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A NEW SPECIES OF THE GENUS *HETEROMETRUS* EHRENBERG, 1828 (SCORPIONES: SCORPIONIDAE) FROM INDIA WITH NOTES ON ITS NATURAL HISTORY

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Abstract: A distinctive new species of the genus *Heterometrus* Ehrenberg, 1828 is described from the Indian state of Andhra Pradesh. *Heterometrus telanganaensis* **sp. nov.** differs from all Indian species of the genus in being one of the smallest species with a relatively short metasoma.
Key words: Scorpiones, Scorpionidae, *Heterometrus*, new species, description, natural history, India.

Una especie nueva del género *Heterometrus* Ehrenberg, 1828 (Scorpiones: Scorpionidae) de la India, y notas sobre su biología
Resumen: Se describe una especie nueva, muy característica, del género *Heterometrus* Ehrenberg, 1828, sobre material de Andhra Pradesh (India). *Heterometrus telanganaensis* **sp. nov.** difiere de todas las especies indias del género por ser una de las especies más pequeñas con el metasoma relativamente corto.
Palabras clave: Scorpiones, Scorpionidae, *Heterometrus*, nueva especie, descripción, biología, India.

Taxonomy / Taxonomía: *Heterometrus telanganaensis* **sp. nov.**

Introduction

The family Scorpionidae is represented in India by two genera *viz Heterometrus* Ehrenberg, 1828 with 19 species (Tikader & Bastawade, 1983; Fet, 2000; Kovařík, 2004) and the monotypic genus *Rugodentus* Bastawade *et al.*, 2005. *Heterometrus* is the most diverse scorpion genus in India and its species are known from all biotopes in the country. Pocock (1900) attempted to revise the genus but Couzijn (1981) provided a detailed monographic revision with detailed keys (Lourenço *et al.,* 2005). Kovařík (2004) revised the genus adding several new species and made several taxonomic amendments.

Indian scorpion fauna has been revised and studied by several arachnologist in the past and several genera have recently been revised too, but the scorpion fauna of the region remains largely unknown. The reason for this is that scorpion studies among Indian researchers in not popular (Javed *et al.,* 2010b; Mirza & Sanap, 2010). In the course of an ongoing study on scorpion fauna of Andhra Pradesh, specimens collected from Telangana region (Fig. 1) did not match the know species reported from the state by Javed *et al.* (2010a, 2010b). Further study revealed that the species shows resemblance to the genus *Heterometrus* but did differ in several aspects from all the known species from India. Therefore, we herein describe it as a new species.

Methods

Specimens in the field were collected by day search by excavating their burrows and later preserved in 70% ethyl alcohol. These were later identified and compared with the descriptions and illustrations provided in Tikader & Bastawade (1983) and Kovařík (2004). Photographs of live specimens were taken with a Canon super macro digital camera, while photos of the preserved material were taken with a same camera mounted on the eye piece of Olympus SZX 12 stereomicroscope illuminated from a 100-watt light source; only minor colour corrections were made to the pictures; line diagrams were drawn with the help of the camera lucida. Maturity and sex of the specimens was determined by lifting the entire genital operculum at the base with the help of a needle (in case of holotype, it can be lifted easily). Measurements were taken with the help of Mitutoyo™ digital calipers. Descriptive terms and abbreviations follow Stahnke (1970), Sissom (1990) and Hjelle (1990). Type specimens are deposited in the collections of the Zoological Survey of India, Freshwater Biology Regional Center, Arachnid section (ZSI/FBRC/A), Hyderabad.

Taxonomic treatment

Family Scorpionidae Latreille, 1802

Genus *Heterometrus* Ehrenberg, 1828

Heterometrus telanganaensis Javed, Mirza, Tampal *et* Lourenco, **sp. nov.**
Fig. 4-8, Table I.

TYPE LOCALITY: India, Andhra Pradesh, Warangal District, Regonda.

