

**DESCRIPTION OF A NEW SPECIES OF SCORPION  
OF THE GENUS *Heterometrus* EHRENBERG, 1828  
(SCORPIONES: SCORPIONIDAE) FROM THE  
WESTERN GHATS, INDIA**

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**ABSTRACT**

A new species of scorpion belonging to the genus *Heterometrus* Ehrenberg, 1828 is described from the Southern Western Ghats of Tamil Nadu, India. *Heterometrus atrascorpius* sp. nov. differs from all other known species of the genus reported from India, in particularly from *Heterometrus beccaloniae* Kovaøík, 2004 by bearing the following set of characters: moderate size in comparison to other members of the genus 91.68 (holotype); body coloration dark blackish brown both dorsally and ventrally, with the exception of the vesicle which is yellowish white and the leg tarsi which are paler; pectines, sternum and pectinal basal piece yellowish brown; pedipalp manus tuberculate with carina; patella and femur dorsally tuberculate; pedipalp femur longer than twice as wide; manus length/width ratio 3.22; pectines with 16-16 teeth.

**INTRODUCTION**

The family Scorpionidae is represented in India by two genera viz *Heterometrus* Ehrenberg, 1828 with 20 species (Tikader & Bastawade 1983; Fet & Lowe 2000; Kovaøík 2004; Javed *et al.* 2010) and the monotypic genus *Rugodentus* Bastawade *et al.*, 2005. *Heterometrus* is the most diverse scorpion genus in India and with its species are known from all biotopes in the country, finding its maximum diversity in the state of Tamil Nadu with 12 species (Kovaøík 2004). Though Pocock (1900) and Couzijn (1981) attempted to revise the genus, much of its taxonomy remained in flux (Lourenço *et al.* 2005) until recent revision by Kovaøík (2004). The genus still remains poorly known as only eight new species were described in the last seven years (Kovaøík 2004; Javed *et al.* 2010).

Indian scorpion fauna has remained largely unknown due to the fact that scorpion studies among Indian researchers is not popular (Mirza & Sanap 2009, 2010; Javed *et al.* 2010). The Western Ghats is a biodiversity hotspot and is known for its endemic fauna (Myers *et al.* 2000). However, this area is still relatively unexplored at least as far as its unique invertebrate fauna is concerned. With respect to this, a project was initiated to study the scorpion and mygalomorph (Araneae) fauna of the Western Ghats for which we visited Tamil Nadu. Material collected of the genus *Heterometrus* from this trip represents an undescribed species which is herein described and illustrated.

#### METHODS

Specimens in the field were collected by daily search by turning boulders and subsequently preserved in 70% ethyl alcohol. These were later identified and compared with the descriptions and illustrations provided in Tikader & Bastawade (1983) and Kovarík (2004). Photographs of live specimens were taken with a Nikon D90 camera with a 60 mm Nikon macro lens. Specimens were examined using a Labomed™ CSM2 stereo-binocular microscope with the aid of an Ultra Violet light source for observing cuticular morphology.

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 Javed *et al.* (2010). Type specimens are deposited in the collections of the Bombay Natural History Society (BNHS), Mumbai, India.

#### Taxonomy

##### Family Scorpionidae Latreille, 1802

##### Genus *Heterometrus* Ehrenberg, 1828

##### *Heterometrus atrascorpius* sp. nov. Mirza, Joshi, Desouza & Sanap, 2012

##### *Heterometrus beccaloniae* Kovarik 2004:4,6 & 7 (in part)

**Type material:** 1 adult female holotype, BNHS Sc- 55, collected from Bokkapuram village near Masinagudi, Nilgiri District, Tamil Nadu, India (11°32'46.15"N, 76°40'17.76"E, 912 m asl) on 25 January 2011; collected by G. Desouza and N.S. Achyuthan. 1 adult male paratype, BNHS Sc-56, collected by R. Sanap and Z. Mirza; 1 immature female paratype, BNHS Sc- 57, collected by D. Joshi and S. Chikane, same data of holotype.

