

Genus *Oedothorax* Bertkau, 1883 (Araneae: Linyphiidae: Erigoninae) with description of two new species from India

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Abstract

As a biodiversity hotspot, the Western Ghats is home to a diverse range of flora and fauna. *Oedothorax* Bertkau, 1883 is described from the Western Ghats of Kerala, India, with three species, including two new species: *Oedothorax veloorensis* sp. nov., *O. cheruthoniensis* sp. nov., and *O. retusus* Westring, 1851. In *O. veloorensis* sp. nov., the lateral sides of the median plate of epigyne are directed towards centre, whereas in *O. cheruthoniensis* sp. nov. the lateral sides are curved inwardly with hook like tips.

Keywords: biodiversity hotspot, Central Kerala, Velloor, linyphiidae, spinneret

Introduction

Subfamily Erigoninae Emerton, 1882, is characterized by simple epigyne and palpal tibia with one or more apophyses (Millidge, 1951) [4]. Genus *Oedothorax* was established by Bertkau in 1883 with *Oedothorax gibbosus* Blackwall, 1841 [1] as the type species. *Oedothorax* possesses trichobothrium on metatarsus IV and is distinguished by the position of the trichobothrium in the distal half of metatarsus I and chaetotaxy 2-2-1-1. The males can be distinguished by the shape of palpal tibia and carapace, whereas females are identified by their simple epigyne. They are composed of a median plate, with lateral lines and spherical or elongated receptacles. The genital organs in many species share similarity even in congeners from different zoogeographical realms (Tanasevitch, 2015) [7].

Oedothorax is one of the largest genera with 83 species (World Spider Catalog, 2021) [9]. In India, with 17 species, *Oedothorax* is the largest linyphiid genus (Sharma *et al* 2020) [6]. So far, only three *Oedothorax* species, namely *O. cunur* Tanasevitch, 2015 [7], *O. kodaikanal* Tanasevitch, 2015 [7] and *O. stylus* Tanasevitch, 2015 [7], have been reported from Kerala (Tanasevitch, 2015) [7].

We report three *Oedothorax* species namely, *Oedothorax veloorensis* sp. nov., *O. cheruthoniensis* sp. nov., and *O. retusus* Westring, 1851, from Central Kerala in this paper, two of which are new to science. Addition of three species to the linyphiid diversity of Kerala is significant in this context.

Materials and methods

Fresh specimens were collected from various sites in the Western Ghats region of Kerala, and preserved in 80% ethyl alcohol. Specimens were examined using compound microscope. Microphotographs were taken using Flexacam C1 attached to LEICA SAPO Automontage Microscope using Leica Application Suite X (LAS X) software and MICAPS PROHDMIB1080CM camera attached to Luxeo 6Z Stereozoom Microscope using MICAPS PROHDMIB1080CM camera software. All measurements are in millimeters. Female epigyne was cleared by boiling in

10% KOH for 5 minutes. Specimens are deposited at Arachnology Museum, Deva Matha College Kuravilangad. DNA was extracted from the legs of specimen (LIN021) using Pure link DNA Isolation kit, Invitrogen, USA. Electrophoresis of the isolated DNA was done in 1% Agarose. Mitochondrial cytochrome oxidase subunit I (COI) region (LEP forward and reverse) was PCR amplified with specific primers. Amplicon was checked for appropriate size by agarose gel visualization. Amplicon was gel purified using commercial column based purification kit (Invitrogen, USA) and Sequencing was performed with forward and reverse primers in ABI 3730 XL cycle Sequencer. Forward and reverse sequences were assembled and contig was generated after trimming the low quality bases. Sequence analysis was performed using online tool BLAST of NCBI database. DNA barcoding was done by Omics Gen Life Sciences Pvt Ltd, Ernakulam, Kerala.

Abbreviations used in the text: AME- anterior median eye, ALE- anterior lateral eye, PME- posterior median eye, PLE- posterior lateral eye, R- receptacle.

