



## Original article

# A new genus and new species of diplurid spider (Araneae: Mygalomorphae: Dipluridae) from northeast India



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## ABSTRACT

A new diplurid genus and species is described from northeast India based on a single female specimen from Jampui hills. *Orientothele* gen. nov. is placed in the subfamily Diplurinae based on the presence of one row of teeth on the chelicerae. The new genus and species can be diagnosed from most diplurid genera in lacking lyra on the prolateral face of maxilla, paired claw with one row of teeth, maxilla with numerous cuspules, scopulae absent on all legs, and spermathecae consisting of two elongate stalks with bulbous receptacles at their tips which are bent inwards. *Ischnothele indicola* Tikader, 1969 is here treated as *incertae sedis* with regards to its generic placement in light of the discovery of *Orientothele* gen. nov.

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## Introduction

The mygalomorph spider family Dipluridae Simon, 1889 is represented globally by 188 species in 24 genera (World Spider Catalog 2016). Members of this family are presently known to be distributed in the Neotropical, southern Nearctic, Afrotropical, Madagascar, Oriental, Sino-Japanese, Oceanian, and Australian realms with its greatest diversity in Australia and the Neotropical region. These spiders possess long posterior lateral spinnerets which are used to make an irregular web with a retreat within it (Schwendinger 2009). In Asia, however, their diversity seems to be poorly represented largely due to the fact that only a handful of investigations have been made on mygalomorph spiders as a whole (Coyle 1995; Mirza et al 2014; Raven 1985; Sanap and Mirza 2015; Siliwal et al 2015b). In India, this family is represented by 2 genera and 4 species namely: *Indothele dumicola* Pocock, 1900; *Indothele mala* Coyle, 1995; *Indothele rothi* Coyle, 1995; *Ischnothele indicola* Tikader, 1969 (Hadole and Rajoria 2012). Of these, the generic allocation of *Ischnothele indicola* is here called into doubt (see discussion).

Northeast India is a biodiversity hotspot (Myers et al 2000) and several vertebrate centric studies have been carried out in this area. However, with a few invertebrate inventories, the arthropod assemblage remains poorly documented. With regards to this, we visited the northeast Indian state of Tripura during which we collected a specimen of a diplurid spider. The collected specimen differs from all known species and genera from Asia. A detailed comparison of museum material aids us to conclude that the specimen is a new species and we also propose a new genus to embody it.

## Materials and methods

Specimens were collected and preserved in 70% ethanol and the holotype was deposited in the collection of the National Centre of Biological Sciences, Bangalore. Measurements were taken using a Mitutoyo digital caliper (Mitutoyo Corporation, Japan). Spermathecae were dissected and cleaned using a needle. Specimens were examined using an Olympus SZ40 stereo-binocular microscope. Photographs were taken using a Canon 70D (Canon Inc, Tokyo) mounted with a 100-mm macro. Eye measurements were taken using the software ImageJ (National Institutes of Health, USA) (<http://imagej.nih.gov/ij/>). All measurements were given in millimeters and with a standard error of  $\pm 0.01$  mm. To study the morphology of spigots, an apical segment of one of the posterior

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lateral spinnerets was removed for scanning electron microscopy. The segment was processed in a critical point drier to remove traces of ethanol and water following coating with gold. Scanning electron microscopy imaging was done using a Zeiss Merlin Compact (Carl Zeiss Microscopy GmbH, Göttingen). Comparative material of the genus *Indothele* spp. was examined from the collection of the National Centre for Biological Sciences, Bangalore. The Life Science Identifiers (LSID) for the manuscript is: urn:lsid:zoobank.org:pub:B4E74A19-CF00-425D-B01F-AAE89C09E9B3.



Figure 1. *Orientothele alyratus* gen. et. sp. nov. holotype female NCBS AR142 in life.

### Taxonomic accounts

Family Dipluridae Simon, 1889

Subfamily Diplurinae Simon, 1889

#### *Orientothele* gen. nov.

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Type species: *Orientothele alyratus* gen. et. sp. nov.

