

A NEW SPECIES OF *BUTHACUS* BIRULA, 1908 (SCORPIONES, BUTHIDAE) FROM INDIA

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Abstract: The genus *Buthacus* Birula, 1908 is reported for the first time from the Republic of India and a new species described based on specimens collected in the Thar Desert in western India. This record represents the easternmost known area for the genus.

Key words: Scorpiones, Buthidae, *Buthacus*, new species, India.

Una especie nueva de *Buthacus* Birula, 1908 (Scorpiones, Buthidae) de la India

Resumen: El género *Buthacus* Birula, 1908 se cita por primera vez de la India, y se describe una especie nueva a partir de especímenes recogidos en el desierto de Thar, en el oeste del país. Se trata de la cita más oriental conocida para este género.

Palabras clave: Scorpiones, Buthidae, *Buthacus*, new species, India.

Taxonomy / Taxonomía: *Buthacus agarwali* sp. n.

Introduction

The taxonomy of the genus *Buthacus* Birula, 1908 has been the topic of debate for over 50 years. In recent years, Lourenço (2001, 2006), Kovařík (2005), Lourenço & Qi (2006, 2007) tried to elucidate the status of various members of this genus through various revisions and new species descriptions. However, due to contrasting views among different authors, the validity and exact status of number of species still remains uncertain (Lourenço, 2006). Contributing to our present knowledge of the genus *Buthacus*, a new species is herein described from the Thar Desert in western India. The new species is an identifiable member of the '*B. leptochelys*' group and is morphologically closest to *B. maliensis* Lourenço & Qi, 2007 from West Africa (Lourenço & Qi 2007). This represents the first record of the genus *Buthacus* from the Republic of India and the eastern most limit of this genus (Lourenço & Qi, 2006).

Methods

Specimens were examined under Labomed CSM2 stereomicroscope. Morphometrics were recorded using an Aerospace digital calliper (closest 0.01mm). Illustrations were produced using a Leica stereomicroscope with a drawing tube (camara lucida). Measurements follow Stahnke (1970) and are given in mm. Trichobothrial notations follow Vachon (1974) and morphological terminology mostly follows Vachon (1952) and Hjelle (1990). Photographs of the new species, in habitus were taken using a Nikon D300 camera body mated with a Nikkor 60 mm f2.8 Macro lens. Photographs of the ventral aspect of the type specimens were obtained using Leica stereomicroscope with a camera attachment.

Description of the new species

Buthacus agarwali sp. n.

Fig. 1-14.

TYPE MATERIAL: Holotype (male, BNHS Sc-30) India, Sagaro dune, Jaisalmer district, Rajasthan, 5/VIII/2009 (26.76159 N, 70.45721 E). (Ishan Agarwal, Aniruddha Dutta Roy & Tarun Khichi). Paratypes: female (BNHS Sc-31) and juvenile male (BNHS Sc-32) collected on 1/X/2009 from the same locality. (N.S. Achyuthan & Tarun Khichi). The specimens are deposited in the collections of Bombay Natural History Society (BNHS).

ETYMOLOGY: Patronym in honour of Ishan Agarwal, India who collected the holotype.

DIAGNOSIS: a species of small to moderate size in relation to other species of the genus; with a total length of at least 38.53 mm in the male and 30.49 mm in female. General coloration yellowish with prominent coffee-brown pigmentation. Metasoma and vesicle yellow, aculeus reddish-brown. Granulation on pedipalp fingers and chelicerae teeth dark brown. Pedipalps with 12 rows of granules on the fixed and movable fingers; external accessory granules moderate. Trichobothriotaxy A-β (beta) orthobothriotaxic. Ventro-median carinae on metasomal segments II-III with strongly marked spiniform granules; anal arc with three spiniform lobes in both sexes. Tibial spurs present only on Leg III-IV, spurs reduced. Pectinal tooth count 33-38 in the males (Fig 11) and 26-27 in female (Fig. 12).

DESCRIPTION based on male holotype. Measurements in Table I.

