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Taxonomy/Taxinomie

A new high-elevation scorpion species of the genus *Scorpiops* Peters, 1861 (Scorpiones: Euscorpiidae: Scorpiopinae) from the Himalayas, India

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ABSTRACT

A new high-elevation scorpion species of the genus *Scorpiops* is described from the Indian state of Himachal Pradesh. *Scorpiops spitiensis* sp. nov. is the second highest-elevation scorpion species in Asia and the first one from India occurring at elevations above 4200 m. The new species closely resembles *Scorpiops petersii*, but it can be distinguished from it based on a suit of characters, one of which is the presence of 16 trichobothria on the external aspect of the patella, which is unique to the new species.

1. Introduction

Family Euscorpidae Laurie, 1896 is globally distributed and is represented by ten genera and ninety-nine species [1]. Of these, three genera, viz. *Euscorpiops* Vachon, 1980, *Scorpiops* Peters, 1892 and *Neoscorpiops* Vachon, 1980, have been reported from India. In India, *Euscorpiops* and *Scorpiops* are primarily distributed across the western Himalayas and in northeast India (a single *Scorpiops* species has been reported from central India), while *Neoscorpiops* is restricted to the northern Western Ghats [2,3]. Among the Indian Euscorpids, the genus *Scorpiops* is most well represented, with at least nine species *viz. Scorpiops braunwalderi* Kovařík 2000, *S. dastychi* Kovařík 2000, *S. demise* Kovařík 2005, *S. feti* Kovařík 2000, *S. hardwickei* Gervais 1843, *S. leptochirus* Pocock 1893, *S. pachmarhicus* Bastawade 1992, *S. petersii* Pocock 1893 and *S. rohtangensis* Mani 1959 currently reported from India [3–5]. A majority of these species typically occur at high-elevations (< 1000 m) with some species occurring at elevations greater than 3700 m.

Recently, individuals from one such high-elevation (4000–4200 m) *Scorpiops* population from Spiti Valley in Himachal Pradesh were collected. Morphologically, these individuals show affinity to *S. petersii*. Detailed comparisons of the collected individuals with the lectotype of *S. petersii* however indicate significant differences between the two, which warrant the individuals from Spiti Valley to be considered a distinct taxon. In this paper, we present a detailed description of the collected types and provide diagnostic characters and notes on its natural history.

2. Methods

Specimens of the new species are stored in 70% ethanol in the collection of the Bombay Natural History Society (BNHS, Mumbai). Measurements were taken with a Mitutoyo™ digital calliper with an error of 0.1, and

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morphological details were recorded using an Olympus™ SZ40. Measurements were taken following Stahnke [6] and are provided in millimetres (mm). Trichobothrial nomenclature follows Vachon [7] and morphological terminologies follow Hjelle [8]. Acronyms used in the manuscript are as follows: BNHS – Bombay Natural History Society, Mumbai; NHM – Natural History Museum, London.

In addition to the classical diagnostic characters, we propose a new method to quantify cuticular granulation that is an important diagnostic character in scorpion taxonomy. Granulation has until now been presented largely descriptively, e.g., dense, sparse, moderately dense, etc. This method, though informative, is prone to personal subjectivity and bias. Moreover, it fails to provide an absolute measure of granulation, making comparisons between closely related species complicated, especially when types cannot be accessed. To counter this issue, we propose a novel yet highly simplistic technique that allows quantitative assessment of granulation. To quantify granulation, photographs (with scale) of the types of the new species and the closely related *S. petersii* were taken and resized to 300 dpi. Grids of 10 pixel^2 were overlaid on the image in Adobe Photoshop CS3 and percent area coverage of granules was calculated by counting the total number of grids required to cover the focal body part and the number grids among them that showed the presence of granules.