**Diagnosis.** *Orientothele* gen. nov. is here placed in the subfamily Diplurinae based on the presence of one row of teeth on the chelicerae. The new genus and species can be diagnosed from most diplurid genera in lacking lyra on the prolateral face of the maxilla, paired claw with one row of teeth, maxilla with numerous cusps, scopulae absent on all legs, and spermathecae consists of two elongate stalks with bulbous receptacles at their tips which are bent inwards. Male unknown.

**Description.** A medium sized spider in relation to members of this family reaching a total length of 17.2 mm excluding chelicerae length. All legs bearing three claws, superior tarsal claws with a single row of sigmoid dentition and inferior tarsal claw with three dentitions. Scopulae absent. Two pairs of spinnerets and the posterior lateral spinneret long and widely spaced. Apical segment of posterior lateral spinnerets entire, no pseudosegmentation seen. Metatarsi of all legs with distal preening combs. Chelicerae with 13 promarginal teeth in a row of teeth and with 28 basosomal teeth. Maxillary and labial cusps present. Labio-sternal

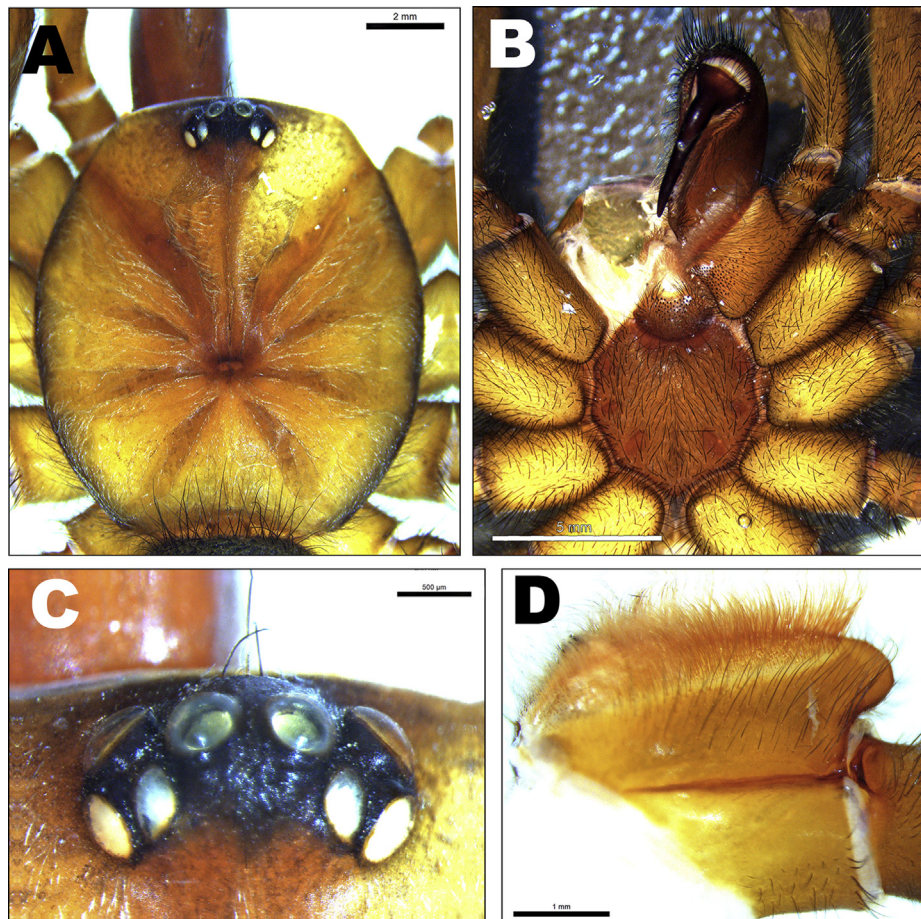


Figure 2. *Orientothele alyratus* gen. et. sp. nov. holotype female NCBS AR142. A, carapace; B, sternum and coxa; C, eyes; D, prolateral maxilla.

collar well developed. Sternum cordate and the posterior edge nearly separating coxa IV. Carapace smooth, glabrous, with soft golden setae. Caput low. Fovea transverse, short. Spermathecae consists of two elongate stalks with bulbous receptacles at their tips which are bent inwards. Spigots on posterior lateral spinnerets fused and flagelliform. Base of spigot smooth with undulating grooved surface. Filiform trichobothria 13–20 present in a row on tarsi of all legs and palp. Spines present on all legs including tarsi of all legs.

