

Zoobank ID. urn:lsid:zoobank.org:act:37739B55-A9F7-4656-A068-412324B8E921

HOLOTYPE. ZSIK-Ar-10521/18, adult male, from Maddimadugu village (16.357483N, 79.05405E; ca. 446 m above s.l), Amrabad, Telangana, India, collected by Pratyush P. Mohapatra on 16 September 2022. The left leg IV tissue has been taken for molecular analysis.

PARATYPES. ZSIK-Ar-10522/18 (adult female, left pedipalp tissue taken for molecular analysis), ZSIK-Ar-10523/18 (adult male), ZSIK-Ar-10524/18 (adult male), ZSIK-Ar-10525/18 (adult female) & ZSIK-Ar-10526/18 (adult female), same collection details as holotype.

ETYMOLOGY. The specific epithet refers to the body colour of the species (*fulvus* = yellow), which readily distinguishes the species from its congeners.

SUGGESTED ENGLISH NAME. Deccan Yellow Forest Scorpion.

DIAGNOSIS. Scorpions of medium to large body size (46.8–55.9 mm) as compared to their congeners. Length in adult male is 52.2–55.9 mm and in adult female is 46.8–56.0 mm. General colouration pale yellow in both males and females with brown shades on carapace and mesosoma. Pedipalp without any reticulations. Metasoma with black spots scattered on the ventral aspect. Carapace granular; almost trapezoid in shape; anterior margin almost straight; slightly longer than wide (length and width ratio is 1:1.0–1.1). Ocular tubercles black; a pair of median eyes situated anteriorly in the ratio 1:1.5–1.6; four pairs of lateral eyes. Triangle between median and lateral eyes granular. Mesosoma granular; tergite I–VI with single median carinae. Tergite VII with two pairs of lateral carinae; intercarinal space coarsely granular. Sternite V with two pairs of denticular carinae; intercarinal space granular. Pectines of moderate length (length = 4.5–5.7 mm); teeth number varies from 24 to 26 in both males and females. Genital operculum always wider than long; sclerites pointed and indented on mid-lateral aspect; separated in both sexes. Segment I–III with 10, segment IV with 8 carinae and segment V with 5 carinae. Lateral carinae of segment III indistinct with smaller granules. Segment IV is scalloped dorsally after the posterior two-third. Intercarinal space granular. Vesicle bulbous in males (length width ratio 1.5–1.6); elongated in females (length width ratio 1.9–2.1). Aculeus shorter than the vesicle (vesicle and aculeus length ratio- 1.9–2.0 in males and 1.7–1.8 in females). Pedipalp femur pentacarinated, patella with four carinae. Chela manus granular except for the exterior aspect in males; smooth without granules

in females. Males have rounded, more robust manus (length and depth ratio 1.6–1.8) and females have slightly elongated manus (length depth ratio 1.8–1.9). Fixed finger is always shorter than the movable finger in both sexes. Fingers in males are scalloped at the base. Leg femur and patella granular with carinae. A long tibial spur is present at the distal end of tibia in legs III and IV. Tarsomere II with two rows of setae on ventral surface. A pair of pedal spur present in all the legs.

GENETIC DIVERGENCE. Based on the phylogeny of the COI gene, the interspecific uncorrected p-distance values between peninsular Indian congeners of the genus *Janalychas* with *J. fulvus* sp.n. range from 12.1–15.9% (Table 1). The species is closely related to its sister taxa, *J. granulatus* (12.1–12.2%), followed by *J. keralaensis* (12.6–13.4%), *J. srilankaensis* (13%), with 60% bootstrap support (Fig. 10).

DESCRIPTION OF HOLOTYPE MALE (ZSIK-Ar-10521/18)

Colouration (Fig. 3A, B). Pale yellow with dark brown patches on carapace and mesosoma. Anterior portion of carapace more yellowish than the posterior. Distinctly dark on median ocular furrow and lateral ocular tubercles. Each side of apical notch of anterior carapace pale yellow. Distal end of tergites with irregular black granules mostly present on both sides of the median carinae. Metasoma yellow with black spots mostly present on the ventral side. Dark line present near the dorsal carinae of metasoma I to III. Telson yellow on dorsal side with reddish aculeus. Legs yellow with dark patches only present near the juncture of femur and patella. Tip of tibial spur, pedal spur, claws and setae dark brown. Chelicera yellow with brown reticulations. Cheliceral fingers dark brown. Pedipalp (femur, patella, manus) yellow, without any markings. Dark brown near the dentate margins of chela fingers. Pectines and genital operculum paler than body.

Carapace (Fig. 4E). Shape of carapace almost trapezoid, slightly longer than wide. Anterior margin straight, with macrosetae sparsely present along the margin. Entire carapace acarinated, finely granular, lateral and posterior margins crenulated. Anterior median furrow with smaller granules. The posteromedian furrow deep, invaginated into an inverted T shaped on the posterior end along the margin, invaginated ends without granules. Central lateral, posterior lateral and posterior marginal furrows distinct. Ocular tubercles black; a pair of median eyes situated anteriorly in the ratio 1:1.5; four pairs of lateral eyes with three major and one minor ocelli. Triangle between median and lateral eyes granular. Pectines well developed, moderate, with teeth number 25/25 (L/R), fulcrum conspicuous, three marginal and eight median lamellae divisions. Genital operculum wider than long; sclerites pointed and indented on mid-lateral aspect; medially separated in both sexes. Cephalothoracic sternum triangular. Chelicerae ventral surface densely covered with fine hairs.

Pedipalp (Fig. 5). Femur with five carinae (dorsoexternal, dorsointernal, ventroexternal, ventrointernal, internal median);

Table 2. Sequences used in this study.
Таблица 2. Сиквенсы использованные в данной работе.

Species	Voucher No.	GenBank Accession	Locality	Reference
<i>Janalychas tricarinatus</i>	–	MN393093	Pondicherry, India	Mirza, 2020
<i>Janalychas tricarinatus</i>	–	MN393092	Savandurga, India	Mirza, 2020
<i>Janalychas tricarinatus</i>	–	MN393091	Gujarat, India	Mirza, 2020
<i>Janalychas tricarinatus</i>	BNHS SC148	MF422317	Maharashtra, India	Suranse <i>et al.</i> , 2017
<i>Janalychas tricarinatus</i>	BNHS SC149	MF422318	Maharashtra, India	Suranse <i>et al.</i> , 2017
<i>Janalychas granulatus</i>	INHER Scorpion 13	MF422321	Maharashtra, India	Suranse <i>et al.</i> , 2017
<i>Janalychas granulatus</i>	INHER-Scorpion 11	MF422319	Maharashtra, India	Suranse <i>et al.</i> , 2017
<i>Janalychas granulatus</i>	INHER Scorpion 14	MF422322	Maharashtra, India	Suranse <i>et al.</i> , 2017
<i>Janalychas granulatus</i>	INHER Scorpion 12	MF422320	Maharashtra, India	Suranse <i>et al.</i> , 2017
<i>Janalychas granulatus</i>	WILD-13 ARA 1256	KT716037	Maharashtra, India	Suranse <i>et al.</i> , 2017
<i>Janalychas keralaensis</i>	WILD-17 ARA 4003	MF422328	Maharashtra, India	Suranse <i>et al.</i> , 2017
<i>Janalychas keralaensis</i>	BNHS SC147	MF422326	Maharashtra, India	Suranse <i>et al.</i> , 2017
<i>Janalychas keralaensis</i>	BNHS SC146	MF422323	Maharashtra, India	Suranse <i>et al.</i> , 2017
<i>Janalychas keralaensis</i>	WILD-17 ARA 4019	MF422325	Maharashtra, India	Suranse <i>et al.</i> , 2017
<i>Janalychas keralaensis</i>	WILD-17 ARA 4018	MF422324	Maharashtra, India	Suranse <i>et al.</i> , 2017
<i>Janalychas keralaensis</i>	BNHS SC144	MF422329	Maharashtra, India	Suranse <i>et al.</i> , 2017
<i>Janalychas keralaensis</i>	BNHS SC145	MF422330	Maharashtra, India	Suranse <i>et al.</i> , 2017
<i>Janalychas keralaensis</i>	BNHS SC150	MF422327	Maharashtra, India	Suranse <i>et al.</i> , 2017
<i>Janalychas srilankensis</i>	S855	ON255612	Puttalam, Eluwankulam, Sri Lanka	Štundlová <i>et al.</i> , 2024
<i>Janalychas fulvus</i> sp.n.	ZSIK-Ar-10521/18	PX637980	Maddimaddugu, Amrabad, Telangana, India	Present study