TYPE MATERIAL: India, Andhra Pradesh, one holotype ♀ and one paratype each of sub-adult ♂, sub-adult ♀), Regonda (18°14´ N, 79°49´ E), Warangal District, 24 September and

Table I. Measurements of the types of *Heterometrus telanganaensis* sp. nov. (morphometrics in mm)

	Holotype ♀ ZSI/FBRC/A-32	Paratype sub-adult ♂ ZSI/FBRC/A-30	Paratype sub-adult ♀ ZSI/FBRC/A-31
Total length	**66.53**	**36.94**	**34.26**
Carapace:			
length	11.59	5.61	5.72
anterior width	7.34	4.32	4.31
posterior width	9.04	4.79	4.93
Mesosoma Length	23.76	15.92	12.90
Metasoma length	23.19	11.43	11.70
Metasomal segment I:			
length	3.60	1.82	1.75
width	4.59	1.98	1.98
Metasomal segment II:			
length	3.99	2.01	2.04
width	3.84	1.84	1.92
Metasomal segment III:			
length	4.10	2.02	2.08
width	3.93	1.75	1.78
Metasomal segment IV:			
length	5.01	2.18	2.26
width	3.51	1.55	1.53
Metasomal segment V:			
length	6.49	3.40	3.57
width	3.29	1.51	1.52
Telson length	7.86	3.99	3.94
Aculeus length	3.56	2.02	1.98
Pedipalp:			
Femur:			
length	6.27	3.06	3.32
width	3.62	1.46	1.50
Patella:			
length	7.93	3.86	3.64
width	3.80	1.62	1.62
Chelae:			
length	16.50	6.14	6.24
width	8.36	3.38	3.49
Movable finger length	9.56	4.31	4.26
Pectinal teeth L/R	11/11	13/13	10/10

27 October 2010, coll. by Narsingh Goud, deposited in the collection of the Zoological Survey of India, Freshwater Biology Regional Center, Arachnid section (ZSI/FBRC/A), Hyderabad (ZSI/FBRC/A-30-32).

ETYMOLOGY: Named after the region, Telangana, where the specimens collection site Regonda is situated.

DIAGNOSIS: ***Heterometrus telanganaensis*** **sp. nov.** is a species of small size (66.53 mm) in relation to the genus (Table I); metasoma shorter than mesosoma; pectines pinkish brown, 10-13 teeth; moveable finger shorter than carapace length; manus covered with smooth, suppressed granules of irregular shape and size on dorso-external aspect along with few merged elongated tubercle; carapace not much narrow anteriorly, anterior margin with a 'U' shaped pronounced concavity; overall less hirsute in relation to other members of the genus; ventral spine-like setae on metatarsus I-II (3-4) & III-IV (4-5).

DESCRIPTION (Holotype female):

Coloration. In life (Fig. 4a), anterior carapace and metasoma in a shade of reddish brown; mesosoma almost black. Telson creamish brown. Legs yellowish brown and pedipalps in a shade of reddish brown. Fixed, movable fingers and carinae dark black. In preserved specimens (Fig. 5a–b), carapace (median to posterior), mesosoma much lighter brown to black; metasoma lighter brown as compared to live coloration; with faint yellow variegations all over the carapace, mesosoma and metasoma. Legs and telson yellowish; fingers of chelae dark black; chelicerae yellow with faint brownish reticulations, fingers reddish brown.

Carapace. Smooth on anterior region between lateral eyes, while coarsely granular on lateral and posterior region; posterior margin smooth, while lateral margin crenulated; anterior margin with a strongly pronounced concavity; anterior and posterior median furrow moderately developed; ocular tubercle fairly distinct in the centre of the carapace. Superciliary carinae present, extends posteriorly as well as anteriorly up to the concavity on anterior margin. Three pair of lateral ocelli; median lateral ocelli close to the anterior one; posterior lateral ocelli smallest; rostrolateral margin without a notch next to the posterior lateral ocelli. Median ocelli higher than superciliary carinae and situated anteriorly in the ratio of 1:1.93 (Fig. 6a).

Mesosoma. Tergites I-VII smooth, glossy and acarinate. Sternite VII with a pair of weakly developed ventrolateral carinae. Sternum pentagonal, longer than wide with a median furrow on the basal region (Fig. 7a). Genital operculum smooth, wider than long. Basal piece have depression at the center of the anterior margin (Fig. 7b). Pectinal tooth count 11/11 (Fig. 7a & c).