**Distribution.** Presently known from borders of Tripura and Mizoram in northeast India

**Comparisons.** The new genus cannot be placed in the known subfamilies following diagnosis provided by Raven (1985). However, with an amended diagnosis by Drolshagen and Bäckstam (2009) the new genus may be placed in the subfamily Diplurinae in bearing the synapomorphy of a single row of teeth on chelicerae. Within Diplurinae the *Orientothele* gen. nov. differs from *Metriura* in bearing a single row of teeth on superior tarsal claws (vs. 2 in *Metriura*), from *Diplura*, *Trechona*, and *Harmonicon* in lacking prolateral maxillary lyra (vs. absent in *Diplura*, *Trechona*, and *Harmonicon*).

**Etymology.** The proposed generic name is a compound work formed by the word 'Oriente' = Oriental referring to the location of the type locality and the later word is a term assigned to members of the family Dipluridae. The sex of the proposed name is masculine.

***Orientothele alyratus* sp. nov.**

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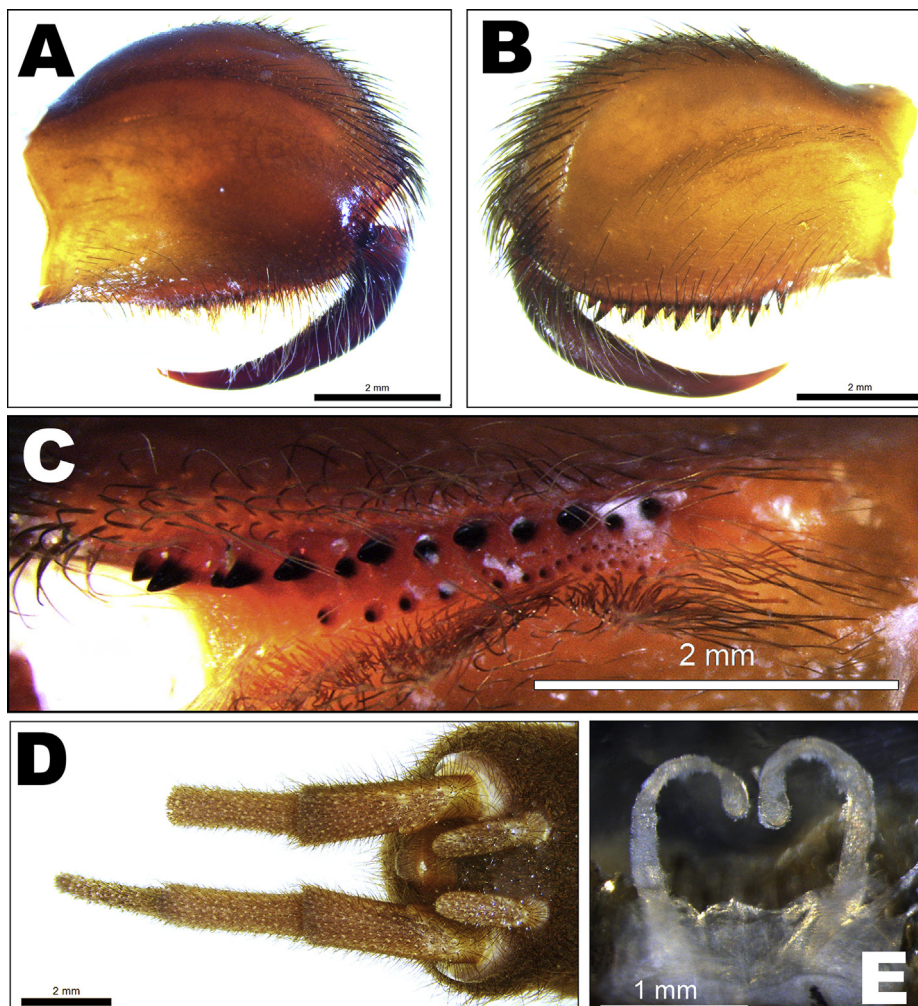
**Type.** Holotype:♀, NCBS AR142 collected from Belianchip, Jampui Hills in North Tripura district, Tripura, India (23.968854°, 92.277980°; elevation 644 m). Collected by Rajesh Sanap and Zeeshan Mirza on November 30, 2014.