Abbreviations for museum and voucher collections are as follows: BNHS — Bombay Natural History Society, Mumbai; INHER — Institute of Natural History Education and Research, Pune; WILD — Wildlife Information Liaison Development Society, Coimbatore.

all carinae and intercarinal space granular. Patella with three granular carinae (dorsal, dorsointernal, internal median), intercarinal space finely granular. Dorsal carinae smooth; dorsointernal and intermedian carinae granular, fused at proximal and distal ends. Chela smooth without any carinae. Manus granular except for the exterior side; bulbous (length-width and length-depth ratio 1:1.7). Fingers finely granular. Fixed finger always shorter than the movable finger (with length ratio of 1:1.3). Movable finger of pedipalp with row of six granules without any accessory granules.

Legs (Fig. 8G). Finely granular; femur and patella carinated, intercarinal space granular. Granulation on tibia sparse. A long tibial spur present in leg III and IV. A pair of pedal spurs present in all the legs. Tarsomere II ventral surface with two rows of setae.

Mesosoma (Fig. 4A, B). Tergites finely granular. Granules on the posterior portion larger than the anterior. Pretergites granular except for the median region. Margins crenulated. A single median carinae present in tergites I–VI. A pair of obsolete lateral carinae, represented by only few granules on the posterior portion of tergites III–VI. A pair of glabrous elongated patch present on both sides of median carinae in the anterior margin of tergites II–VI. Tergite I–VI with inward-pointing angular markings (> <). Tergite VII with two pairs of lateral carinae developed on the posterior two-thirds. Intercarinal space finely granular. Sternite I granular only on anterior lateral portion.

Sternites II–IV smooth, except for the granular lateral margins. Sternite V with two pairs of denticular carinae, inter-

carinal space granular. Pectinal teeth count 25/25 (L/R), fulcra present (Fig. 8C).

Metasoma (Fig. 7A, C, E). Metasomal segments longer than wide. Length increases from segment I–V, almost no variation in width (3.6–3.7 mm). The depth of segment increases from segment I–III and decreases afterwards. Segments I–III with five pairs carinae (dorsal, dorsolateral, lateral, ventrolateral and ventral). The lateral carinae in segment III inconspicuous with smaller granules. Segment IV with four pairs of carinae (dorsal, dorsolateral, ventrolateral and ventral). The dorsal carinae extend till the two-third portion, after which the segment is scalloped. Segment V with five carinae (single ventral and paired dorsolateral and ventrolateral). Intercarinal space finely granular. Central median furrow distinct in segments I–IV, but not prominent on segment V. Setation in all the segments sparse. Anal arch posterior crest crenulated, intercrystal area with sparse setation. Telson bulbous, longer than wide (length width ratio 1:2.3), wider than deep (width depth ratio 1:1.4), without granules. Five keels present on the ventral aspect of vesicle, granules sparsely placed along keels, smooth. Longitudinal furrow present on the lateral sides, which extends till the base of subaculear tooth. Subaculear tooth strong, with ventral granules and setae. Aculeus shorter than vesicle, firmly curved, with few macrosetae.

VARIATION. The paratypes match the description of the holotype. The mensural and meristic characters are given in Table 2. There is a significant difference between the males and females in the following characteristics:

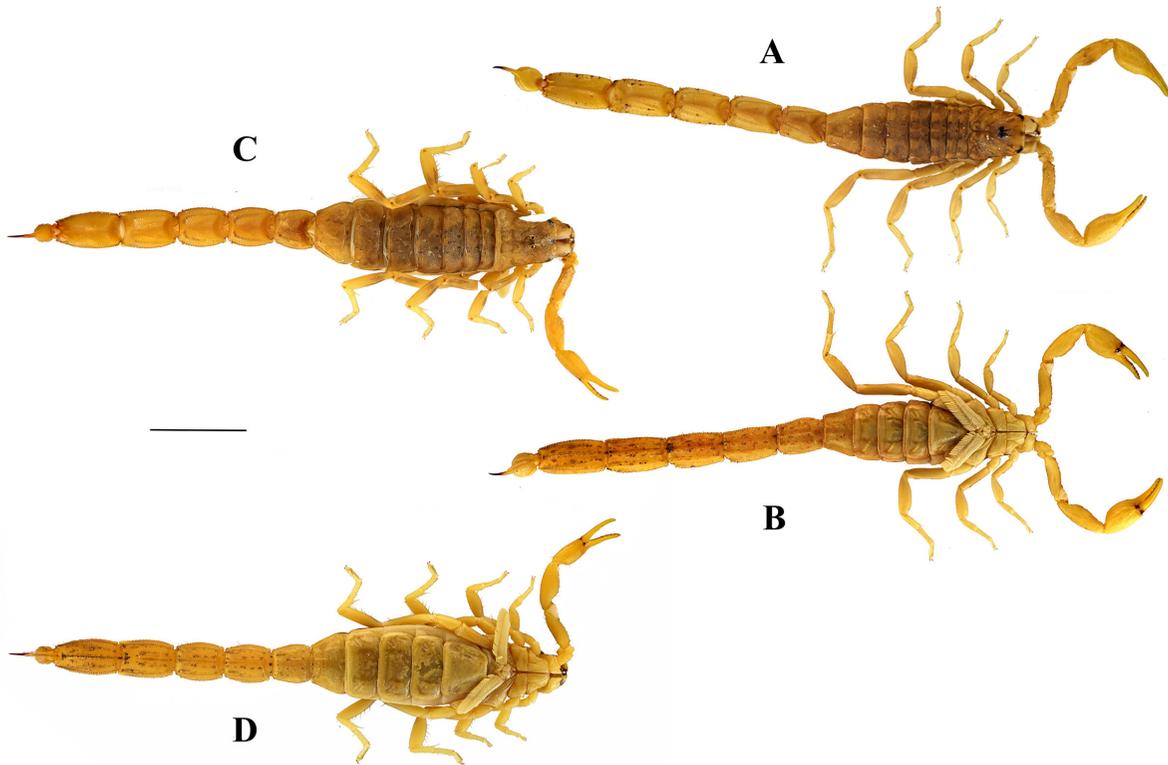


Fig. 3. *Janalychas fulvus* sp.n., male holotype (ZSIK-Ar-10521/18) (A, B), female paratype (ZSIK-Ar-10522/18) (C, D): A, C — dorsal view; B, D — ventral view. Scale bar 10 mm.