**Etymology:** The specific epithet is a combination of two Latin words 'atra' meaning dark and 'scorpius' meaning scorpion, referring to the dark coloration of the scorpion in life.

**Diagnosis:** moderate size in comparison to other members of the genus 91.68 (holotype); body coloration dark blackish brown both dorsally and ventrally, with the exception of the vesicle which is yellowish white also the leg tarsi is paler; sternum and basal piece yellowish brown; manus tuberculate with carina; patella

and femur dorsally tuberculate; pedipalp femur longer than twice as wide; manus length/width ratio 3.22; pectines 16-16.

**Relationship:** *Heterometrus atrascorpius* **sp. nov.**, can be distinguished from other *Heterometrus* species, and in particular from *H. beccaloniae*, the most geographically and morphologically close species of the genus by the following set of characters: (i) mesosomal sternites bear the same dark coloration as the carapace and tergites; *H. beccaloniae* has sternites brownish (Kovarik 2004), (ii) vesicle yellowish white; in *H. beccaloniae* vesicle is reddish yellow (yellow in juveniles) (Kovarik 2004), (iii) pedipalp chela more elongate length/width ratio is 3.22 (female holotype); in *H. beccaloniae* it is 2.38 (female holotype), (iv) pedipalp femur of female longer than twice as wide; in *H. beccaloniae* pedipalp femur of female is very wide, only twice longer than wide (Kovarik 2004), (v) third and fourth leg formula is 4:6; in *H. beccaloniae* it is 5–6:6–7, (vi) smaller size 65 mm (male) 76–91 mm (female); 115 mm (female) in *H. beccaloniae*, (vii) pedipal femur, patella and manus bear large conical tuberculate granules throughout uniformly vs. granules more depressed on manus of *H. beccaloniae*, (viii) dorsal carinae on pedipal patella well define vs. poorly developed in *H. beccaloniae*.

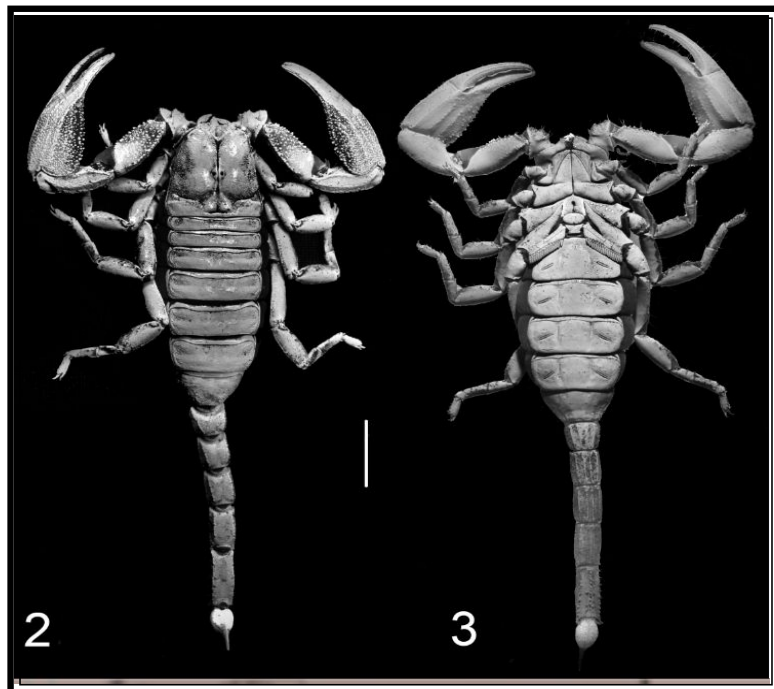
Description based on female holotype BNHS SC- 55. Measurements as in Table 1.

