

A NEW SPECIES OF THE GENUS *Plesiophrictus* (ARANEAE: THERAPHOSIDAE: ISCHNOCOLINAE) FROM WESTERN GHATS, INDIA

Manju Siliwal¹, Sanjay Molur² and Robert Raven³

^{1,2}Wildlife Information & Liaison Development Society, ²Zoo Outreach Organisation,
29-1, Bharathi Colony, Peelamedu, Coimbatore, Tamil Nadu 641004, India

³Queensland Museum, Grey Street, PO Box 3300, South Brisbane, 4101, Queensland, Australia
Email: ¹manju@zooreach.org; ²herpinvert@gmail.com; ³Robert.Raven@qm.qld.gov.au

ABSTRACT

Plesiophrictus nilagiriensis sp. nov., a new mygalomorph spider of the family Theraphosidae is described from the Western Ghats of Tamil Nadu, India. Illustrations, images and natural history are included. The new species is distinct from other known species in carapace length, absence of apical spur on tibia I, presence of single metaspine on metatarsus II, differences in scopulae, and spermathecae structure.

KEYWORDS

Mygalomorph, new description, Nilagiri, *Plesiophrictus* sp. nov., tarantula, Theraphosidae, Western Ghats

ABBREVIATIONS

AME - anterior median eye; ALE - anterior lateral eye; d - dorsal; fe - femur; pa - patella; PME - posterior median eye; PLE - posterior lateral eye; me - metatarsus; MOQ - median ocular quadrate; PMS - posterior median spinnerets; PLS - posterior lateral spinnerets; p - prolateral; r - retrolateral; ta - tarsus; ti - tibia; v - ventral; WILD - Wildlife Information & Liaison Development Society; ZSIK - Zoological Society of India, Kolkata

The genus *Plesiophrictus* belongs to the subfamily Ischnocolinae of the mygalomorph family Theraphosidae and is reported from China, India, Micronesia and Sri Lanka (Platnick, 2007). Amongst the Indian genera of the family Theraphosidae, *Plesiophrictus* is a relatively species-rich genus (Siliwal *et al.*, 2005; Siliwal & Molur, 2007).

Pocock (1899) established the genus *Plesiophrictus* with description of three species, *P. millardi* and *P. collinus* from India and *P. tenuipes* from Sri Lanka, assigning *P. millardi* as the type species. Later, a number of new species were described from India under this genus (Pocock, 1900; Gravely, 1915, 1935; Tikader, 1977). After the establishment of the genus *Plesiophrictus*, the two Indian species, *Ischnocolus linteatus* Simon, 1891 and *Stichoplastus fabrei* Simon, 1892 were transferred to this genus by Pocock (1900) and Simon (1903), respectively. This genus was considered endemic to South Asia until the Micronesian species *Ischnocolella senffti* Strand, 1907 was transferred to this genus by Roewer (1963). Recently, Yin & Tan (2000) described a new species, *P. guangxiensis* from China. Till date, 16 species have been reported under this genus from the world, of which 13 are endemic to India, one endemic each to China and Sri Lanka and one endemic to the islands of Micronesia (a conglomerate of 9 countries) (Platnick, 2007).

Most of the species described from India are known only from the type localities; information on range and geographical variations are limited. More than fifty percent of the species were described a century ago based on very few morphological

characters, missing details used in present day taxonomy like morphometry of legs, description of genital structure especially of female, illustrations, sternum, male palp and female spermatheca (see Simon, 1891, 1892; Pocock, 1899, 1900; Strand, 1907; Gravely, 1915, 1935). The more recent descriptions of *P. meghalayaensis* and *P. mahabaleshwari* by Tikader (1977) are also incomplete as they lack morphometry of legs, comparison with other species and diagnosis for the species.

This paper is an effort to describe a new species based on a female specimen after comparing the available prominent characters with other known species. The objective of this paper is not only to describe a new species, but also provide South Asian arachnologists with a standard description pattern on theraphosids or any mygalomorph spider along with pictures (see Images in the web supplement) in addition to figures as a useful tool for comparative studies. None of the past descriptions of *Plesiophrictus* spp. includes notes on natural history or ecology, which we have added as noted during our study.