Colouration. Globally pale yellow. Carapace with diffused blackish-brown pigmentation posteriorly and around median and lateral ocular tubercles. A conspicuous blackish-brown

Table I. Morphometrics (in mm) of holotype ♂ (BNHS Sc-30) and paratype ♀ (BNHS Sc-31) of *Buthacus agarwali* sp. n.

| | Holotype ♂ | Paratype ♀ |
|------------------------|---------------|---------------|
| Total length: | 36.53 | 30.49 |
| Carapace : | | |
| length | 4.12 | 3.19 |
| anterior width | 3.14 | 2.4 |
| posterior width | 4.54 | 3.85 |
| Metasomal segment I: | | |
| length | 2.81 | 2.51 |
| width | 1.86 | 1.56 |
| Metasomal segment II: | | |
| length | 3.21 | 2.67 |
| width | 1.55 | 1.3 |
| Metasomal segment III: | | |
| length | 3.27 | 2.7 |
| width | 1.58 | 1.35 |
| Metasomal segment IV: | | |
| length | 3.79 | 3.14 |
| width | 1.6 | 1.42 |
| Metasomal segment V: | | |
| length | 4.95 | 3.93 |
| width | 1.76 | 1.49 |
| depth | 1.34 | 1.2 |
| Vesicle: | | |
| length | 3.07 | 2.4 |
| width | 1.42 | 1.28 |
| depth | 1.37 | 1.14 |
| Aculeus: | 1.39 | 1.08 |
| Pedipalps: | | |
| Femur length | 4.54 | 3.79 |
| Femur width | 1.08 | 0.91 |
| Patella length | 4.73 | 4.29 |
| Patella width | 1.35 | 1.21 |
| Chela length | 8.34 | 7.31 |
| Chela width | 1 | 0.94 |
| Chela depth | 0.98 | 0.86 |
| Movable finger: | | |
| length | 5.96 | 5.45 |

stripe running from the anterior margin of carapace to each median eye. Mesosoma prominently coffee-brown in life turning to ochre yellow after preservation. Metasoma and vesicle yellow, aculeus reddish-brown. Granulation on pedipalp fingers and chelicerae teeth dark brown.

Morphology.

Prosoma- Anterior margin of carapace straight. Carapace carinae, anterior median, central median, posterior median and central lateral, weakly marked. All furrows weak. Intercarinal spaces with a few small granules but largely smooth. Median ocular tubercle placed anteriorly in the ratio 1:1.3; median eyes separated by one and half ocular diameter. Five pairs of lateral eyes- three large contiguous and two small placed behind the third eye. **Mesosoma-** Tergites I-VI tricarinate, all carinae weak; lateral carinae on segments I and II vestigial. Tergite VII pentacarinata, both pairs of lateral carinae moderate; median carinae present on the anterior half, weakly marked. Intercarinal spaces very weakly granular. Sternites III-VI without carinae; Sternite VII with two pairs of moderate carinae. Pectinal tooth count 36-38. **Metasoma-** Segment I and II with ten carinae, segments III and IV with eight carinae. Ventral carinae weak to moderately marked on segment I; more strongly marked on segments II and III. Dorsal and dorsolateral carinae on segments I and II without spinoid granules. Segment V with five carinae; ventrolateral carina with spinoid granules. Granules size variable between sexes; three small spinoid granules close

to anal arch, a few large spinoid granules intermixed with smaller ones throughout the length of the carinae only in males. Anal arc with three spinoid lobes with five spiniform granules in both sexes. Dorsal furrows on all segments weak, almost smooth; intercarinal spaces almost smooth. Telson smooth, covered with a few reddish setae. Aculeus moderately long and moderately curved; subaculear tubercle absent. **Chelicerae-** with two reduced but not fused denticles at the base of the movable finger (Vachon 1963). **Pedipalps-** Trichobothrial pattern orthobothriotaxic, Type A (Vachon 1974). Dorsal trichobothria on femur in β (beta) configuration (Vachon 1975). Femur pentacarinata. Patella with internal, dorso-internal and dorsal carinae; internal and dorso-internal carinae moderately marked while dorsal is weakly marked. Chela smooth and somewhat laterally compressed. Dentate margins on fixed and movable fingers with 12 weakly imbricate rows of granules; external accessory granule moderate to large. **Legs-** Legs I-III scalloped/ dorso-ventrally compressed with numerous long setae; Leg IV not scalloped with very few short setae. All legs with a pair pedal spur, spur size increasing uniformly from Leg I-IV. Tibial spur absent on Leg I-II; Leg III-IV with reduced tibial spurs. **Sexual dimorphism:** morphology of female similar to that of male but differing in the following set of characters (i) a lower pectinal tooth count of 26-27 (ii) Spiniform granules on the ventro-lateral carinae of metasomal segment V in two sets- a set of three small spiniform granules near the anal arc while another set of larger uniform sized spiniform granules occupying the entire length of the carinae (iii) comparatively smaller size of 30.49 mm.