**Diagnosis.** As for the genus

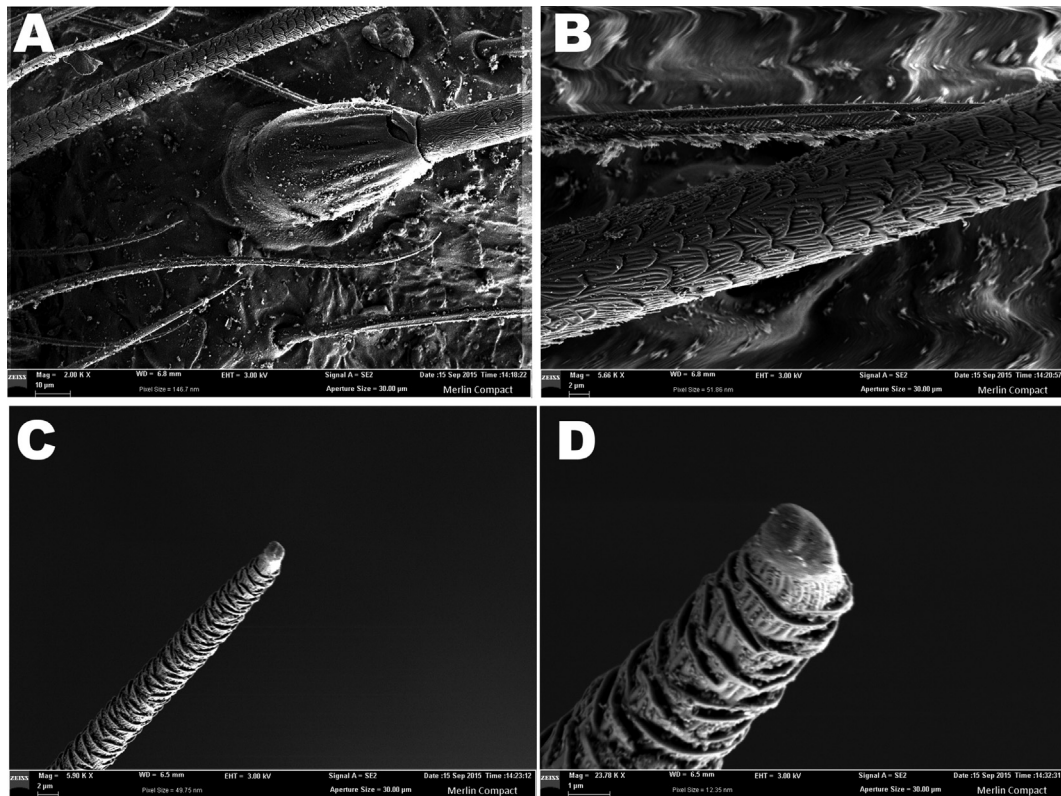
**Description of holotype female NCBS AR142 (Figure 1).** Holotype in general good condition with an exposed ventral cavity from a dissection to retrieve spermathecae. The abdomen is laterally compressed likely an artifact of preservation. The posterior lateral spinnerets lack the apical segment which has been removed for scanning electron imaging.