**Coloration** (in preservation): Body basically dark blackish-brown. Carapace, mesosoma and metasoma blackish-brown. Coxapophyses and sternum light-brown with dark-brown reticulations; genital operculum and pectines yellowish to light brown. Telson yellowish-white; aculeus reddish-brown at the base and blackish at the tip. Chelicerae reddish-yellow with variegated pigmentation; fingers blackish-brown with darker teeth. Pedipalps: femur, patella and chela blackish-brown. Legs blackish brown on proximal segments and only leg tarsi brownish.

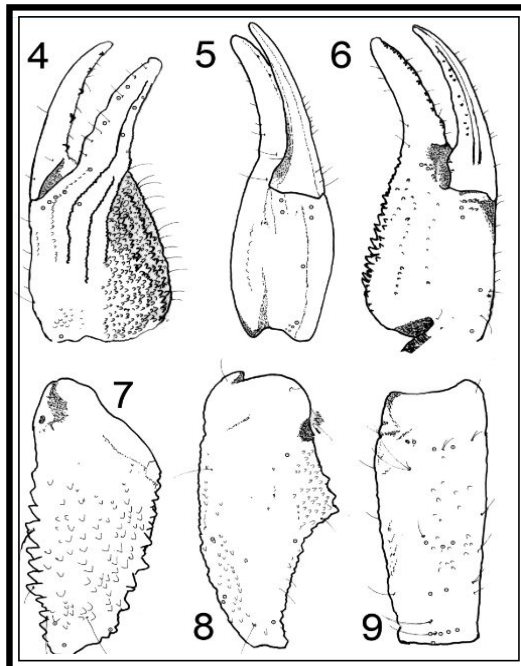
**Morphology:** Carapace lustrous and acarinate with granulation on lateral posterior margins (Figure 2); anterior margin with a strongly pronounced indentation; carinae absent; posterior furrows moderately to strongly pronounced; median ocular tubercle distinct in the centre of the carapace; three pairs of moderate to small lateral eyes, about half the size of median eyes. Mesosoma: sternum pentagonal (see figure 22 Soleglad & Fet 2003), higher than wide. Tergites lacking carinae and smooth (lustrous), with some sparse, thin granulation on lateral portion of all tergites. Venter: genital operculum formed by two plates with a semi-oval shape. Pectines: pectinal tooth count 16–16 (Figure 3); fulcra strongly developed. Sternites smooth and shiny, with two longitudinal parallel furrows on III to VI; spiracles linear and conspicuous. Metasoma with ventral carinae on segments I to III smooth, granular on segment IV; granulation becomes strongly spiniform on segment V; ventral and latero-ventral carinae intensely spinoid on V; all intercarinal surfaces weakly granular to smooth. Telson markedly elongated with four ventral carinae formed by spinoid granules; aculeus shorter than vesicle and moderately curved. Cheliceral dentition characteristic of the Scorpionidae (Vachon, 1963); movable finger with one subdistal tooth, and conspicuous basal teeth. Pedipalps with moderate to strong granulation; femur with four carinae, almost complete; patella with a dorsal carina complete,



**Figure-1.** Dorso-lateral view of adult female *Heterometrus atrascorpius* sp. nov. in life



**Figure-2-3.** Monochrome image of female holotype *Heterometrus atrascorpius* sp. nov. under UV light to show surface morphology; 2. dorsal view, 3. ventral view. Scale 10 mm.



**Figures-4-9.** *Heterometrus atrascorpius* sp. nov. holotype female. Trichobothrial pattern. 4-6. Chela (4. dorso-lateral, 5. ventral, 6. ventro-internal). 7. femur dorsal view, 8. patella dorsal and 9. patella external view.