METHODS

Taxonomic description style for the species follows Raven (2005). Measurements of body parts except eye were taken by Mitutoyo™ Vernier Caliper. Eye measurements were done with calibrated ocular micrometer. All measurements are in mm. Spermathecae were dissected from female and were cleaned in concentrated lactic acid in 100°C water bath for 15-20min. Photographs were taken with the help of Olympus™ (μ720 SW) camera attached to CETII™ stereomicroscope and illustrations were prepared with the help of camera lucida. The specimen is stored at WILD, Coimbatore and will be transferred to a national collection eventually.

TAXONOMY

Plesiophrictus Pocock 1899

Plesiophrictus Pocock, 1899. *J. Bombay Nat. Hist. Soc.*, 12: 749; 1900. *Fauna of British India*, 181; Raven, 1985. *Bull. Am. Mus. Nat. Hist.* 182: 154

Heterophrictus Pocock, 1900. *Fauna of British India*, 180
Ischnocolella Strand, 1907. *Jahresh. Ver. Naturk. Württbg.* 63: 14
Type species assigned in original description, *Plesiophrictus millardi* Pocock, 1899 based on male specimen.

Diagnosis: Fovea straight, transverse. Sternum sigilla marginal. PLE larger than PME. Few spines present on tibia and metatarsus of leg I-II and many more present on these

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segments of leg III-IV. Tarsal scopulae on all legs divided (Pocock, 1900; Raven, 1985).

Type species: *Plesiophriectus millardi* Pocock, 1899

Distribution: China, India, Micronesia and Sri Lanka

***PLESIOPHRICTUS NILAGIRIENSIS* sp. nov.**

(Images 1-24", Figs. 1-6)

Material examined

Holotype: Female, 23.xii.2006, Sundapatti beat, Mettupalayam Reserve Forest, Coimbatore district, Tamil Nadu (11°15'23"N & 76°50'31.9", 327m), coll. Manju Siliwal and B. Ravichandran, WILD-06-ARA-157.

Etymology

The species is named after the hill range Nilagiri (blue mountains) the southern extreme of the northern Western Ghats north of the Palakkad gap, on the southern spur of which is the type locality.

Diagnosis

Fovea straight. Cephalothorax and abdomen, reddish-brown. Cephalothorax as long as tibia and metatarsus of leg I; slightly shorter than length of femur and patella of leg II or metatarsus and tarsus of leg IV. ALE larger than the rest. Chelicerae with nine promargin teeth and few basomesal teeth. Apical spine on tibia II absent, single metaspine present on metatarsus II. Scopulae on tarsi not very dense, tarsi I-II divided centrally with single row of hair, tarsi III-IV divided with 3-4 rows of setae. Scopulae on metatarsi I-II, 3/4, divided with 2-3 row of setae, metatarsus III, distal half, scanty, divided with 3-4 row of setae, metatarsus IV distal few scopuliform hairs. Spermatheca consists of two pairs of lobes with two buds at anteriolateral sides.

Description

Female: Carapace 6.44 long, 5.10 wide, chelicerae 2.56 long intact, 3.3 long after dissection. Sternum 2.4 long, 2.74 wide. Abdomen 7.0 long, 4.88 wide. Spinnerets: PMS 1.36 long, 0.52 wide, 0.7 apart; PLS length: 2.14 basal, 1.54 middle, 2.16 distal; midwidths 0.52, 0.62, 0.48 respectively, 1.00 apart.

Carapace: (Images 1,2; Fig. 1) Fovea straight. Length to width 1.26; reddish-brown, darker towards anterior side and a darker band on the periphery; covered with short golden/gray wavy hairs, more dense towards margins and concentrated along the interstitial ridges radiating from fovea, posterior end with long curved brown hairs. Bristles: five long, 10-15 short black on caput, seven long gray on anterior edge; 17 short, three long between anterior eyes; five long, seven short between posterior eyes; no bristles between AME. No setae.

Eyes: (Image 3; Fig. 2) Ratio of group width to length 2.4. ALE clearly larger than the rest, PLE slightly larger than AME, and PME clearly smaller than the rest. Eyes on ocular tubercle. Eye diameter: ALE, 0.5; AME, 0.25; PLE, 0.3; PME, 0.15. Distance between the eyes: AME-AME, 0.05; PME-PLE, adjacent; AME-ALE, 0.1; PME-PME, 0.4. Ocular Quadrate, 0.5 long, 1.2 wide. MOQ: length, 0.4; front width, 0.6; back width, 0.8. Clypeus absent.