Carapace 8.27 long, 7.58 wide (L/W ratio 1.2), chelicerae 5.25 long. Sternum 3.95 long, 3.80 wide (L/W 1.2). Abdomen 8.89 long, 5.05 wide (L/W 1.4). Spinnerets: PMS, 2.26 long, 0.48 wide, 0.88 apart; posterior lateral spinnerets, 3.09 basal, 2.31 middle, 3.12 distal; midwidths 1.07, 0.70, 0.44, respectively, apart 1.99.

**Coloration (Figures 1 and 2).** Carapace, legs and teguments black; abdomen and spinnerets dark brown. Soft golden setae radiating from foveae along lateral edges of caput. Coloration in preservative is more faded and is in a shade of brown to reddish brown.



**Figure 3.** Claws of *Orientothele alyratus* gen. et. sp. nov. holotype female NCBS AR142. A, leg III ventral view; B, leg III lateral view; C, leg IV lateral view; D, palp claw lateral view.



**Figure 4.** Scanning electron microscopy of spigots of *Orientothele alyratus* gen. et. sp. nov. holotype female NCBS AR142. A, base; B, surface of flagelliform stalk; C and D, tip of spigot.

**Carapace** (Figure 1A). Overall flat with slightly raised caput. Fovea transverse. Sloping caput covered with short, soft golden setae. Carapacial borders edged with long black setae.

**Eyes** (Figure 1C). Ratio of ocular quadrant width to length 2.2. Anterior lateral eye (ALE) largest, other eyes equal. Eye diameter: ALE, 0.58; anterior median eye (AME), 0.34; posterior lateral eye (PLE), 0.35; posterior median eye (PME), 0.31. Distance between the eyes: AME-AME, 0.23; PME-PLE, 0.12; AME-ALE, 0.14; PME-PME, 0.87; ALE-PLE, 0.18. Ocular quadrate, 0.95 long, 1.95 wide. Median ocular quadrate: length, 0.75; front width, 0.85; back width, 1.25.

**Maxilla** (Figures 1B and 1D). Front length 2.42, back length 2.49 and 1.70 wide. Anterior maxillary lobe well developed. Prolateral face of maxilla smooth, glabrous, with a few long black setae scattered below the maxillary suture. Cuspules: over 110 in anterior corner in roughly triangular region.

**Labium** (Figure 1B). 1.06 long, 1.67 wide with nearly 52 cuspules in band for half of anterior length; cuspules ca. similar in size to maxillary. Labio-sternal collar distinct and well developed.

**Chelicera** (Figures 2A and 2B). Basal oral fringe of chelicerae lacking modified setae. Promarginal teeth 13 with a parallel row of 28 basosomal teeth gradually decreasing in size.

**Sternum** (Figure 1B). Cordate in its shape, slightly longer than wide, sloping gradually, with long black setae sparsely present. Posterior edge pointed fairly separating coxae IV. Pedicel not clearly seen.

**Sigilla** (Figure 1B). Three pairs almost submarginal, posterior 0.64 diameter, ca. 1.09 lengths apart; ca. 0.20 dist. from margin; middle 0.30 diameter, ca. 2.69 lengths apart; ca. 0.11 dist. from the margin; anterior 0.3 diameter, ca. 2.71 apart, marginal.

**Coxae** (Figure 1B). I, long 3.38 wide 1.54; II, long 3.29 wide 1.73; III, long 2.75 wide 1.70; IV, long 3.25 wide 1.97.

**Leg.** Formula 4321. Leg lengths (ta—tarsus, mt—metatarsus, ti—tibia, pa—patella, fe—femur, total): leg I 2.22, 3.67, 4.76, 3.64, 5.78, 20.07; leg II 2.37, 4.75, 4.50, 3.54, 6.30, 21.46; leg III 2.59, 5.69, 4.47, 3.38, 5.40, 21.53; leg IV 2.96, 7.57, 5.54, 3.41, 6.45, 25.93; palp 4.11, —, 3.09, 2.39, 5.56, 15.15. Midwidths (fe, ti): leg I 1.33, 1.30; leg II 1.42, 1.20; leg III 1.38, 1.11; leg IV 1.13, 1.14; palp 0.89, .94. Spines (r—retrolateral, p—prolateral, v—ventral) leg I, ta, r 2, p 3, mt, p 2, r 4, ti, v 1; leg II, ta, p 4, r 5, mt, r 3, p 3, ti 1; leg III, ta, p 5, r 4, mt, r 8, p 8, v 1, ti v 2, p 3, r 2; leg IV, ta, r 4, p 8, mt, r 5, p 6, ti, p 5, r 2, v 2, palp ta, r 5, p 6, ti p 3, v 1.