**Figure-11.** Location of the type locality in Western ghats



**Figure-10,** Habitat at the type locality of *Heterometrus atrascorpius* sp. nov.

**TABLE 1.** Morphometric values (in mm) of the holotype and paratypes of *Heterometrus atrascorpius* sp. n. and holotype of *Heterometrus beccaloniae* Kovarik, 2004. (I recommend adding depth for metasomal segments, telson, and pedipalp segments)

	<i>Heterometrus atrascorpius</i> sp. nov.			<i>Heterometrus beccaloniae</i> (female) Kovarik, 2004
	holotype @ BNHS Sc- 55	paratype BNHS Sc- 56	paratype BNHS Sc- 57	
<b>Total length</b>	91.68	65.44	76.22	115
Carapace:-				
length -	12.68	10.46	12.94	18.30
anterior width -	08.32	06.20	08.74	--
posterior width	12.56	10.44	13.20	19.00
<b>Mesosomal length</b>	29.80	20.94	20.80	--
Metasomal segment I:				
length -	04.30	03.80	04.68	07.00
width -	04.12	03.56	05.04	07.70
Metasomal segment II:				
length -	05.16	04.06	05.18	07.40
width -	03.80	03.34	04.58	06.90
Metasomal segment III:				
length -	05.70	04.28	05.68	08.00
width -	03.46	03.14	04.30	06.60
Metasomal segment IV:				
length -	06.68	05.20	06.68	09.10
width -	03.44	02.88	03.88	05.70
Metasomal segment V:				
length -	08.06	06.90	10.08	13.00
width -	03.36	02.60	03.28	13.00
<b>Telson -</b>				
length	09.30	09.80	10.18	13.30
<b>Pedipalp:-</b>				
Femur length -	10.48	07.30	10.68	15.90
Femur width -	04.30	02.56	04.74	07.90
Patella length -	09.68	07.10	11.36	15.70
Patella width -	04.78	03.92	05.20	07.60
Chela length -	18.54	16.40	20.18	32.50
Chela width	05.74	06.30	08.62	13.60
<b>Movable finger: length</b>	09.98	10.72	11.44	18.50
<b>Pectines L/R</b>	16/16	17/17	15/15	15/16

and spinoid granules on the internal aspect; chela with six carinae; dorsointernal with spinoid granules; dorso-external aspect of the manus strongly tuberculate. Dentate margin on fixed and movable fingers with a series of granules. Trichobothriotaxy of type C; orthobothriotaxic (Vachon, 1974); femur with 3 trichobothria, patella with 19, and chela with 26 (Figures 4–9). Legs: tarsi of legs III and IV with four internal and six external spines arranged in series.

**Natural History and Habitat:** The type locality of *Heterometrus atrascorpius* **sp. nov.** is located on the outskirts of the Nilgiri hills in the Western Ghats of Tamil Nadu. The habitat is dominated by thorny shrubs and many large boulders with sparse human settlements (Figure 10). About six individuals of the new species were found under large boulder. Most of these boulders were embedded in the soil and a small half moon-shaped burrow entrance as seen in *Heterometrus phipsoni* (Mirza & Sanap 2009) led to a small chamber/cavity under the boulder. The holotype female was found under a large flat boulder in a small cavity, perhaps not a permanent hideout as other specimens were observed in larger chambers. Partly consumed remains of beetles were found in some of these chambers. *Lychas* sp. and *Hottentotta* species (Buthidae) were found in sympatry with the new species.

#### DISCUSSION

Kovarik (2004) described *Heterometrus beccaloniae* based on one adult female holotype from Kavalore, Javadu Hills, Vellore District, Tamil Nadu in addition to one immature and seven juvenile specimens from Mudumalai National Park, Nilgiri hills, Tamil Nadu. These two localities are nearly 500km apart and are two different biotopes experiencing drastically different ecological parameters. The specimens collected from Mudumalai National Park are juveniles and juveniles cannot be used to assign that population to a particular species unless genetic data is available considering the fact that characters necessary to identify species are not well developed in juveniles. Thus it is not clear how Kovarik (2004) assigned the specimens from Mudumalai National Park to be conspecific with *H. beccaloniae*. To complicate matters, Kovarik (2004) has explicitly or implicitly failed to provide details of the paratypes. We hereby attribute paratypes of *H. beccaloniae* from Mudumalai National Park to be conspecific with *Heterometrus atrascorpius* **sp. nov.**

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