Taxonomy

Oedothorax Bertkau, 1883 [3]

Type species: *Oedothorax gibbosus* Blackwall, 1841 [1]

Oedothorax veloorensis sp. nov.

urn:lsid:zoobank.org:act:9D7F7AD8-5143-46AA-9699-317313A04C3A
(Fig.1 A-C)

Type species: Holotype, ♀, Velloor Reserve Forest, Udumbannoor, Idukki, Kerala (9°55'15.6"N, 76°51'08.4"E), 22 June 2020, A. Domichan leg. (DMCK LIN 006).

Etymology: The specific name, an adjective, refers to the type locality 'Velloor', a place in the district of 'Idukki', Kerala, India. The holotype was collected from Velloor Reserve Forest.

Diagnosis: The reddish brown colour of the abdomen gives clear distinction to *O. veloorensis* sp.nov. from other species. The lateral sides of the median plate of epigyne, which are directed towards centre, clearly distinguishes *O. veloorensis* sp.nov. as new species.

Description: Female. Total length: 2.6; carapace: 1.2 long, 0.98 wide; abdomen: 1.4 long, 0.91 wide. Light brownish carapace, slightly yellowish towards border. Chelicerae length 0.25. Stridulatory files present on the lateral sides of chelicerae. Heterogeneous, eight eyes. Enlarged, white eyes in black rings. Eye diameter (PME) 0.05, eye interdistances: PME-PME 0.06, PME-PLA 0.05. Anterior and posterior lateral eyes juxtaposed. Legs pale yellowish, with long black hairs. Leg measurements: I 2.23 [0.67, 0.25, 0.71, 0.36, 0.24], II 2.18 [0.75, 0.17, 0.46, 0.39, 0.41], III 1.47 [0.52, 0.10, 0.36, 0.30, 0.19], IV 2.41 [0.74, 0.19, 0.32, 0.73, 0.43]. Leg formula: 4123. Chaetotaxy 2-2-1-1. Trichobothrium absent on metatarsi of all legs. Light brownish, heart-shaped sternum, with dark border (Fig. 1B). Abdomen slightly reddish brown. Three pairs of black patches on either side of median line (Fig. 1A). Median plate of epigyne converges to centre. Lateral lines curved inwards. Receptacles round, small and slightly curved outwards (Fig. 1C)

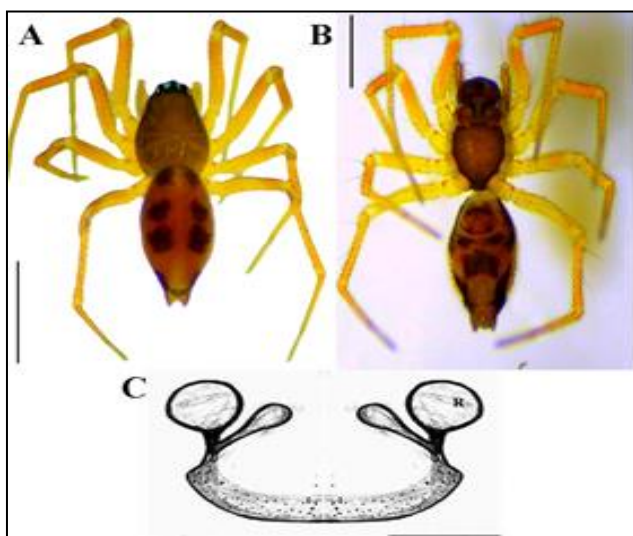


Fig 1: General morphology and genitalia. *Oedothorax veloorensis* sp.nov. A, dorsal ; B, ventral ; C, epigyne, dorsal. Scale bars: A-B, 1 mm, C-0.5 mm

Male: Unknown

Distribution: India (Kerala)

Remarks: The reddish brown colour of abdomen and prominent black marks are the major characteristics of this species. In addition, arrangement of anteriorly swollen lateral lines of median plate differentiates it from other *Oedothorax* species. The lateral lines curved inwards, but not as much as in *Oedothorax cheruthoniensis* sp.nov.