Рис. 3. *Janalychas fulvus* sp.n., голотип самец (ZSIK-Ar-10521/18) (A, B), паратип самка (ZSIK-Ar-10522/18) (C, D): A, C — дорсально; B, D — вентрально. Масштаб 10 мм.

Body shape slender in males (Fig. 3A, B), vs. stout in females (Fig. 3C, D).

Male chela is rounded (Fig. 5C) and granular (Fig. 5A), whereas female chela is slender (Fig. 6C) and smooth (Fig. 6A). Chela fingers scalloped at base in males (Fig. 9A).

The number of pectinal teeth count ranges from 24–26 in males and 24–27 in females.

The metasoma length and carapace length ratio are 1:5.7–6 in males and 1:5–5.3 in females.

Metasomal segments wider in females, having length width ratio of 1–1.9, with gradually increasing order. In males, it is less wide, having length width ratio of 1.2–1.9. All the segments are longer than deep in both sexes; deeper in females, with length depth ratio of 1:1.3–2.2; the ratio in males is 1:1.5–2.6.

Telson bulbous in males (length width ratio- 1:2.3–2.4 and length- depth ratio 1:1.4–1.5) (Fig. 9D), whereas females have elongated telson (length width ratio- 1:3.1–3.3 and width depth ratio 1:1.1) (Fig. 9. C).

The carapace and metasoma length ratio is 5.6–5.9 in males and 5–5.2 in females.

AFFINITIES. *Janalychas fulvus* sp.n. can be distinguished from its congeners by the combination of the following morphological characters, such as:

(a) Metasomal segment III with ten carinae (vs. eight carinae in *J. granulatus*, *J. heurtaultae*, *J. keralaensis* and *J. tricarinatus*). (b) Fingers of hand of same colour (vs. fingers darker than manus in *J. albimanus*; much lighter than manus in *J. shoplanti*; spotted in *J. tricarinatus*). (c) Pedipalp femur and patella without any markings (vs. reddish-brown markings in *J. granulatus* and *J. keralaensis*; darker on femur and

patella in *J. laevifrons*; several spots on femur and patella in *J. srilankaensis*). (d) Median eyes present anteriorly in the ratio 1:1.5 (vs. 1:1.7 in *J. tricarinatus*; 1:2.5 in *J. albimanus*; 1:2.6 in *J. granulatus*; 1:2.7 in *J. keralaensis*). (e) Number of lateral eyes 4 (vs. 3 in *J. srilankaensis*; 5 in *J. albimanus*, *J. granulatus*, *J. keralaensis*, *J. laevifrons* and *J. tricarinatus*). (f) Tergite VII with four carinae (vs. five carinae in *J. srilankaensis*, *J. granulatus*, *J. keralensis* and *J. tricarinatus*). (g) Manus granular on internal surface (vs. smooth in *J. albimanus*, *J. granulatus*, *J. keralaensis*, *J. laevifrons* and *J. tricarinatus*; with keels in *J. srilankaensis*). (h) Mesosomal tergites III–VI with one carina (vs. three carinae in *J. farkasi*, *J. granulatus*, *J. keralaensis*, *J. srilankaensis* and *J. tricarinatus*). (i) Denticules present along carinae on sternite V (vs. absent in *J. farkasi* and *J. tricarinatus*). (j) The metasoma length and carapace length ratio is 1:5–5.3 in females (vs. 1:5 in *J. keralaensis*; 1:5.2 in *J. heurtaultae*; 1:5.4 in *J. shoplanti*; 1:4.8–5.7 in *J. laevifrons*; 1:5–6.3 in *J. tricarinatus*; 1:5.2–6.6 in *J. granulatus*). (k) The metasoma length and carapace length ratio is 1:5.7–6 in males (vs. 1:5.7 in *J. farkasi*; 1:6.2 in males of *J. heurtaultae*; 1:6.9 in *J. tricarinatus*; 1: 5.2–9.3 in *J. granulatus*; 1: 6.4–7.3 in *J. keralaensis*). (l) The carapace length and pedipalp length ratio is 1:2.6–2.7 in females (vs. 1:2.9 in *J. shoplanti*; 1:3.1 in *J. keralaensis*; 1:3.3 in *J. heurtaultae*; 1:2.9–3.6 in *J. granulatus*; 1:3.2–3.6 in *J. tricarinatus*; 1:3.3–3.4 in *J. laevifrons*). (m) The carapace length and pedipalp length ratio is 1:3–3.2 in males (vs. 1:2.1 in *J. srilankaensis*; 1:3.2 in *J. farkasi*; 1:3.7 in *J. heurtaultae*; 1:3.8 in *J. tricarinatus*; 1:3.5–3.6 in *J. keralaensis*; 1:3–7.1 in *J. granulatus*). (n) The metasoma segment II length and width ratio is 1:1.1–1.2 in females (vs. 1:1.3 in *J. heurtaultae*; 1:1.4 in



Fig. 4. *Janalychas fulvus* sp.n., male holotype (ZSIK-Ar-10521/18) (A, B, E), female paratype (ZSIK-Ar-10522/18) (C, D, F): A, C — mesosoma dorsal; B, D — mesosoma ventral; E, F — carapace.

Рис. 4. *Janalychas fulvus* sp.n., голотип самец (ZSIK-Ar-10521/18) (A, B, E), паратип самка (ZSIK-Ar-10522/18) (C, D, F): A, C — мезосома, дорсально; B, D — мезосома, вентрально; E, F — карапакс.