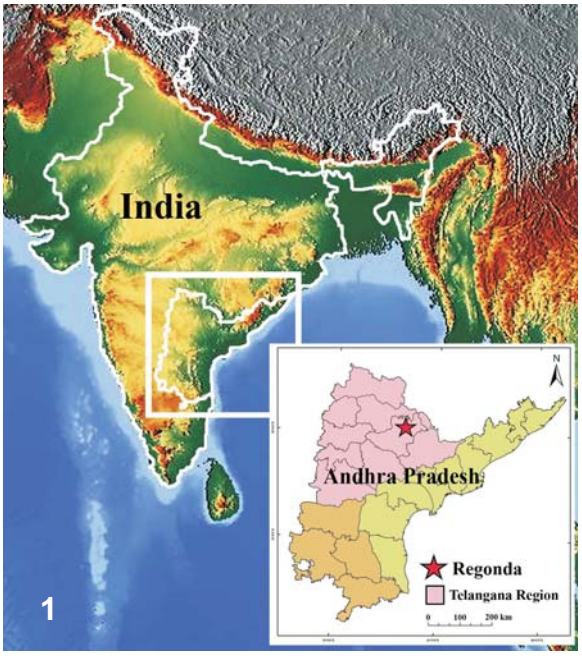
Chelicerae. Fixed finger with two teeth, the distal one large and stout, basal tooth bicusp as if made up of two fused teeth. The movable finger bears four teeth; the basal and the subdistal tooth smaller than the sub-basal and distal tooth.

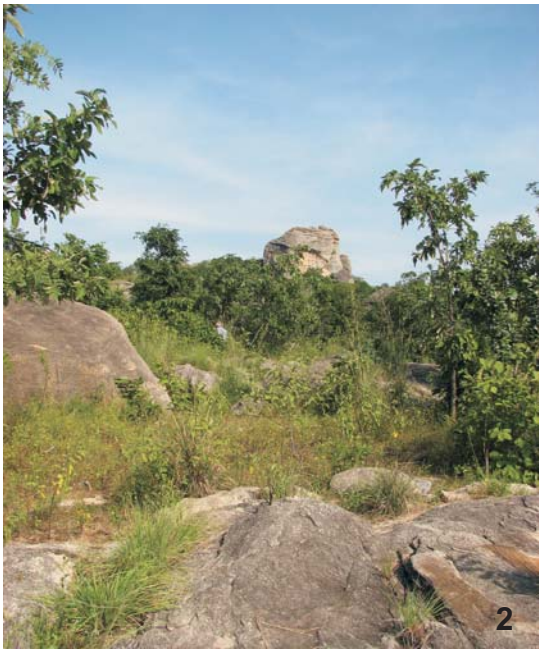
Pedipalp. Manus covered with smooth, suppressed granules of irregular shape and size on dorso-external aspect, while few of them merged to form elongated tubercle. Carinae prominent on dorsal, external, internal margin, movable and immovable fingers. Fingers coarsely granular (Fig. 6c & d). Patella sparsely tuberculated on dorsal, ventral posterior and external region, rest smooth; carinae smooth. Femur with enlarged pointed granules on internal, dorsal and external region; carinae tuberculated on dorsal region, rest smooth. Stridulating organs comprising of macrosetae present on coxae. Trichobothriotaxy of type C; orthobothriotaxic (Vachon 1974); femur with 3 trichobothria, patella with 19, and chela with 26 (Fig. 8a-g).

Legs. Only prolateral pedal spurs are present; stout spine-like setae on ventral surface of tarsi in the ratio of 3/4 (leg I-II) and 4/4 (III-IV) (Fig. 7d & e). Leg I coxae bears stridulating organs comprising of macrosculpture.

Metasoma. Shorter than mesosoma and more than twice the length of carapace; segment I-IV bearing 8 smooth (ventral) to slightly granular (dorso-lateral & dorsal) and well developed carinae; segment V with 7 carinae. Metasomal segment V with a row of enlarged serrated ventro-lateral carinae (Fig. 6b); tubercular lateral carinae extend half the length of the segment; ventro-median carinae bear enlarged granules, broken into sparse tubercles towards posterior end; anal crest well developed. Intercarinal area smooth. Telson smooth on lateral aspect; four ventral carinae formed by spinoid granules (Fig. 6b).