***Oedothorax retusus* Westring, 1851**

Type species: Holotype, ♀, Peechi, Thrissur, Kerala (10°29'38.5"N 76°25'49.5"E), 10 October 2020, A. Domichan leg. (DMCK LIN 028).

Diagnosis: Three pairs of irregular black marks on

abdomen. Lateral lines of median plate curved outwards with its hook like tip.

Description: Female. Total length: 2.09; carapace: 0.80 long, 0.42 wide; abdomen: 1.29 long, 0.46 wide. Dark brownish carapace. Ocular area raised. Heterogeneous, eight, enlarged white eyes. Eye diameter (PME) : 0.02, eye interdistances : PME-PME 0.05, PME-PLA 0.04, AME-ALE 0.02. Anterior median eyes juxtaposed. Anterior and

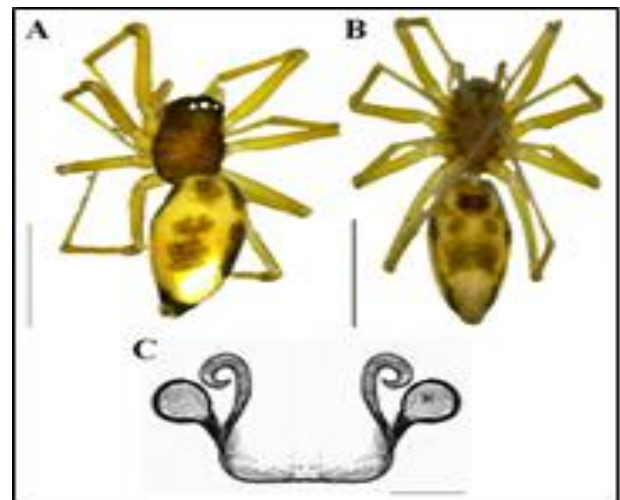


Fig 2: General morphology and genitalia. *Oedothorax retusus* Westring, 1851 A, dorsal ; B, ventral ; C, epigyne, dorsal. Scale bars: A-B, 1 mm, C, 0.5 mm.

Posterior lateral eyes are also closely arranged. Chelicerae length 0.47. Stridulatory files present on the lateral sides of chelicerae. Legs pale yellowish. Leg measurements: I 2.06 [0.67, 0.12, 0.29, 0.59, 0.39], II 2.09 [0.67, 0.14, 0.35, 0.52, 0.41], III 1.93 [0.66, 0.11, 0.36, 0.47, 0.33], IV 2.36 [0.81, 0.12, 0.32, 0.71, 0.40]. Leg formula 4123. Chaetotaxy 2-2-1-1. Trichobothrium present on metatarsi of all legs. TmI 0.54. Heart-shaped sternum with dark borders. Abdomen pale yellowish with three pairs of black marks on dorsal side. White patch at posterior end (Fig. 2A). Dark patches on ventral and lateral sides (Fig. 2B). Lateral lines of median plate initially directed towards centre and then curved outwards, with hook-shaped tip. Receptacles round and curved outwards (Fig. 2C).

Distribution: Europe, Turkey, Caucasus, Russia (Europe to north-eastern Siberia), Kazakhstan, China, India (Kerala).

Remarks: *O. retusus* is reported for the first time from India. Though it show slight morphological differences in band pattern from earlier reported *O. retusus* species, similarity in the arrangement of lateral lines of median plate and shape of receptacles is enough to confirm identity.

***Oedothorax cheruthoniensis* sp.nov.**

urn:lsid:zoobank.org:act:D2D831D4-F2F1-4739-ADBC-40C813E068FD GenBank Accession Code: MZ661542 (Fig. 3A-D)

Type species: Holotype, ♀, Cheruthoni, Idukki, Kerala (9°51'43.4"N, 76°57'38.7"E), 26 December 2020, A. Domichan leg. (DMCK LIN 021).