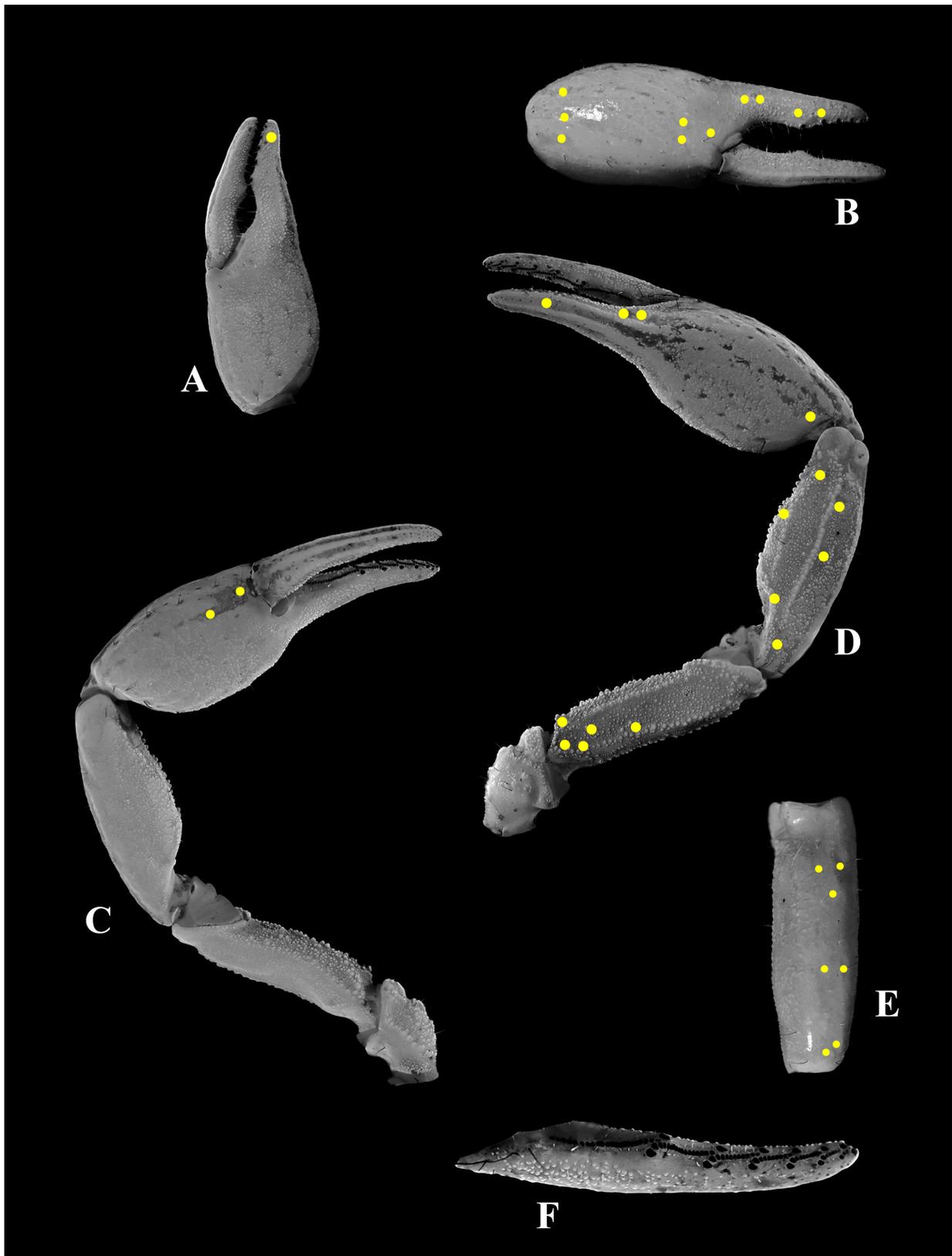


Fig. 5. *Janalychas fulvus* sp.n., male holotype (ZSIK-Ar-10521/18), trichobothria positions: A — chela internal; B — chela exterior; C — pedipalp ventral; D — pedipalp dorsal; E — pedipalp patella exterior; F — movable finger dentition.

Рис. 5. *Janalychas fulvus* sp.n., голотип самец (ZSIK-Ar-10521/18), расположение трихоботрий: А — хела, изнутри; В — хела, снаружи; С — педипальпа, вентрально; D — педипальпа, дорсально; E — колено педипальпы, снаружи; F — зубы подвижного пальца.

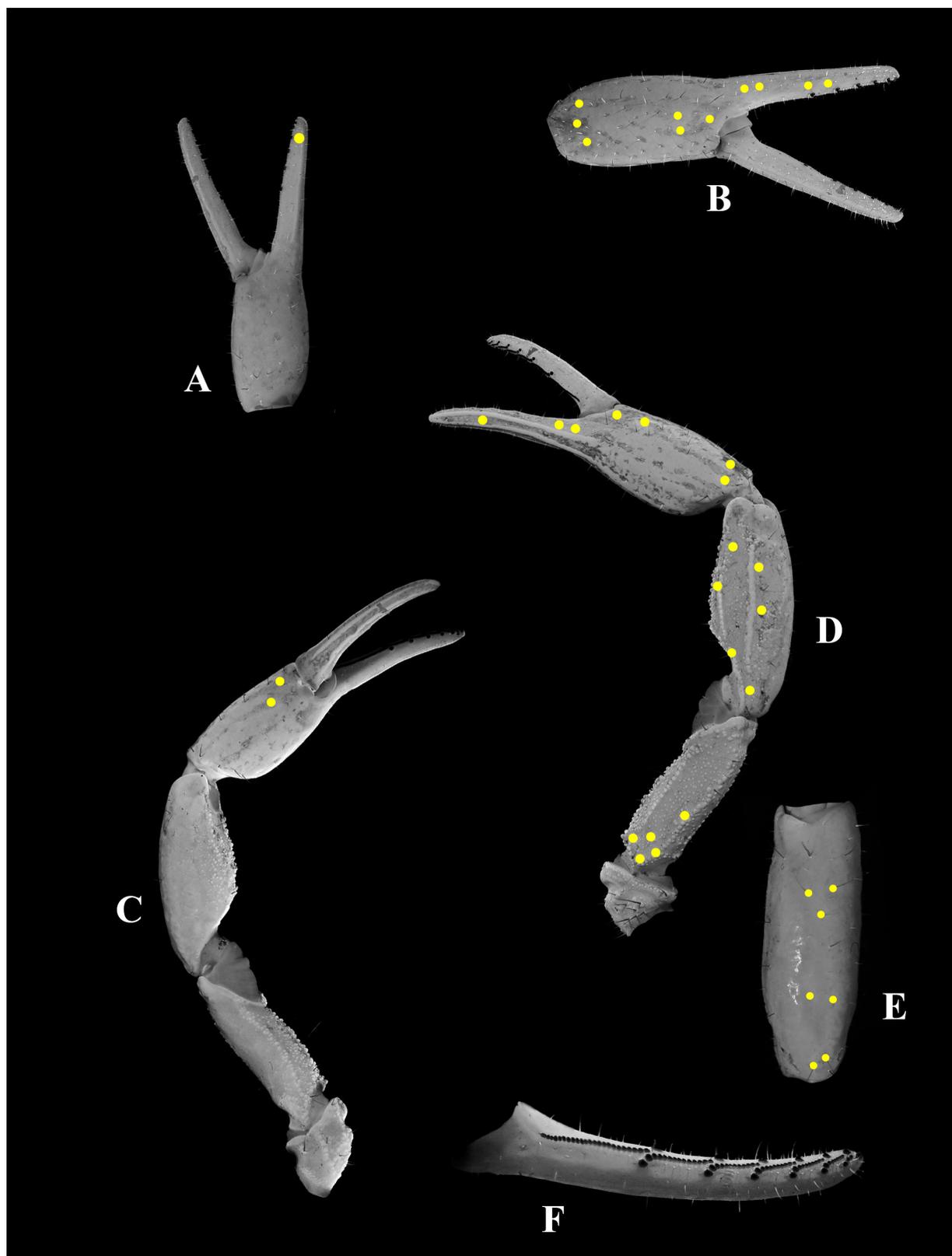


Fig. 6. *Janalychas fulvus* sp.n., female paratype (ZSIK-Ar-10522/18), trichobothria positions: A — chela internal; B — chela exterior; C — pedipalp ventral; D — pedipalp dorsal; E — patella exterior; F — movable finger dentition.