Maxillae: (Images 4-6; Fig. 3) Posterior ventral edge gently rounded for length. Cuspules: ca. 70 sparsely arranged in anterior corner in triangle region. Posterior edge near heel slightly concave. Maxillary lyra absent. Prolateral face, scattered short and long hair present, a band of setae present above the maxillary suture. Retrolateral face glabrous, yellowish-red.

Labium: (Images 4,5; Fig. 3) 0.80 long, 1.00 wide; ca 50 cuspules in band for one-fourth of length anteriorly; cuspules ca. similar in size to maxillary. Basal groove shallow, distinct. Labiosternal groove convex. One pair of large sternal sigilla present in labiosternal groove.

Chelicerae: (Images 7-9; Fig. 4) Intercheliceral spines absent. Chelicerae lyra absent. Prolateral, retrolateral faces glabrous, reddish-brown; promarginal teeth nine; 11 granules at basal chelicerae furrow or groove; a notch at the base of chelicerae furrow present.

Sternum: (Images 4,10; Fig. 3) 2.74 long, 2.4 wide. Oval, high in centre, sloping gradually, covered with long, dense, black hair. Posterior angle sharp but not separating coxae IV. Posterior edge clearly seen. Prostate hair mat strong, dense, of gray hairs. Marginal thorns absent. Pedicel pallid, not seen properly.

Sigilla: (Image 10; Fig. 3) Three pairs; posterior, oval, 0.2 diameter, ca. 1.2 apart, 0.1 from margin; middle, round, 0.15 diameter, 0.1mm from margin; anterior, very small, round, marginal.

Legs: Formula 4123. Leg I clearly thicker than IV, II subequal to IV. Basifemoral thorns absent on all. Metatarsus III 1.5 times longer than tarsus; metatarsus IV 1.8 times longer than tarsus; rest slightly longer than tarsae.

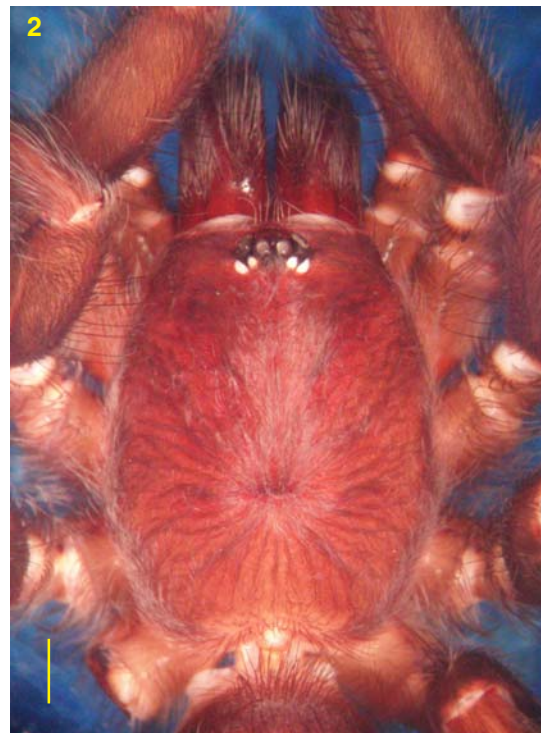
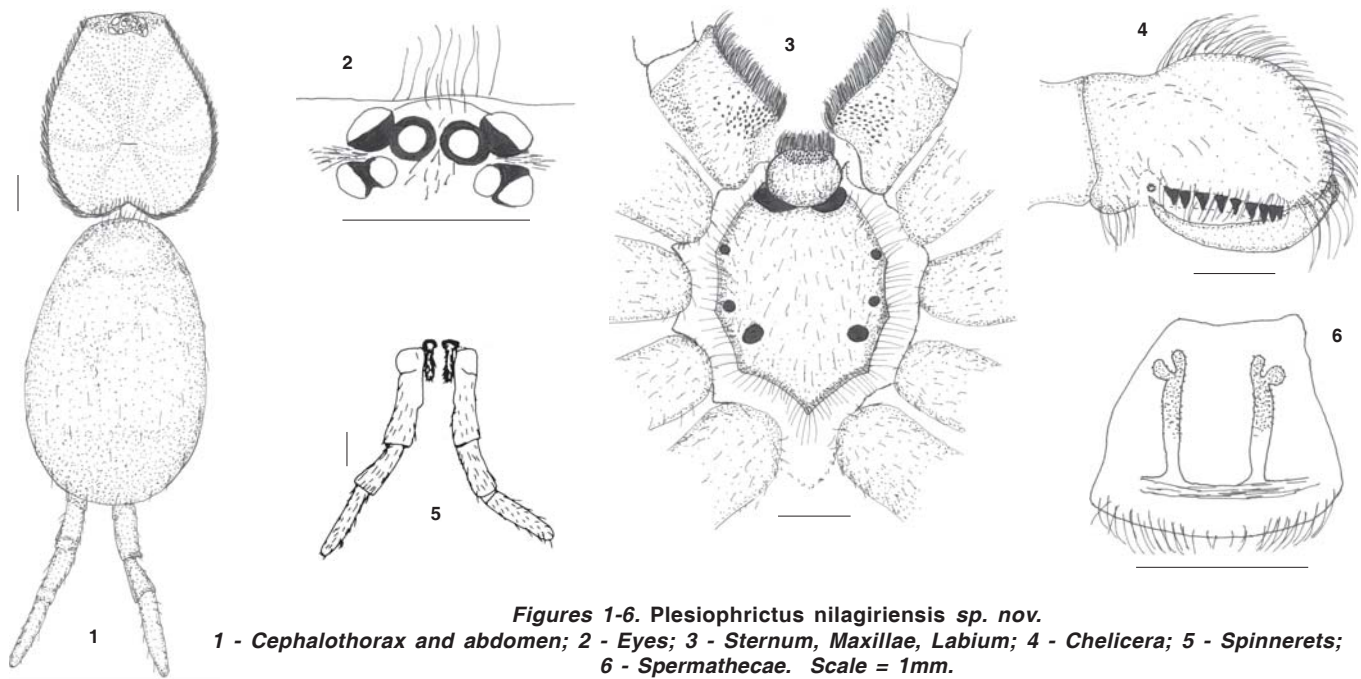
Spines: Metatarsus I, v1; metatarsus II, v1; tibia III, p1, r1, v3; metatarsus III d1, p1, r1 broken, v5; tibia IV p1, r3, v3; metatarsus IV p1+1 broken, r3, v3, elsewhere absent.