RELATIONSHIPS: In its general morphology the new species displays associations with the '*Buthacus leptochelys*' group of species. It can be distinguished from the geographically closest *Buthacus pakistanensis* Lourenço & Qi, 2006, whose type locality is approximately 185 airline kilometers from the Sagaro dunes, by the following characters: (i) pedipalps with 12 rows of granules on the fixed and movable fingers (ii) anal arc with three spiniform lobes in both sexes (iii) blackish-brown pigmentation on carapace and mesosoma (iv) ventro-median carinae of metasomal segments II-III with spiniform granules in both sexes. The new species can be distinguished from its most morphologically similar congener *B. maliensis* by the following characters: (i) overall larger body size, with total length of 38.53 mm (male) (ii) blackish-brown pigmentation on mesosoma (iii) ventro-median carinae on metasomal segments II-III with marked spiniform granules.

HABITAT, DISTRIBUTION AND NATURAL HISTORY NOTES: the new species seems to be restricted to barren sand dunes. These mobile sand dunes are characterized by very low total vegetation cover (<2%), and very sandy (>95% sand), loose soil. Dunes are interspersed by hard depressions called interdunal areas. These areas and the edge of the barren dunes usually have permanent vegetation and rodent burrows (Agarwal *et al.*, 2009). Presently the species is only known from the type locality, though it is likely that species also occurs on other contiguous sand dunes.

In the sand, the species anchors itself with its fourth pair of legs and raises the posterior portion of the abdomen. Then using the first three pairs of legs actively scoops out the sand thus creating shallow depressions. It occasionally