AFFINITIES: ***Heterometrus telanganaensis*** **sp. nov.** can be distinguished from all Indian *Heterometrus* species, and in particular from *H. fulvipes* C. L. Koch, 1837, the most geographically close and resembling species (both ones have chela ratio between 1.7-1.9 for both sexes) by the following





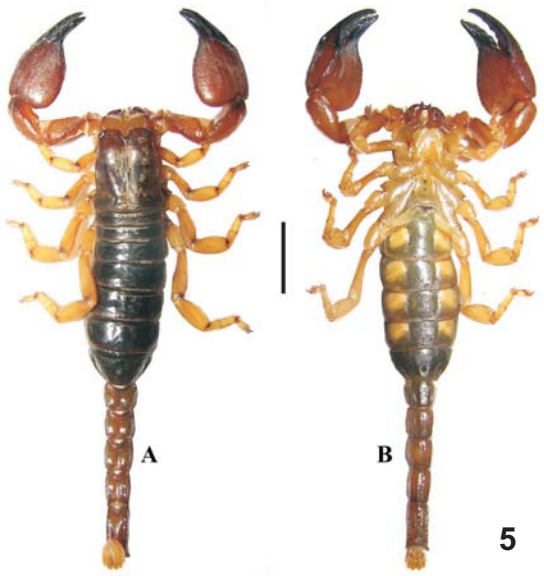


Fig. 1. Map depicting the type locality of *Heterometrus telanganaensis* sp. nov. at Regonda,Warangal District, Andhra Pradesh, India. **Fig. 2.** *Heterometrus telanganaensis* sp. nov., habitat over view. Photo by S. M.Maqsood Javed. **Fig. 3.** *Heterometrus telanganaensis* sp. nov. burrow top view showing several openings of different sizes. (Scale bar = 50mm). Photo by S. M. Maqsood Javed. **Fig. 4.** *Heterometrus telanganaensis* sp. nov. A. Habitus, holotype female (ZSI/FBRC/A-32). B. Habitus, paratype sub-adult male (ZSI/FBRC/A-30). (Scale bar = 5mm). Photos by S. M. Maqsood Javed. **Fig. 5.** *Heterometrus telanganaensis* sp. nov., holotype female (ZSI/FBRC/A-32). A & B. Dorsal and ventral view. (Scale bar = 10mm).

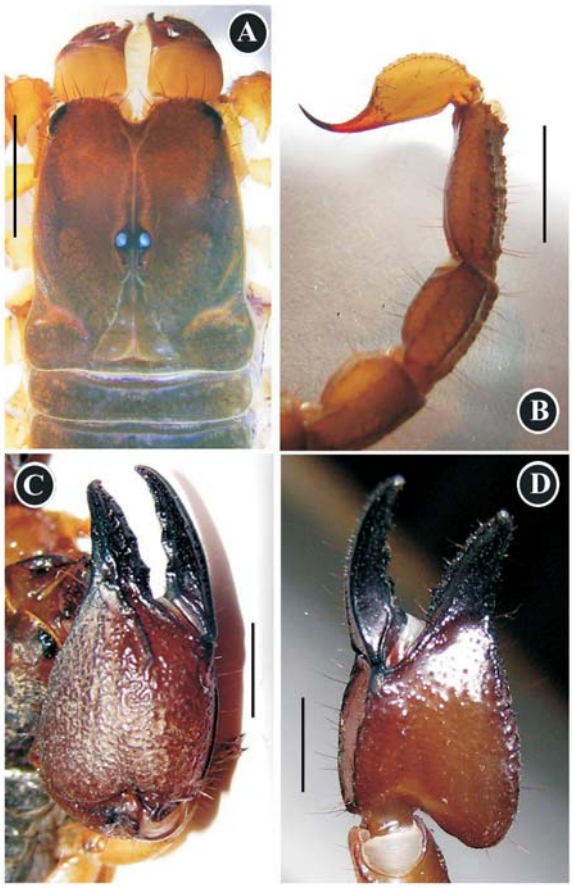


Fig. 6. *Heterometrus telanganaensis* sp. nov., holotype female (ZSI/FBRC/A-32). **A.** Carapace and tergites (I & II), dorsal view. **B.** Telosn and metasoma segments (IV & V), lateral view. **C** & **D.** Chela, dorso-external and ventral view, showing colouration and arrangement of tubercles. (Scale bar = 5mm).