Paratype, ♀, Near Kozha Seed Farm, Kottayam, Kerala (9°45'44.9"N, 76°33'51.2"E), 25 January 2021, A. Domichan leg. (DMCK LIN 017).

Etymology: The specific name, an adjective, refers to the type locality 'Cheruthoni,' which is located in the district of 'Idukki', Kerala, India.

Diagnosis: The abdomen in *O. cheruthoniensis* sp.nov. posses three pairs of black bands as in *O. veloorensis* sp.nov.. But shape of band and that of abdomen differs in both species. Receptacles are not curved in *O. cheruthoniensis* sp.nov. as in *O. retusus*. Lateral lines of median plate curved inwards, dorsally, with hook like tips in *O. cheruthoniensis* sp.nov.

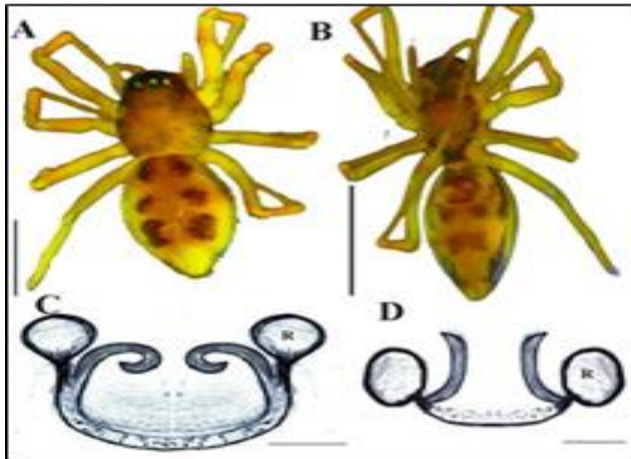


Fig 3: General morphology and genitalia. *Oedothorax cheruthoniensis* sp.nov. A, dorsal; B, ventral ; C, epigyne, dorsal; D, epigyne, ventral. Scale bars: A-B, 1mm, C-D, 0.5mm

Description: Female. Total length: 2.9; carapace: 1.2 long, 1.35 wide; abdomen: 1.7 long, 1.57 wide. Carapace yellowish brown. Ocular area slightly raised. Heterogeneous, eight, enlarged eyes. Anterior and posterior lateral eyes juxtaposed. Eye diameter: 0.02, eye interistances: PME-PME 0.04, PME-PL 0.03. Heart-shaped sternum, with dark borders. Chelicerae length 0.47. Stridulatory files present on lateral sides of chelicerae. Legs yellowish with long hairs. Leg measurements: I 2.09 [0.93, 0.22, 0.36, 0.39, 0.19], II 2.07 [0.92, 0.21, 0.37, 0.38, 0.19], III 2.02 [0.90, 0.22, 0.35, 0.37, 0.18], IV 2.12 [0.78, 0.24, 0.62, 0.30, 0.18]. Leg formula 4123. Chaetotaxy 2-2-1-1. Trichobothrium present on metatarsi of all legs. TmI 0.37. Abdomen yellowish. Three pairs of black patches on dorsal region. White patch at posterior end near spinnerets. Dark bands along lateral sides (Fig. 3A). Dark colouration around spinnerets. Pair of black patches above and below epigastric region and black patch on ventral region of abdomen (Fig. 3B). Median plate of epigyne converges towards centre. In dorsal view, lateral lines curved inwards with hook like tip (Fig. 3C). Ventrally, lateral lines initially directed towards centre and then slightly curved outwards.

Male: Unknown

Distribution: India (Kerala)

Remarks: Inwardly curved lateral line of median plate is unique to *O. cheruthoniensis* sp.nov.. Also it possess a white patch near spinneret, which is found in some *Oedothorax* species.

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