Рис. 6. *Janalychas fulvus* sp.n., паратип самка (ZSIK-Ar-10522/18), расположение трихоботрий: А — хела, изнутри; В — хела, снаружи; С — педипальпа, вентрально; D — педипальпа, дорсально; E — колено педипальпы, снаружи; F — зубы подвижного пальца.

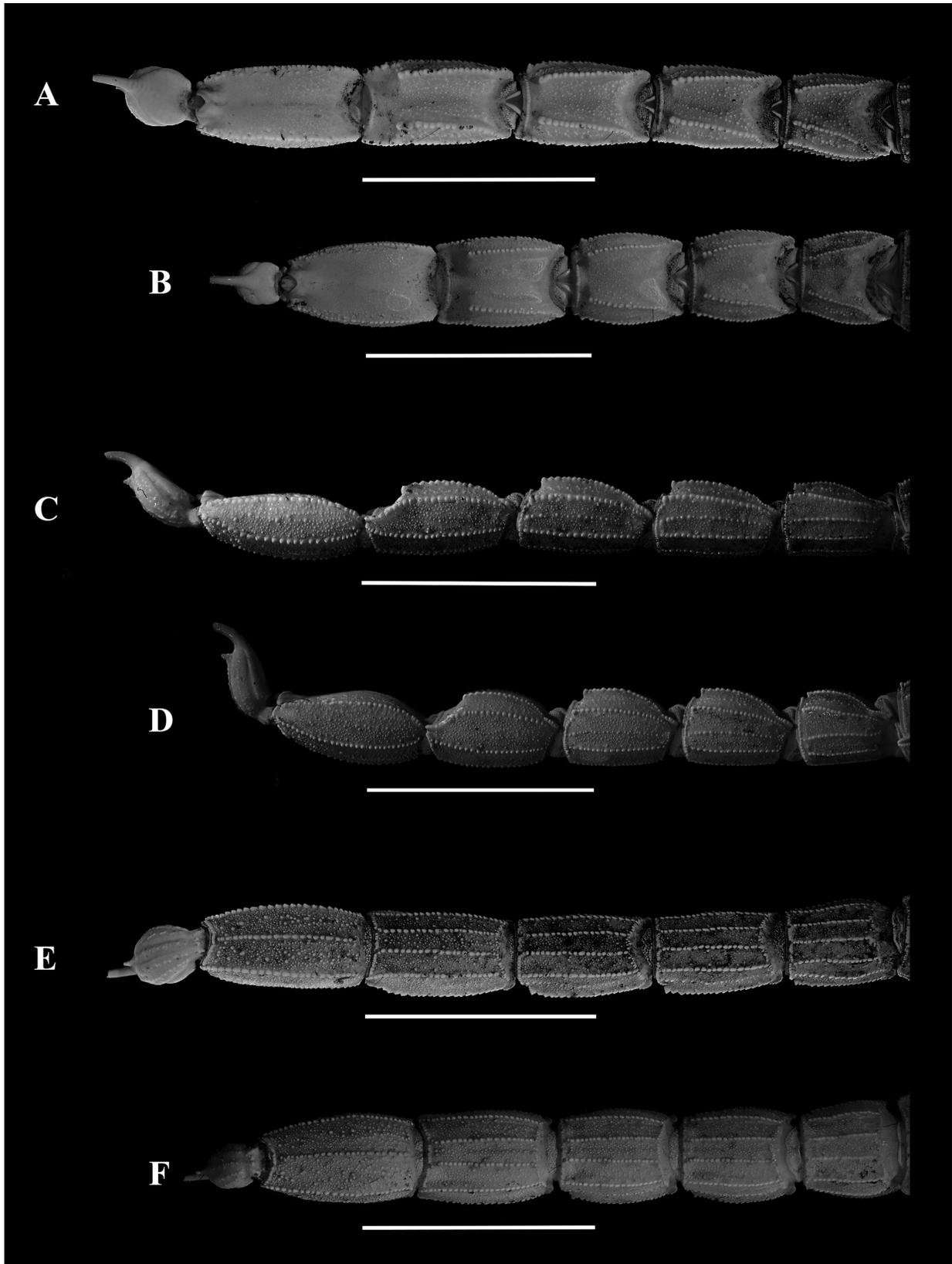


Fig. 7. *Janalychas fulvus* sp.n., metasoma, male holotype (ZSIK-Ar-10521/18) (A, C, E), female paratype (ZSIK-Ar-10522/18) (B, D, F): A, B — dorsal view; C, D — lateral view; E, F — ventral view. Scale bars 10 mm.

Рис. 7. *Janalychas fulvus* sp.n., метасома, голотип самец (ZSIK-Ar-10521/18) (A, C, E), паратип самка (ZSIK-Ar-10522/18) (B, D, F): A, B — дорсально; C, D — латерально; E, F — вентрально. Масштаб 10 мм.