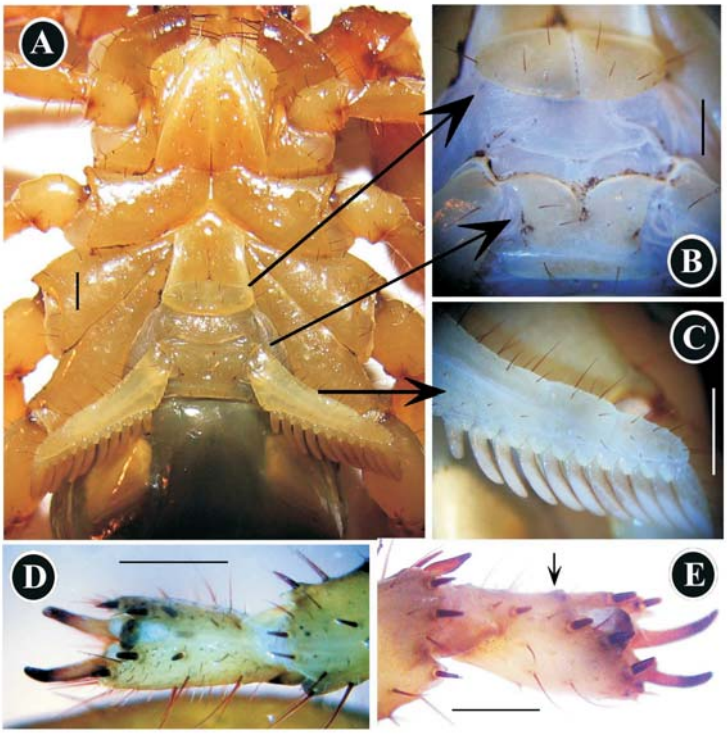


Fig. 7. *Heterometrus telanganaensis* sp. nov., holotype female (ZSI/FBRC/A-32). **A.** Coxae (I-IV), sternum, genital operculum, basal piece and pectinal teeth, ventral view. **B.** Genital operculum slightly raised and basal piece close-up, ventral view. **C.** Pectinal teeth close-up, ventral view. **D** & **E.** Leg I and IV tarsus, showing arrangement and number of ventral spines (arrow showing broken spine in leg IV). (Scale bar = 1 mm).