Trichobothria: On tarsi basal filiform field slightly wider than clavate field and merges smoothly; tarsi I-IV, clavate in distal 2/3; long filiforms only in basal half, shorter filiforms throughout the length. Short epitrichobothrial hair field on I as wide as clavates and uniform height for length.

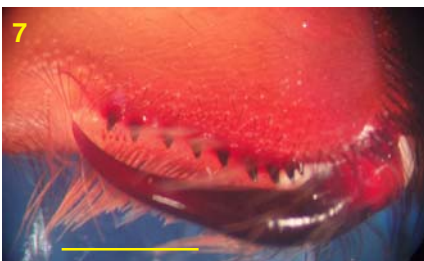
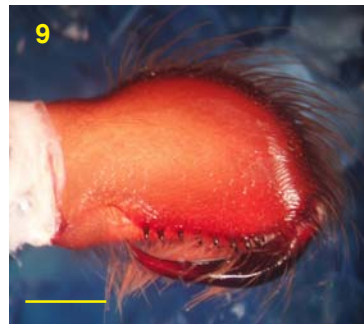
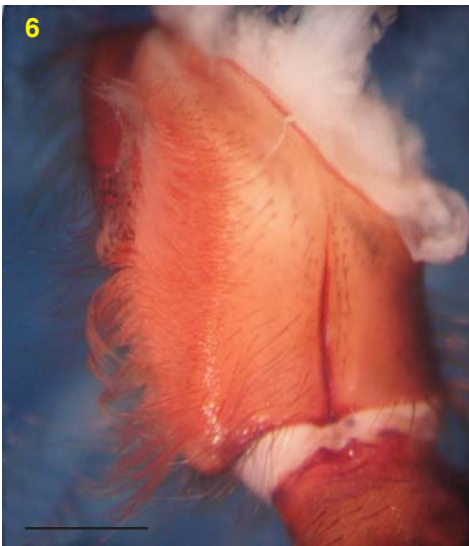
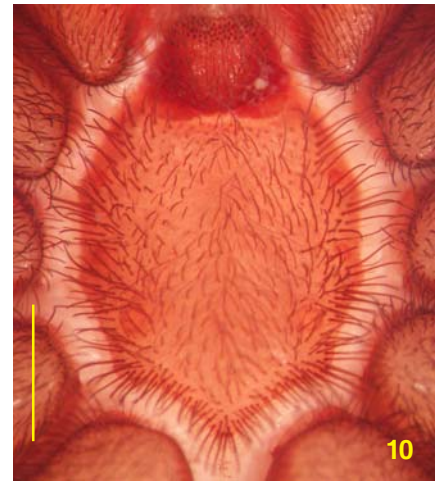
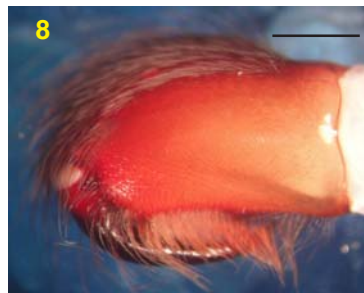
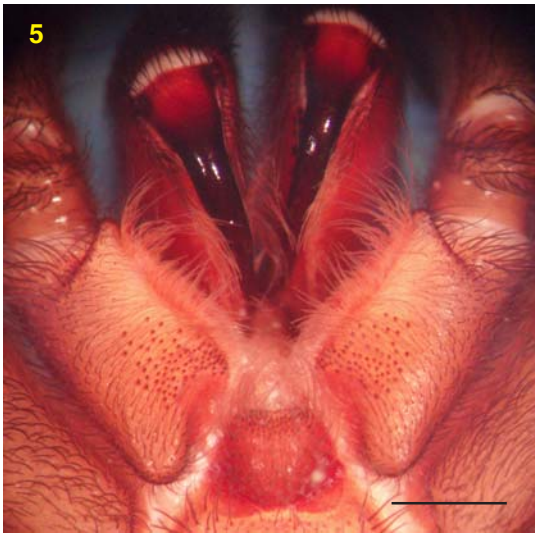
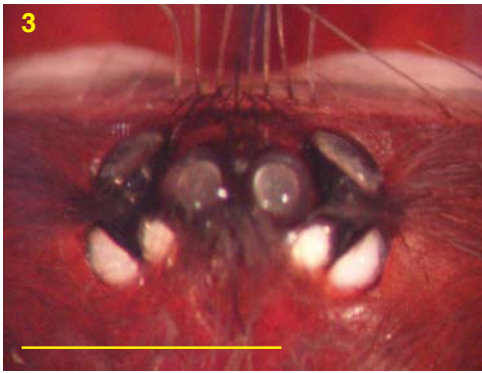
Leg coxae: (Image 4; Fig. 3) Coxal bases dorsally easily seen from above (Image 1^w). I longest, about 1.2 times length of II; IV clearly widest and basally with anterior corner indistinct, edge curves dorsally, rounded at interface. Coxae ventrally with short golden brown hair, weak thorns only on prolateral faces of I-II, III-IV consists of hairs. I-IV ventrally covered with golden brown mat of small hairs at base of coxa, long and short black and pallid hair, I-II sloping forward, III-IV sloping backward. Retrolateral setation I-III with median narrow light brush, IV glabrous; all retrolaterally lack ventral ledge.

Leg pilosity: Tibia I, p=4, r=2, d=2, v=8-10; metatarsus I, p=5, d=4, p=3; tarsus I, p=8, d=8-10, r=4-5; tibia II, p=4, r=2, d=3; metatarsus II, p=7-8, d=5-6, r=4-5, v=4-5; tarsus II, p=3, d=4, r=2; tibia III, p=3, d=5, r=2; metatarsus III, p=5-8, d=5, r=2; tarsus III, p=7, d=4, r=5; tibia IV, p=8, d=5, r=4, v=8-10; metatarsus, p=4, d=6-8, r=3, v=5; tarsus, p=3, d=5-6, r=7.

