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New distributional record of *Neoheterophrictus crurofulvus* (Araneae: Mygalomorpheae) from Western Ghats Kerala

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Abstract
The genus *Neoheterophrictus* is endemic to the western ghats of India, hence the first record of *Neoheterophrictus crurofulvus* described in this article by Udumbannor Western Ghats, Kerala. This species is similar to the genus *Heterophrictus* Pocock 1900 and *Plesiophrictus* Pocock 1899; differs by a double tibial spur. Similar to *Neoheterophrictus smithi* in the double tibial spur, but can be separated by the lack of a long, slender spine at the base of the primary apophysis. The Western Ghats of India stretches over few states, the chances of flora and faunal distribution is uncertain. Since this woodland range is intertwined, there is a possibility of faunal and floral intermixing. Hence the species *N.crurofulvus* was first discovered in Karnataka, but it is also possible to find it in Kerala. Here we are providing a new distributional report of species *N.crurofulvus*. Illustrations, pictures and natural history are included.

Keywords: theraphosidae, mygalomorph, distribution, taxonomy

Introduction
Theraphosidae Thorell, 1869 is a plentiful family of spiders that includes 1004 species and 150 genera. Pocock (1892. 1895 & 1900), who first studied these spiders in India, Ceylon, and Burma. Eventually, Hirst (1909) [10] Gravely (1915, 1918), Tikader (1969) [8] attempts to work out this group of spiders. The genus *Neoheterophrictus* was established by Siliwal *et al*. (2012) [5] to accommodate three species namely *Neoheterophrictus crurofulvus* Siliwal, *N.sahyadri* Siliwal, and *N.uttarakannada* Siliwal. This genus shows very small variation from the genus *Heterophrictus* and *Plesiophrictus* (Mirza and Sanap 2014) [4]. The genus *Neoheterophrictus* is endemic to India with seven species. *Neoheterophrictus* Siliwal (2012) [5] can be diagnosed from related genera by the multilobed spermathecae in females and double tibial spur in males (Mirza *et al*., 2014) [4]. It differs from *N. bhori* having a slightly curved maxillary suture (Jose, K. S. 2019) [6]. This species differs from *N. smithi* in possessing a long slender spine along the base of the primary apophysis. In this paper, a *Neoheterophrictus crurofulvus* from Udumbannoor Western Ghats, Kerala is described.

Materials and Methods
The specimens were examined and preserved in 70% alcohol. Measurements are given in mm. Images of live spider were taken with a Canon EOS 600D Digital Camera, with EFI0 mm f/2.8 macro USM. Microphotographs were taken by Labomed Luxeo 6Z stereozoom microscope. Spermathecae were dissected out and cleared in KOH. Measurements of legs were taken based on left side. Length of palp and leg segments is given as: Femur, patella, tibia, metatarsus (except palp), tarsus, total. Eyes measurements were taken by calibrated ocular micrometer. Claws are not included in the measurement of tarsi. Total body length excludes chelicerae.
Abbreviations used: AME-anterior median eye, ALE-anterior lateral eye, PME-posterior median eye, PLE-posterior lateral eye, mt-metatarsus, ti-tarsus.

Result
Taxonomy: A male *Neoheterophrictus crurofulvus* Siliwal, M., Gupta, N., & Raven, R. (2012) [5].

Type: Male, 10.xii.2009, WILD-09-ARA-472, coll. M. Siliwal, S. Behera. Deposited at WILD, Coimbatore, Tamil Nadu.

Diagnosis: Males are characterized with primary and secondary tibial apophysis (fig.4) with stout pointed black spine. Secondary tibial apophysis differs from primary in the presence of a tubercle with numerous erect spines and a spine arises from the base of tubercle pointing toward apex in retrolateral view. A white patch found in all tarsi except fourth leg (Fig.1). Presence of coxal suture in all legs (Fig3).

Description: (Fig. 1)
Total length 12.6, carapace 6.6 long, 0.50 wide, chelicera 3.2 long after dissection. Sternum 3.0 long, 2.6 wide. Abdomen 6.2 long, 2.8 wide.