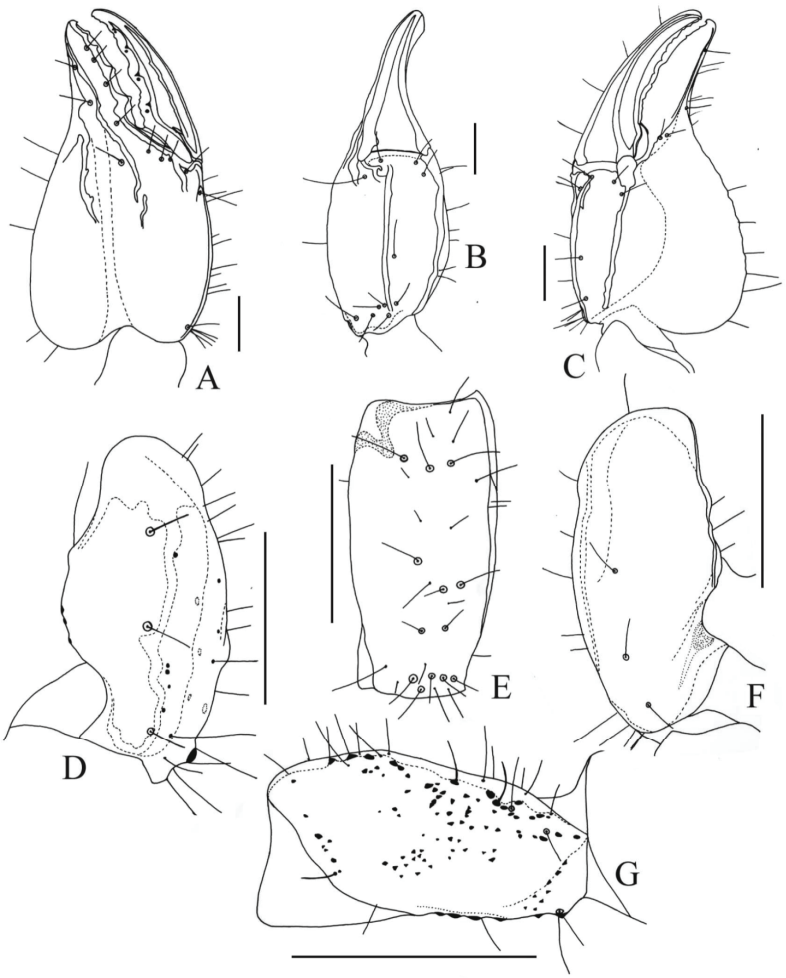


Fig. 8. *Heterometrus telanganaensis* sp. nov., holotype female (ZSI/FBRC/ A-32**). A-G.** Trichobothrial pattern**. A-C.** Chela, dorso-external, dorso-lateral and ventral view. **D-F.** Patella, dorsal, exter-nal and ventral view. **G.** Femur, external view. (Scale bar = 5 mm).

characters: (i) small size 66.53 mm (*vs. H. fulvipes,*70-100 mm); (ii) colouration on pedipalp, metasoma and anterior carapace in shade of reddish brawn, mesosoma and median to posterior carapace dark brown to almost black (*vs.H. fulvipes,* uniformly reddish brown to black); (iii) metasoma shorter than mesosoma (*vs. H. fulvipes,* much bigger); (iv) pectines pinkish brown, 10-13 teeth (*vs. H. fulvipes,* yellowish, 12-18 in both sexes); (v) moveable finger shorter than carapace length (*vs. H. fulvipes,* bigger); (vi) median eye ratio 1:1.93 (*vs. H. fulvipes,* 1:1.12); (vii) manus with prominent black carinae on the distal half of dorso-lateral region and covered with smooth, suppressed granules of irregular shape and size on dorso-external aspect along with few merged elongated tubercle (*vs. H. fulvipes,* devoid of carinae and covered by large, rounded granules); (viii) overall less hirsute (*vs. H. fulvipes,* much hirsute); (ix) genital operculum wider than long (*vs. H. fulvipes,* longer than wide) (data of *H. fulvipes* after Kovařík, 2004; Tikader & Bastawade, 1983).

VARIATION: The sub-adult male and female paratypes match the female holotype in all respects except for differing in morphometry (Table I); smooth manus; pointed teeth on chelicerae fingers; overall colouration; pectinal tooth count 10/10 (female) and 13/13 (male); ventral spine-like setae on metatarsus I-V: 4/4,4/4, 4/5 & 4/5. The sub-adult male further differs from holotype by having thin more hirsute chela and telson; more prominent ventro-lateral serrated carinae on metasomal segment V.

NATURAL HISTORY: The type locality Regonda (18°14´ N, 79°49´ E) is located in the semi-arid part of Warangal District in Telangana region, Andhra Pradesh. It has an average elevation of 302 m (990 feet). Warangal has a predominantly hot and dry climate. Summer starts in March, and peak in May with average high temperatures in the 42°C (108°F) range and in winter ranges from 22-23°C (72-73°F). The monsoon arrives in June and lasts until September with about 550 mm (22 in) of precipitation. ***Heterometrus telanganaensis* sp. nov.** is a burrowing species as others of the genus namely *H. fulvipes*, *H. indus, H. swammerdami, H. xanthopus* and *H. phipsoni* (Prendini *et al.,* 2003; Mirza & Sanap, 2009). The burrows were found on a hillock surrounded by agricultural fields (Fig. 2). The type specimens were collected from their respective burrows, which were constructed in a shady area (Fig. 3). The individual burrows were ca. 20 to 25 mm wide at the entrance and were about 150 mm in depth. Along with this we recorded few brooding borrows with multi-opening (Fig. 3). The single entrance burrow leads to a tunnel parallel to the surface and eventually slopes at the end into a wider chamber. But, in case of multi-opening borrow different channels linked randomly with the main channel, which leads to the wider chamber.

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