**Scopulae.** Absent on all legs

**Trichobothria.** Tarsi I, 13–14 long and short filiform in one rows, entire; tarsi II, 15–16 long and short filiform in one rows, entire; tarsi III 17–18 long and short filiform in one rows, entire; tarsi IV, 18–19 long and short filiform in one rows, entire; palp tarsi 20–21 long and short filiform in one rows, entire.

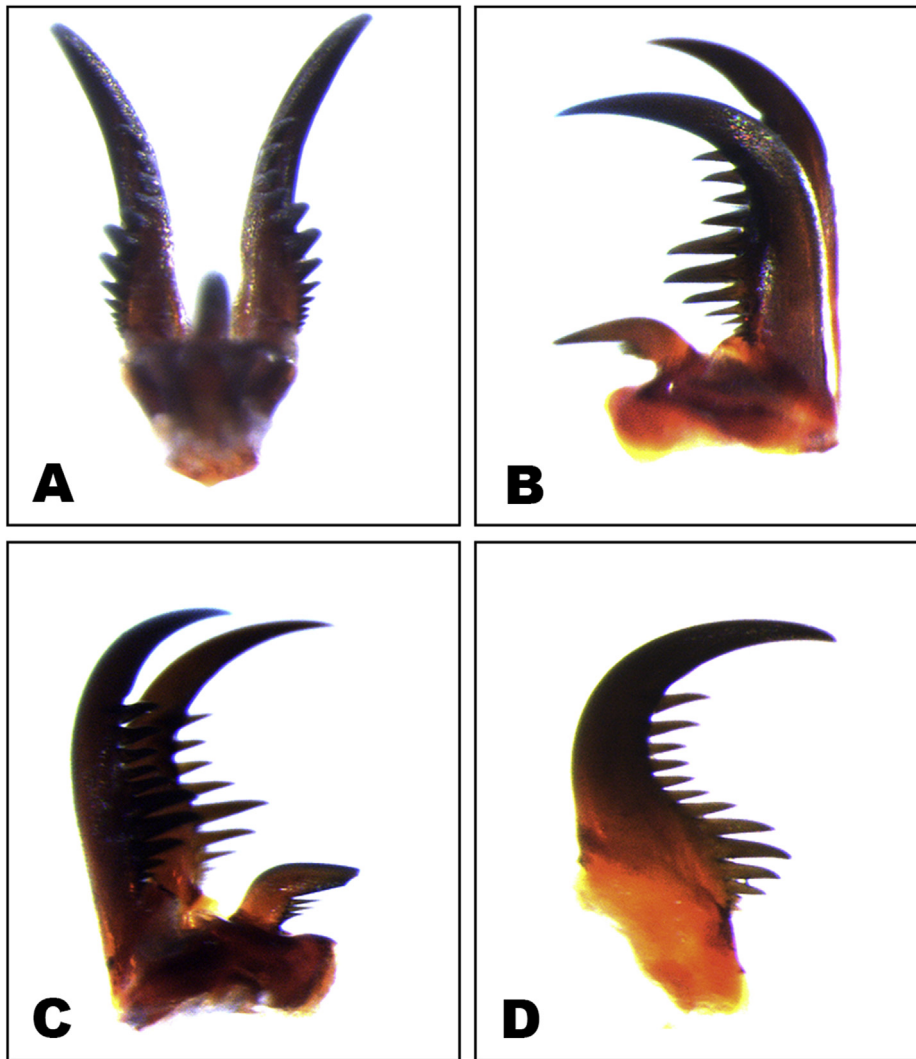
**Claws** (Figures 3A–D). Inferior tarsal claw with three dentitions. Superior tarsal claws on all legs with sigmoid dentition; single claw on palp with dentition.