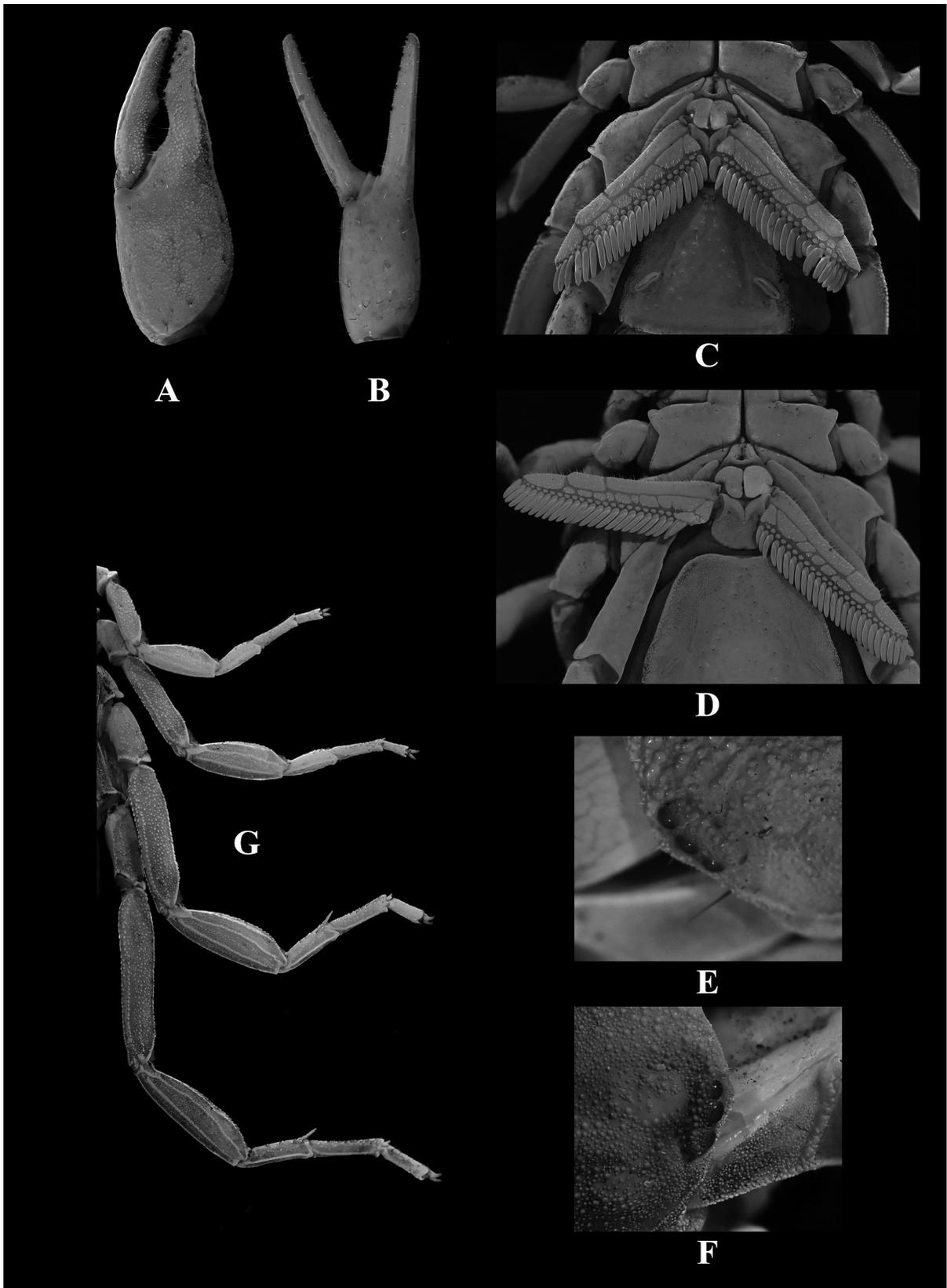


Fig. 8. *Janalychas fulvus* sp.n., male holotype (ZSIK-Ar-10521/18) (A, C, F, G); female paratype (ZSIK-Ar-10522/18) (B, D, E): A, B — chela internal; C, D — pectinal teeth and genital operculum; E, F — lateral eyes; G — legs.

Рис. 8. *Janalychas fulvus* sp.n., голотип самец (ZSIK-Ar-10521/18) (A, C, F, G); самка паратип (ZSIK-Ar-10522/18) (B, D, E): A, B — хела изнутри; C, D — зубцы гребневидного органа и половое отверстие; E, F — боковые глаза; G — ноги.

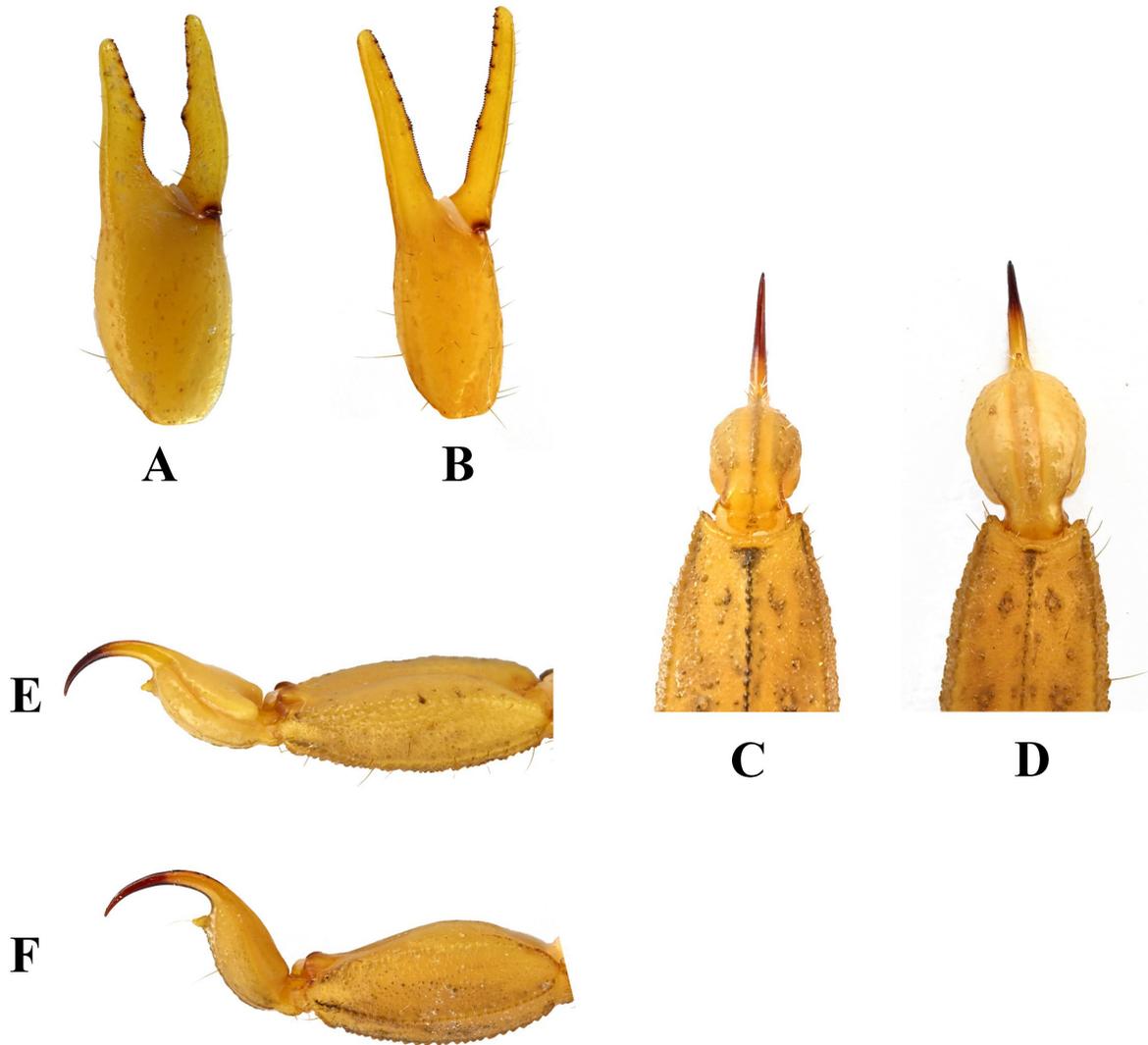


Fig. 9. *Janalychas fulvus* sp.n., male holotype (ZSIK-Ar-10521/18) (A, D, E), female paratype (ZSIK-Ar-10522/18) (B, C, F). A, B — chela exterior; C, D — telson ventral; E, F — telson lateral.

Рис. 9. *Janalychas fulvus* sp.n., голотип самец (ZSIK-Ar-10521/18) (A, D, E), паратип самка (ZSIK-Ar-10522/18) (B, C, F). A, B — хела снаружи; C, D — тельсон, вентрально; E, F — тельсон, латерально.

J. laevifrons; 1:1.5 in *J. shoplanti*; 1:1.3–1.4 in *J. tricarinatus*; 1:1.4–1.7 in *J. granulatus*). (o) The metasoma segment II length and width ratio is 1:1.4–1.5 in males (vs. 1:1.4 in *J. heurtaultae*; 1: 1.5 in *J. farkasi*; 1:1.9 in *J. tricarinatus*; 1:1.2–1.9 in *J. granulatus*; 1:2.6–4.2 in *J. keralaensis*).

The new species is most similar to *J. farkasi* from which it differs in the following characters: mesosomal tergites with one carina, vs. three carinae in *J. farkasi*; denticles present on sternite V, vs. absent in *J. farkasi*.