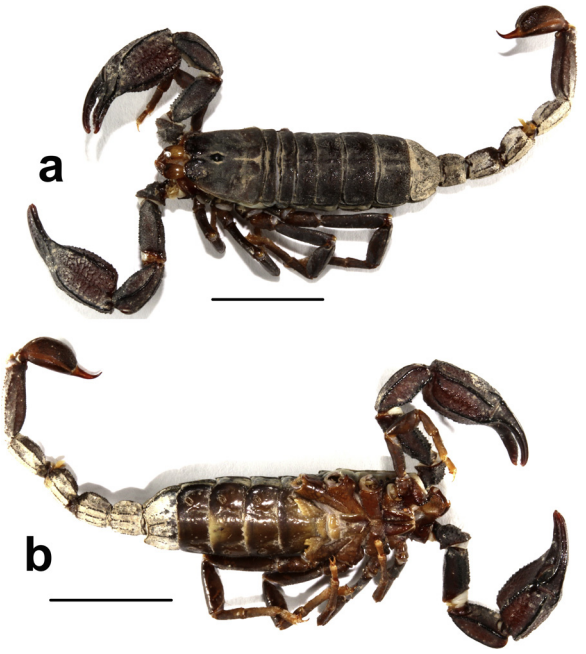

Fig. 1. (Colour online.) *Scorpiops spitiensis* sp. nov. holotype male Bombay Natural History Society Sc-67, (a) dorsal view, (b) ventral view. Scale bar: 10 mm.

3. Taxonomic treatment

Family EUSCORPIIDAE Laurie, 1896
Subfamily SCORPIOPINAE Kraepelin, 1905
Scorpiops spitiensis sp. nov. (Figs. 1–4)
urn:lsid:zoobank.org:act:32A6146C-6336-4024-869E-598F05ED37BA

Holotype. BNHS Sc-67, adult male collected by Mayank Kohli and Ashwin Viswanathan from Kibber village, Spiti Valley, Himachal Pradesh, India (32.3309N, 78.0072E, altitude 4200 m).

Paratypes. One female BNHS Sc-68 and one male BNHS Sc-69 by Kulbhushansingh Suryawanshi; 1 female BNHS Sc-70 by Mayank Kohli and Ashwin Viswanathan. Collection locality same as the holotype.

Etymology. The specific epithet refers to the type locality "Spiti" where the types were collected.

3.1. Diagnosis

A medium-sized species in relation to members of the genus *Scorpiops* (39.51 mm maximum). Carapace anterior margin raised upwards. Median eyes situated anteriorly in the ratio 1:3. Patella with 7 ventral trichobothria and 16 external trichobothria, single em present. Manus flexed in males. Mesosomal tergites I–VI with median carinae, posterior and laterally portion of tergites with depressed granulation. Telson moderately bulbous. Pectines 5 in number.

3.2. Description of holotype BNHS Sc-67

Colouration (Fig. 1a & 1b, Table 1). Overall in a shade of brownish black with the chelicerae being yellowish brown with dark brown reticulations. Manus and telson with a slight reddish ting. Pectines and genital operculum pale yellowish. Sternites dark brown.

Morphology. Carapace anterior margin with a moderately deep 'U' shaped indentation with its edges along the lateral eyes and anterior margin raised upwards. Surface with coarse granulation throughout. Carapacial carinae indistinct. Median eyes situated anteriorly in the ratio of 1:3. Median and lateral ocular tubercle glossy black (Fig. 2a). Three pairs of lateral eyes. Mesosoma (Figs. 1a, 1b & 2b) – Tergites coarsely granular throughout with large depressed granules concentrated on the lateral and posterior region of each segment. Median carinae fairly distinct on segments I–VI, lateral carine indistinct, merely represented by concentrated granules. Pectines 5 in number with fulcra present. All sternites smooth and glossy lacking carinae except sternite VII, which bears two pairs of lateral carinae. *Metasoma* – First metasomal segment with 10 keels (dorso-median vestigial, merely represented by a few granules), II–IV segment with 8 keels (latero-median absent), segment V with 7 keels. Keels on segment V serrated. Vesicle sparsely granular with a clear smooth band on its lateral aspect (Fig. 2c). Pedipalp (Figs. 3a–f & 4a–f) – Trichobothrial pattern C, neobothriotaxic [7]. Patella with 16 trichobothria on its external (5 eb, 2 esb, 1 em, 4 est, 4 et; Figs. 3e, 4e) and 7 on its ventral aspect (Figs. 3f, 4f). Patella with a large tooth and a few small ones on its internal aspect. Movable finger with a single row of granules. Manus length to width ratio 1:2.5. Chelicerae – Fixed finger with one large tooth at distal end and a small bifid tooth. Movable finger with two rows of teeth, from 4–6.