**Abdomen pilosity.** Cuticle not exposed dorsally and ventrally; dorsal and ventral aspect covered with fine layer of black setae intermixed with long and short black spike setae.

**Spinnerets** (Figures 2D and 4A–D). Two pairs, pale yellowish, covered with sparsely placed black setae. Spigots spread across the ventral aspect of all segments. Spigots on posterior lateral spinnerets fused and flagelliform. Base of spigot smooth with undulating grooved surface.

**Spermathecae** (Figure 5E). Two elongate stalks with bulbous receptacles at their tips which are bent inwards.

**Natural history and distribution.** A single specimen of this species was found in a cavity on a tree trunk ca. 1.5 m above the ground. The



**Figure 5.** *Orientothele alyratus* gen. et. sp. nov. holotype female NCBS AR142. A, retrolateral chelicerae; B, prolateral chelicerae; C, ventral view of chelicerae showing teeth; D, spinnerets; E, spermathecae.

cavity was lined with a thick layer of web. The type locality is situated on the border on Mizoram and Tripura and is the highest elevation in Tripura (Figure 6). The Jampui hills run parallel to other low hills in Tripura as well as Mizoram in addition to Bangladesh. These low hills share a similar biotope and it is likely that the new species will be found in both these states, Bangladesh, and other parts of northeast India. The forest type at the collection locality and is of semi-evergreen type, but is largely degraded and dominated by *Jhum* cultivation.

**Etymology.** The specific epithet is a Latinized compound word for “alyrate” with a Latin suffix ‘us’ referring to the absence of lyra on the prolateral face of maxilla.

## Discussion

Description of the new genus is not really surprising as north-east India is poorly surveyed to document its arachnid fauna and investigations by recent researchers have resulted in discoveries of several new species and also a new genus (Mirza et al 2016; Siliwal et al 2015a, 2015b, 2009). This is not just the case with spiders alone, but a parallel scenario for scorpions (Mirza et al 2016).

Furthermore, spiders of the family Dipluridae are one of the least studied group among mygalomorph spiders globally, as is evident from the description of several new species and genera in the recent past (Coyle 1988, 1995; Main and Framenau 2009; Raven and Platnick 1978; Schwendinger and Zonstein 2011; Schwendinger 2009).

Tikader (1968) described *Ischnothele indicola* from Shillong now in Meghalaya based on a male and female specimen. During a visit to the head office of the Zoological Survey of India in Kolkata, attempts were made to locate the types but the specimens were not found. The author stated that the specimens would eventually be deposited at Zoological Survey of India, Kolkata (ZSIK) but likely they were not deposited and hence the exact identity of this species remains in question. Based on the description and illustrations, it is impossible to comment on the taxonomic status. In light of the present discovery of the new genus, we presume that *Ischnothele indicola* would likely belong to the new genus and not certainly *Ischnothele*. This must be formally executed after examining type or topotypic material from the type locality. Examination of topotypic material is out of the scope of the present study and hence we propose *Ischnothele*