Carapace (Fig. 2): Black carapace wider than larger covered with golden brown coloured hairs. The body greenish black in color with channel like stripes arising from fovea intermixed with golden brown and short black hairs. Ocular area glaborous. Anterior and posterior ocular area covered with mat of fine hairs spread towards clypeus and chelicerae. Fine golden hairs surrounding the PLEs and hairs absent in between AMEs. Fovea is deep and procurved.

Eyes (fig 3A): ALEs are clearly larger than others, AMEs are slightly smaller than ALEs. PMEs are smaller than rest. Anterior set of eyes are procurved. Eye diameter: ALE 1.2,

AME 0.72, PLE 1.0, And PME 0.9. Distance between eyes: AME-AME 0.4, ALE-ALE 2.4, PME-PME 1.8, PLE-PLE 3.3. Occular field 4.4long, 2.5wide.

Maxillae (Figs.3B, 5C): 1.8 long, 0.9 wide; Coxa of the maxillae featuring a suture with short scattered setae above and below on prolateral view; retrolateral face is smooth and glabourous with long bristles arising from the base of coxa. Vento lateral side of maxillae has dense mat of orangish yellow hairs. Around one hundred cuspules in the triangular anterior corner of ventral side.

Labium (Fig. 2B): 1.0 long, 1.4 wide; nearly 33 cuspules present anteriorly. Labiosternal groove is concave covered with long black bristles.

Chelicerae (Fig 5A-B): 15 promarginal teeth present. Long tuft of retromarginal setae present. Rastellum absent.

Sternum: comparatively small sternum filled with black bristles and 3 pairs of sigillae. Posterior edge is pointed but not separating the coxa IV. Long and short bristles radiating from the base. Pedicel is not clear.

Sigillae: 3 pairs. Posterior oval, 0.03 diameter; middle oval, 0.02 diameter, anterior oval, 0.01 diameter.

Leg: Formula 4123. (Femur, patella, tibia, metatarsus, tarsus, total).All legs almost equal in thickness. Presence of spines on leg segments except coxa and femur.

Leg coxae: Prolateral coxa of all legs with numerous horizontally aligned small setae above and below coxal suture. Coxa I and II sloping forward; coxa III and IV is sloping backward. Spines leg I mt v 1; leg II – ti v 4 p1 r1, mt v 4 p 2 r1; leg III- ti v 5 p 2 r 1; leg IV-ti 4 p 2 r 2, mt v4 p2 r.

Table 1: Leg measurements of *Neoheterophrictus crurofulvus* (male) (Measurements in mm)

	Leg I	Leg II	Leg III	Leg IV	Palp
Femur	6.23	6.12	4.58	5.74	6.8
Patella	2.02	1.43	1.62	2.04	2
Tibia	5.89	4.31	3.81	5.27	4.1
Metatarsus	3.72	3.41	4.02	6.50	-
Tarsus	3.34	3.18	3.51	3.17	1.2
Total	21.2	18.45	17.54	22.2	14.1

Fig 1: *Neoheterophrictus crurofulvus*. Habitus

Fig 2: *Neoheterophrictus crurofulvus.* A, Dorsal view; B, Sternum, labium maxillae, and chelicera ventral view

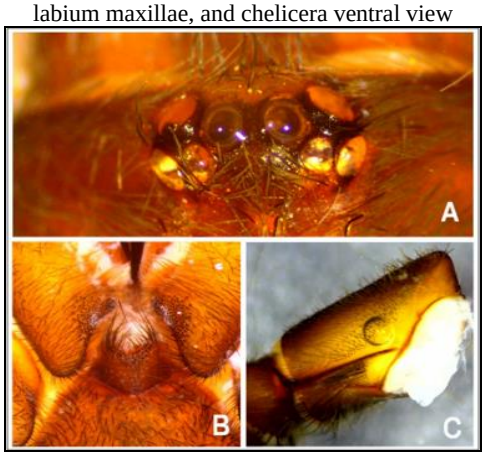

Fig 3: *Neoheterophrictus crurofulvus*. A, Eyes; B, cuspules on maxillae; C, coxal suture