NATURAL HISTORY. *Janalychas fulvus* sp.n. exhibits sexual dimorphism (Fig. 10A, B), as observed in several other congeners. The species was locally abundant in Maddimadugu and adjacent scrub forests near the Amrabad Tiger Reserve. During intensive field surveys, a total of 126 individuals were recorded within four hours, indicating high local abundance. The species occurs in sympatry with *J. tricarinatus sensu lato* (Fig. 10C) but can be readily distinguished by its distinct coloration, higher number of pectinal teeth (25–26),

and the granulated manus of the pedipalp (vs. smooth in *J. tricarinatus*). The scorpion assemblage in the habitat also includes *Buthoscorpio politus* (Pocock, 1899), *Orthochirus cf. bastawadei* Zambre *et al.*, 2011, *Charmuslaneus* Karsch, 1879, *Hottentotta rugiscutis* (Pocock, 1897), and *H. tamulus* (Fabricius, 1798) (family Buthidae), as well as *Deccanometrus xanthopus* (Pocock, 1897) and *Chersonesometrus fulvipes* (Koch, 1837) (family Scorpionidae). Most individuals of *J. fulvus* sp.n. were detected under ultraviolet light, either resting inside/near bushes (Fig. 10 D) or in open ground areas (Fig. 10E). During the survey in September 2022, four females were observed carrying broods beneath boulders, each sheltered within a shallow, cup-shaped nest (Fig. 10F), with clutch sizes ranging from 22 to 27 juveniles.

DISTRIBUTION. The new species is currently known only from its type locality, situated within the Central Plateau Province (6D) of the Deccan Peninsula biogeographic zone in Telangana, India. The locality lies in the Amrabad Tiger Re-

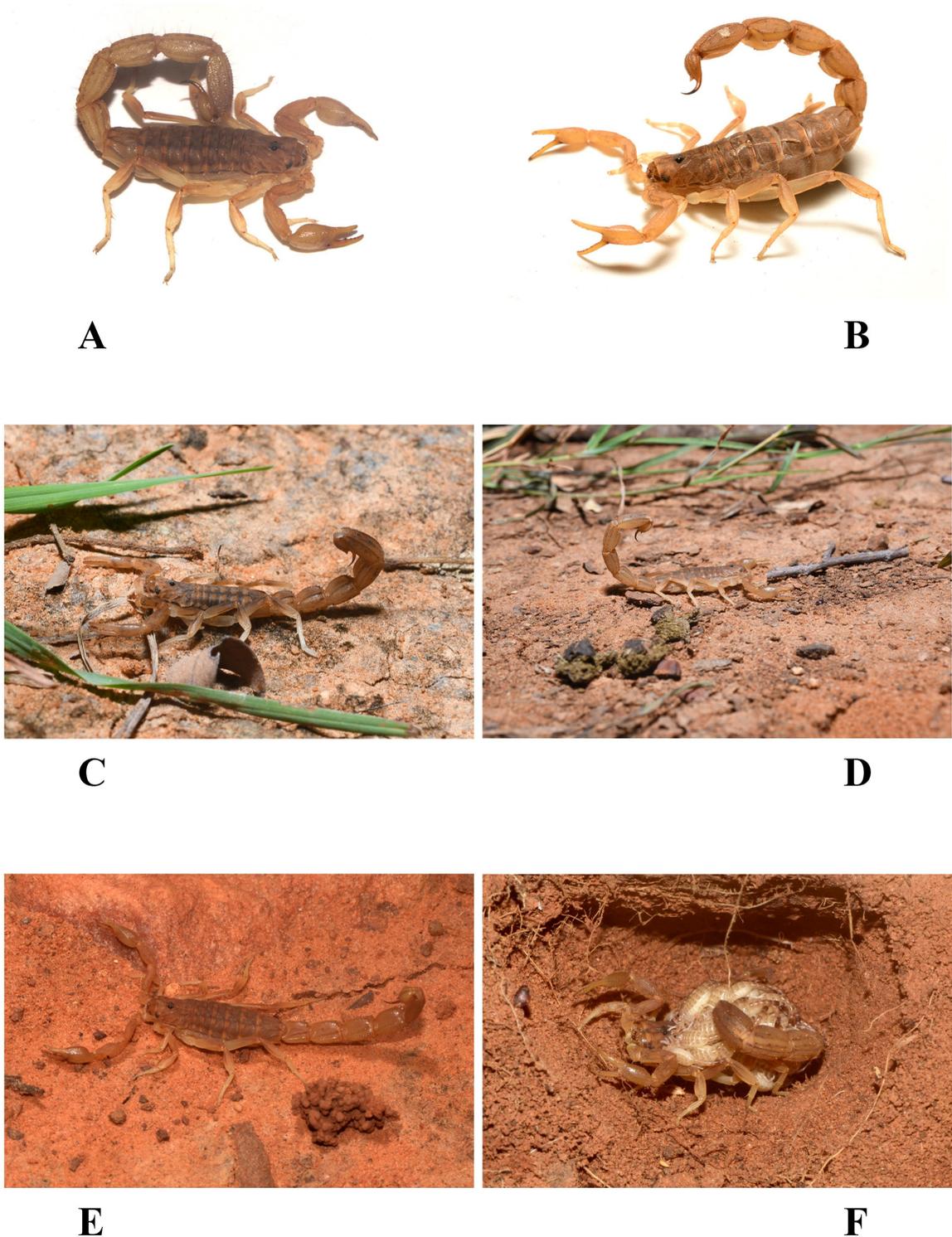


Fig. 10. *Janalychas fulvus* sp.n. in life (A, B, D–F), *J. tricarinatus* from the same habitat (C): A — male; B — female; D — male foraging; E — male in its habitat; F — female with neonates.

Рис. 10. *Janalychas fulvus* sp.n. в природе (A, B, D–F), *J. tricarinatus* в том же биотопе (C): A — самец; B — самка; D — фуражировка самца; E — самец в своем биотопе; F — самка с новорожденными.

serve, which forms part of the Nallamala forest tract within the Eastern Ghats hill ranges. The reserve is characterized by rugged hilly terrain, with deep valleys and gorges shaped by river systems. These steep valleys constitute an important drainage

basin for the Krishna River, a critical source of water for the region's ecosystem. The forests of the area are predominantly tropical dry forests, supporting unique species adapted to the local environmental conditions. This heterogeneous landscape

Table 3. Morphological and meristic data for type specimens of *Janalychas fulvus* sp.n.
Таблица 3. Морфологические морфометрические данные типовых экземпляров *Janalychas fulvus* sp.n.