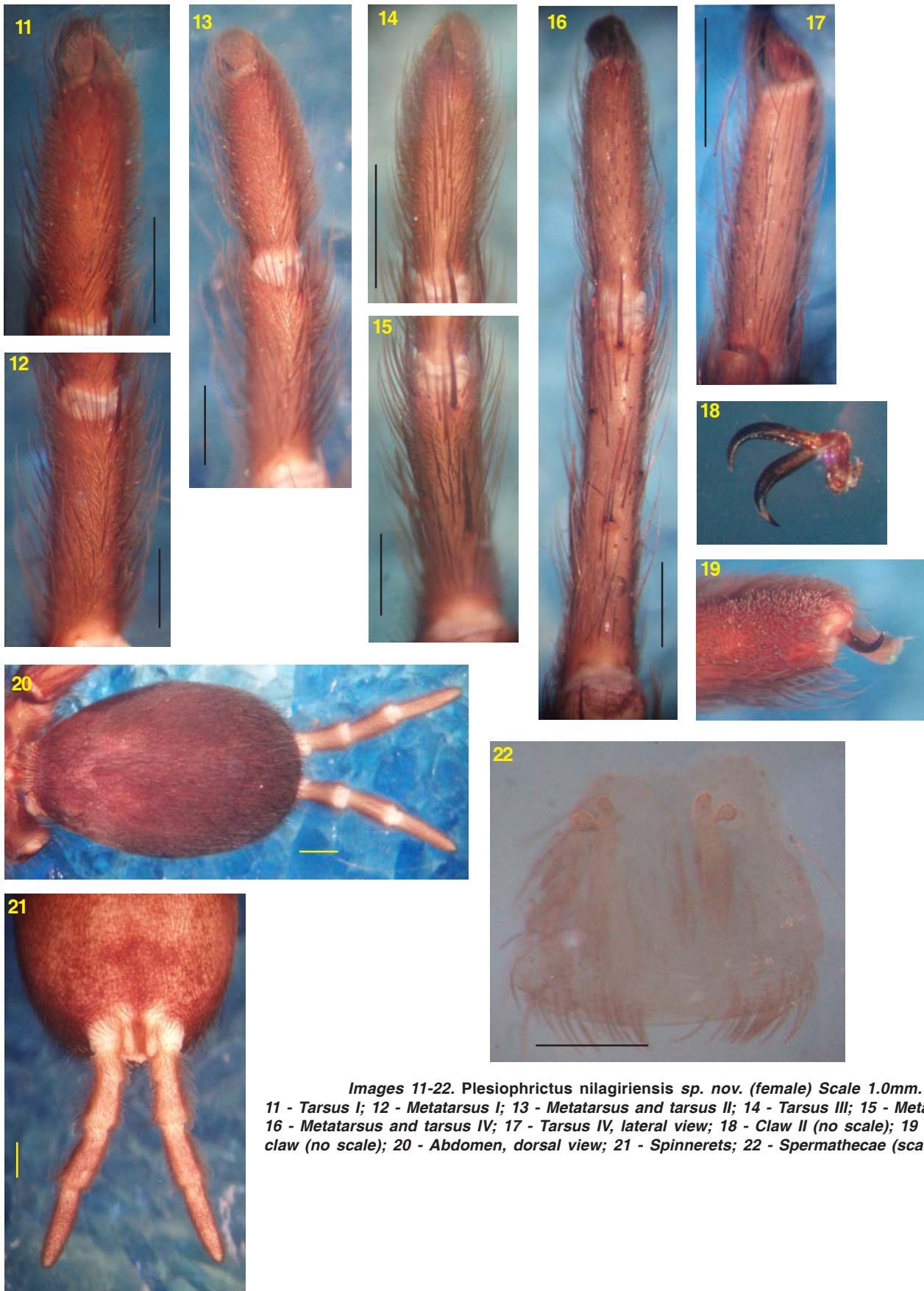
Scopula: (Images 11-16) Not very dense as seen in other



Images 1-2. *Plesiophrictus nilagiriensis* sp. nov. (female) Scale 1.0mm
1 - Dorsal view; 2 - Cephalothorax.



**Images 3-10. *Plesiophrictus nilagiriensis* sp. nov. (female) Scale 1.0mm.
3 - Eyes; 4 - Sternum, labium and maxillae; 5 - Labium and maxillae;
6 - Maxillae; 7 - Chelicerae promargin teeth; 8 - Chelicerae, retrolateral face;
9 - Chelicerae, prolateral face; 10 - Sternum.**