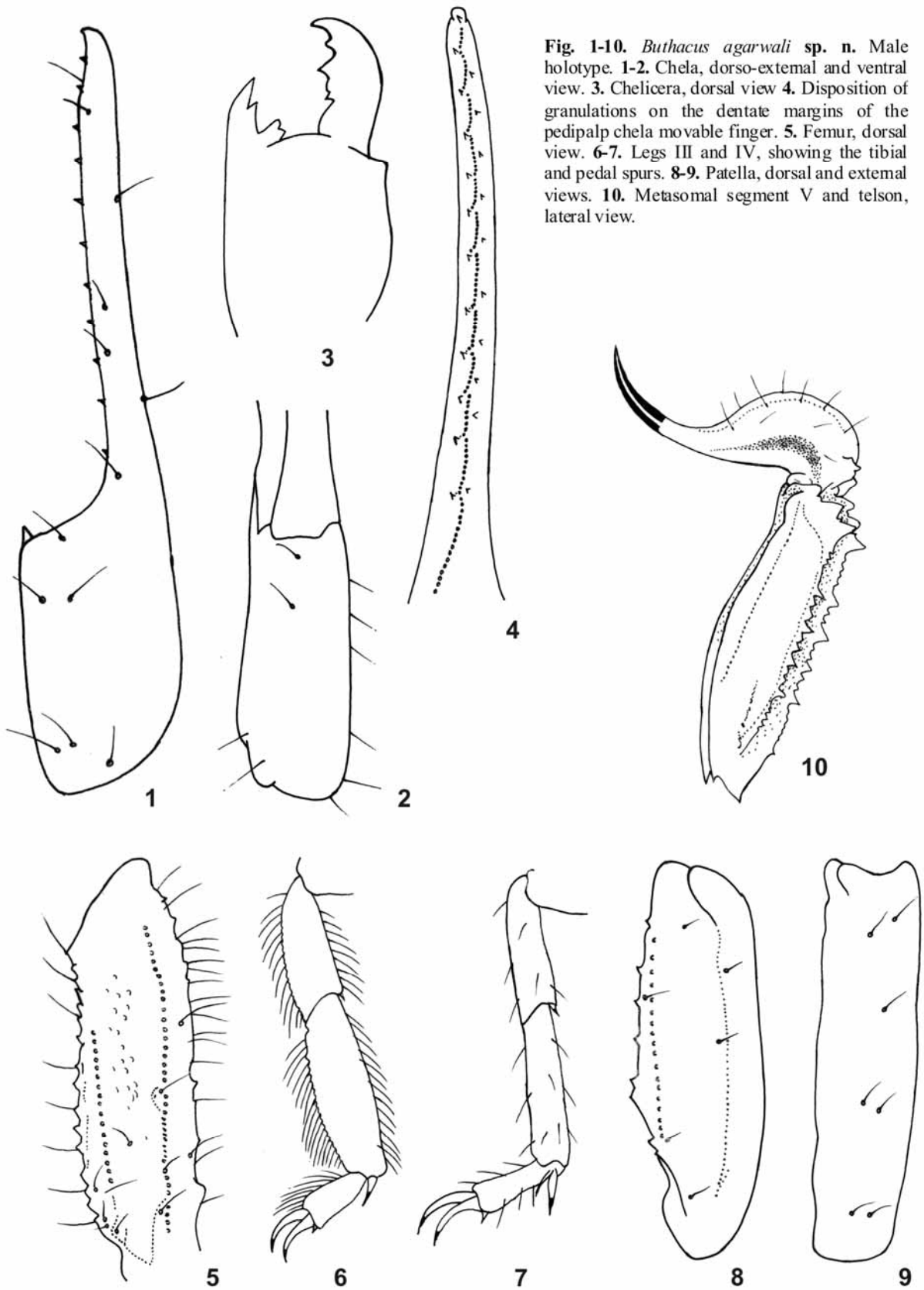


Fig. 1-10. *Buthacus agarwali* sp. n. Male holotype. 1-2. Chela, dorso-external and ventral view. 3. Chelicera, dorsal view 4. Disposition of granulations on the dentate margins of the pedipalp chela movable finger. 5. Femur, dorsal view. 6-7. Legs III and IV, showing the tibial and pedal spurs. 8-9. Patella, dorsal and external views. 10. Metasomal segment V and telson, lateral view.

also uses its metasoma to drive out sand from the depressions. During the day it lies in these shallow depressions with its body partially buried flush, with the surface of the sand (Fig 13), emerging out only at night (I. Agarwal pers. comm).

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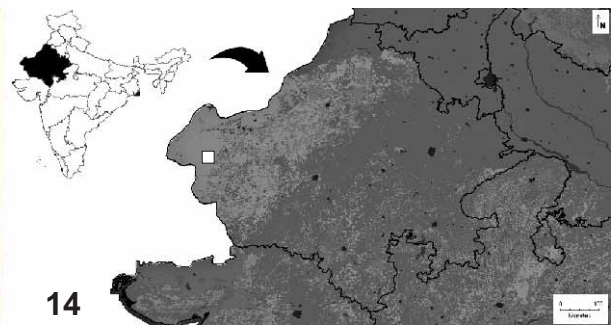
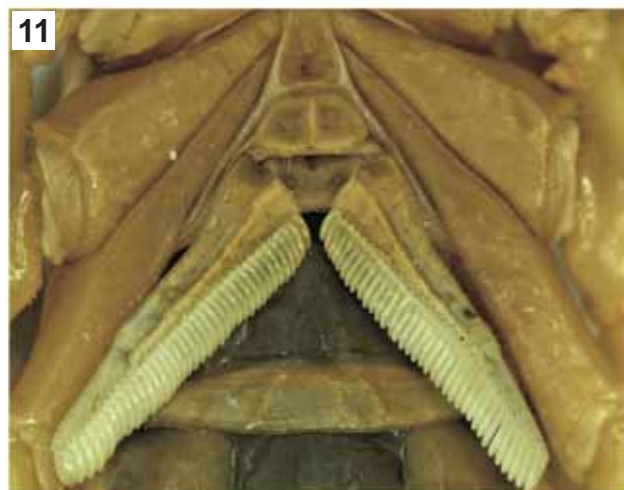


Fig. 11-14. *Buthacus agarwali* sp. n. 11-12. Male and female sternum, genital operculum and pectines. 11. Male holotype. 12. Female paratype. 13. Male (juvenile) paratype. (Photograph by I. Agarwal), in habitus. 14. Map of Rajasthan state showing the type locality of *Buthacus agarwali* sp. n. (white square).