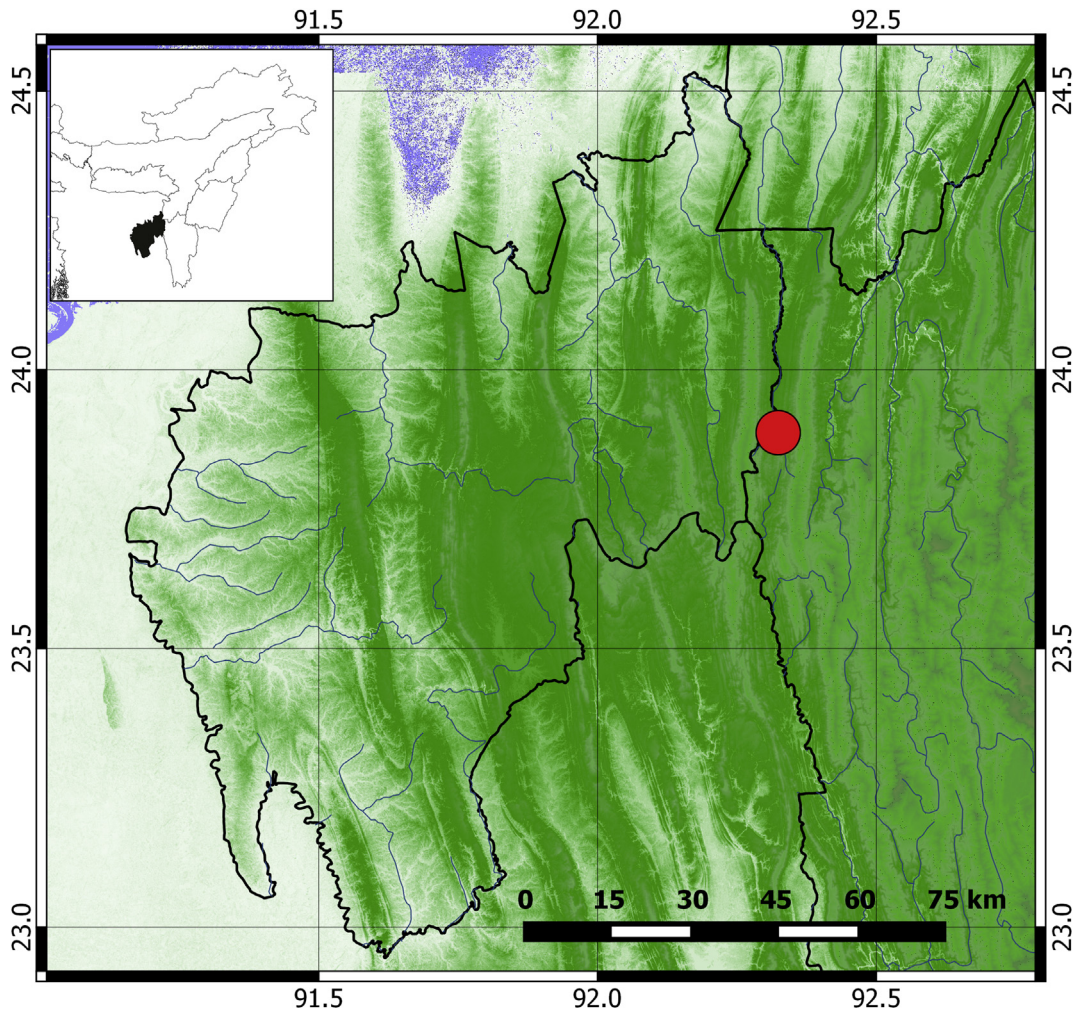


Figure 6. Map showing type locality on the border of Tripura and Mizoram in northeast India. Inset map shows northeast India with Tripura highlighted in black.

*indicola* be treated as *incertae sedis* with regards to its generic placement as the genus *Ischnothele* is restricted to the new world (Coyle 1995).

The family Dipluridae is well represented by the genus *Indothele* in the peninsular region, however, the northeast had thus far remained undersurveyed. It is likely that additional species of the new genus as well as *Intothele* will be found across India with dedicated surveys across the country.

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Thanks are due to Atul Kumar Gupta (PCCF & CWLW, Member Secretary, Tripura Biodiversity Board) and Ajith Kumar (NCBS) for initiating the Tripura biodiversity surveys. This work was in collaboration with the Tripura Biodiversity Board, which facilitated and funded this project. Survey and collection permits [No.F.8.(163)/For-WL-2012/Part/38802-08] were granted by the Principal Chief Conservator of Forests, Department of Forest, Government of Tripura. Forest department staff at Kanchanpur and Manu Forest Divisions provided logistical support. The voucher specimen is deposited in the research collections of the National Centre for Biological Sciences, Bangalore. Special thanks to Ajith Kumar and Atul Kumar Gupta for comments on the manuscript. Zeeshan Mirza was supported by a generous grant from the Rufford

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