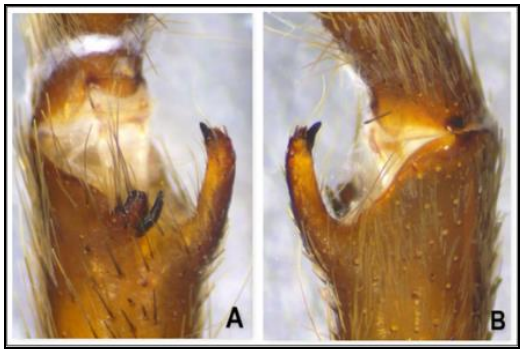

Fig 4: *Neoheterophrictus crurofulvus*. A, Tibial apophysis prolateral view; B, Tibial apophysis retrolateral view

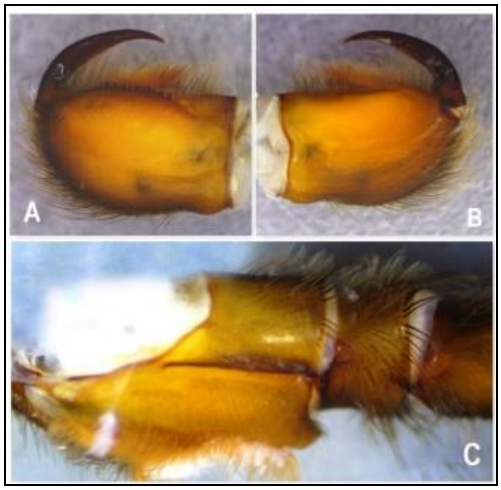

Fig 5: *Neoheterophrictus crurofulvus*. A, chelicerae prolateral view; B, chelicerae retrolateral view; C, maxillary suture

Fig 6: *Neoheterophrictus crurofulvus*. A, palp retrolateral view; B, palp prolateral view

Fig 7: Distributional map – *Neoheterophrictus crurofulvus* 01: Idukki-Kerala, 02: Karnataka

Abdomen
Comparatively smaller abdomen with covered with thick mat of brown setae intermixed with black and grey bristles. Dorsally numerous black bristles near the pedicel. Spinnerets protruding outwards.

Tibial apophysis (Fig.4): Thick primary segment, curved at the apex, gradually tapers in to a spine. Primary segment reddish brown at base, gradually turning black towards the distal portion. Secondary segment in tubercle form, bearing up on its numerous erect spines and a stout curved spine arises from its base which terminates in a blunt tip.

Palp (Fig 6): A whitish tuft of hairs on the tarsus of Pedipalp featuring dark brown colored palpal bulb and a spine tapering in to fine point, which curve upwards.

Material examined: Male (DMCK 20/343) India: Kerala, Idukki (9°34'23.4"N 76°29'09.5"E), 23 June 2020.Deposited at Arachnology Lab, Deva Matha College, Kottayam (DMCK 20/343).

Biology: Males of this species were usually wandering around semi evergreen forest with 70% canopy and 30 % ground and rock. We collected this species while crossing a mud road with a deep slope in one side and full of trees and rocks on the other side. They were quite calm while collecting, but aggressive and wandering in captivity. They feed up on cockroach larva and nymph.

Distribution (Fig. 7): India (Kerala, Karnataka)
Etymology: The name of the species is a combination of two Latin words, 'cruro' (for legs or limbs) and **'**fulvus**'** (for tawny or yellowish-brown) theraphoside.

Conclusion
Genus *Neoheterophrictus* is endemic to the Western Ghats of India, since *N.crurofulvus* were reported only from Karnataka, the first report from Kerala extends the distributional range of this genus along the Western Ghats. A detailed description of this particular genus provides additional information about their natural history and taxonomy. *N.crurofulvus* was first reported from India was by *siliwal et al* (2012) [5].

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