Specimen No.		Holotype	Paratypes				
		ZSIK-Ar-10521/18	ZSIK-Ar-10522/18	ZSIK-Ar-10523/18	ZSIK-Ar-10524/18	ZSIK-Ar-10525/18	ZSIK-Ar-10526/18
Sl. No.	Sex	M	F	M	M	F	F
1	Total length	55.9	56.0	55.2	52.2	49.6	46.8
2	Carapace length	5.9	6.4	5.9	5.7	5.6	5.2
3	Anterior width	3.2	3.7	3.2	3.1	3.1	3.0
4	Median width	4.6	5.0	4.9	4.4	4.6	4.3
5	Posterior width	5.7	6.3	5.8	5.3	5.3	5.2
6	Median eye to anterior carapace	2.1	2.3	2.2	2.1	2.0	1.9
7	Median eye to posterior carapace	3.2	3.6	3.2	3.2	3.1	2.9
8	1st lateral eye to median eye	2.4	2.6	2.3	2.3	2.3	2.2
9	MOT	1.2	1.3	1.2	1.1	1.1	1.1
10	Inter ocular	0.6	0.6	0.6	0.6	0.6	0.6
11	Mesosoma length	15.0	17.3	16.2	13.8	15.1	14.1
12	Tergite VII L	3.7	3.8	3.7	3.4	3.2	3.2
13	Tergite VII W	5.0	6.1	4.7	4.8	5.1	4.8
14	Metasoma (TL)	35.1	32.3	33.2	32.7	28.9	27.5
15	Metasoma-I: L	4.7	4.1	4.4	4.3	3.7	3.5
16	Metasoma-I: W	3.6	4.1	3.6	3.5	3.7	3.5
17	Metasoma-I: H	2.9	3.2	3.0	2.9	2.9	2.7
18	Metasoma-II: L	5.4	4.8	5.2	5.0	4.2	4.0
19	Metasoma-II: W	3.6	4.0	3.6	3.5	3.7	3.4
20	Metasoma-II: H	3.0	3.3	3.0	2.9	2.9	2.7
21	Metasoma-III: L	5.6	5.0	5.2	5.1	4.5	4.2
22	Metasoma-III: W	3.6	4.1	3.7	3.7	3.6	3.4
23	Metasoma-III: H	3.1	3.4	3.1	3.0	2.9	2.9
24	Metasoma-IV: L	6.4	5.7	6.0	6.0	5.4	5.1
25	Metasoma-IV: W	3.7	4.0	3.6	3.6	3.6	3.5
26	Metasoma-IV: H	3.0	3.3	3.0	3.1	2.9	2.8
27	Metasoma-V: L	6.9	6.6	6.6	6.7	5.9	5.8
28	Metasoma-V: W	3.6	3.8	3.6	3.5	3.3	3.1
29	Metasoma-V: H	2.7	3.0	2.7	2.8	2.8	2.7
30	Telson L	6.0	5.9	5.9	5.6	5.4	5.0
31	Telson W	2.6	1.9	2.5	2.3	1.7	1.5
32	Telson H	1.8	1.7	1.7	1.5	1.5	1.4
33	Vesicle length	3.9	3.7	3.9	3.7	3.4	3.1
34	Aculeus length	2.1	2.1	2.0	1.9	2.0	1.9
35	Pecten L	5.6	5.5	5.7	5.7	5.3	4.5
36	DML	8	8	8	8	8.0	8.0
37	Pectinal teeth L/R	25/24	26/25	26/25	25/26	27/26	24/24
38	Genital operculum L	0.9	1.1	1.0	1.0	1.0	0.9

Table 3 (continued).
Таблица 3 (окончание).

Sl. No.	Specimen No.	Holotype		Paratypes			
		ZSIK-Ar-10521/18	ZSIK-Ar-10522/18	ZSIK-Ar-10523/18	ZSIK-Ar-10524/18	ZSIK-Ar-10525/18	ZSIK-Ar-10526/18
Sex		M	F	M	M	F	F
39	Genital operculum W	1.6	1.7	1.6	1.4	1.4	1.3
40	Pedipalp length	18.3	16.1	17.2	17.7	14.4	13.8
41	Manus L	4.5	3.6	4.3	4.4	3.2	3.2
42	Manus W	2.6	1.8	2.4	2.3	1.7	1.5
43	Manus D	2.7	2.0	2.6	2.6	1.7	1.7
44	Patella L	5.4	5.1	5.2	5.2	4.7	4.2
45	Patella W	1.9	2.0	1.9	1.7	1.7	1.6
46	Patella D	1.6	1.8	1.6	1.5	1.6	1.5
47	Femur L	4.8	4.3	4.4	4.5	3.9	3.7
48	Femur W	1.4	1.5	1.4	1.3	1.3	1.2
49	Femur D	1.3	1.2	1.2	1.1	1.1	1.0
50	Tibia	8.4	7.5	7.7	8.1	6.6	6.3
51	Movable finger	4.3	4.3	4.2	4.2	3.8	3.6
52	Fixed finger	3.2	3.7	3.2	3.21	3.0	2.9
53	Position of median eye	1.5	1.6	1.5	1.5	1.5	1.5
54	Metasoma seg-I L/W ratio	1.3	1.0	1.2	1.2	1.0	1.0
55	Metasoma seg-II L/W ratio	1.5	1.2	1.5	1.4	1.1	1.2
56	Metasoma seg-III L/W ratio	1.6	1.2	1.4	1.4	1.3	1.2
57	Metasoma seg-IV L/W ratio	1.7	1.4	1.7	1.7	1.5	1.5
58	Metasoma seg-V L/W ratio	1.9	1.8	1.8	1.9	1.8	1.8
59	Carapace L/ Pedipalp L	3.1	2.5	2.9	3.1	2.6	2.6
60	Telson L/D ratio	3.4	3.4	3.4	3.6	3.5	3.6
61	Telson L/W ratio	2.3	3.1	2.4	2.4	3.2	3.3
62	Carapace L/ Metasoma L	6.0	5.0	5.7	5.8	5.2	5.3
63	Carapace L/W	1.0	1.0	1.0	1.1	1.1	1.0
64	Vesicle L/Aculeus L	1.9	1.8	1.9	2.0	1.7	1.7
65	Manus L/D	1.7	1.8	1.6	1.7	1.9	1.9
66	Vesicle L/W	1.5	1.9	1.6	1.6	2.0	2.1

harbors rich biodiversity, including several endemic species of flora and fauna, and represents a significant stronghold for tigers, sustaining the largest tiger population in Telangana.

Discussion

The phylogenetic relationships of Indian buthid taxa remain unclear, and efforts are underway to produce

molecular data for every Indian species [Mirza, 2020]. Although *J. fulvus* sp.n. is morphologically closely related to *J. farkasi*, due to the unavailability of its COI gene sequence in the public database, its phylogenetic position and genetic distance with *J. fulvus* sp.n. is not determined in this paper. *J. fulvus* sp.n. constitutes the 10th species of the genus worldwide, making it the 6th species from India. The present report underlines the need for integrative

taxonomic approaches in studying cryptic species like, *J. tricarinatus* in peninsular India [Mirza, 2020]. The obscurity of scorpion distribution data also hinders the study of the biology and ecology of these animals in the country. Similarly, studies regarding population are scanty in case of Indian scorpions, which is crucial for determining their conservation status [Ojanguren-Affilastro *et al.*, 2025].

The discovery of this species from the Amrabad region in Telangana state highlights the ecological value of the region adding to the understanding of cryptic scorpion taxa in the country. This unique yet understudied area sustaining new species highlights the need for dedicated surveys to uncover more enigmatic species. It also emphasises the necessity of addressing the taxonomic gap (also known as the Linnean shortfall) and information about the geographic distribution of species (the Wallacean shortfall), as these gaps hinder the inclusion of unseen biodiversity in conservation planning [Delso *et al.*, 2021].

Compliance with ethical standards

CONFLICT OF INTEREST: The authors declare that they have no conflict of interest.

Ethical approval: No ethical issues were raised during our research.

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