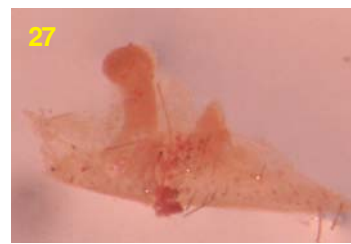
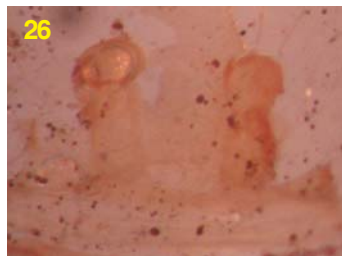


Images 11-22. *Plesiophrictus nilagiriensis* sp. nov. (female) Scale 1.0mm.
11 - Tarsus I; 12 - Metatarsus I; 13 - Metatarsus and tarsus II; 14 - Tarsus III; 15 - Metatarsus III;
16 - Metatarsus and tarsus IV; 17 - Tarsus IV, lateral view; 18 - Claw II (no scale); 19 - Palp
claw (no scale); 20 - Abdomen, dorsal view; 21 - Spinnerets; 22 - Spermathecae (scale, 0.5mm).



Images 23-24. *Plesiophrictus nilagiriensis* sp. nov.

23 - Multiple entrance to a burrow in decaying wood between rocks on the ground; 24 - Spider in life as seen with the dry leaf turned over. This species also makes its retreat under leaves and rocks on the forest floor amidst boulders.



Images 25-30. *Spermathecae*. No scale.

25 - *Plesiophrictus bhorii* Gravelly, 1915 from Parambikulam (Type, ZSIK 2218/17); 26 - *Plesiophrictus* ?*bhorii* from Kovalai (ZSIK no registration number); 27 - *Plesiophrictus blatteri* Gravelly, 1935 (Type, ZSIK 1491/18); 28 - *Plesiophrictus madraspatanus* Gravelly, 1935 (Type, ZSIK 1493/18); 29 - *Plesiophrictus satarensis* Gravelly, 1915 (Type ZSIK 2207/17); 30 - *Plesiophrictus mahabaleshwari* Tikader, 1977 (Holotype, ZSIK no registration number).

theraphosids; tarsi I-II, entire, divided centrally with single row of hair; tarsi III-IV, entire, divided 3-4 rows of setae, division broader at base; metatarsi I-II $\frac{3}{4}$, divided with 2-3 row of setae; metatarsus III $\frac{1}{2}$, distal, scanty, divided with 3-4 row of setae; metatarsus IV distal few scopuliform hairs, divided with 3-4 row of setae. No scopula on proventral tibiae I-II.

Spines, metatarsi: I-II, one distal ventral; III-IV, one distal ventral, two distal ventrolateral.

Claws: (Images 18-19) Paired claws on leg I-IV without dentition and single bare claw on palp.

Abdomen pilosity: (Image 20) Brown, cuticle little exposed dorsally and ventrally; dorsally covered with mat of golden hair, fine layer of brown long and short hair, many pallid; ventrally not uniformly light brown, darker near booklungs, epigynum and spinneret areas, many short and few long brown hair sparsely arranged.

Spinnerets: (Image 21; Fig. 5) Two pairs, yellowish with brown hairs. Apical end of PLS, digitiform.

Spermathecae: (Image 22; Fig. 6) Two pairs of lobes, broader at base and gradually narrowing towards apex with two buds anteriolaterally.

Remarks

Except for *P. raja* Gravely, 1915, all southern Indian species, namely, *P. linteatus* (Simon, 1891), *P. fabrei* (Simon, 1892), *P. collinus* Pocock, 1899, *P. satarensis* Gravely, 1915, *P. bhori* Gravely, 1915, *P. blatteri* Gravely, 1935, *P. madraspatanus* Gravely, 1935 and *P. mahabaleshwari* Tikader, 1977 and including the new species described here have brown integument.

Plesiophrictus nilagiriensis sp. nov. differs from the known species of *Plesiophrictus* from southern India described based on female specimen in the following characters: (i) carapace as long as tibia and metatarsus of leg I, slightly shorter than length of femur and patella of leg II or metatarsus and tarsus of leg IV; (ii) absence of apical spine on tibia I; (iii) presence of single metaspine on metatarsus II; (iv) scopulae on metatarsi I-II $\frac{3}{4}$, divided with 2-3 row of setae, metatarsus III $\frac{1}{2}$, distal, scanty, divided with 3-4 row of setae, metatarsus IV distal few scopuliform hairs.

Plesiophrictus nilagiriensis sp. nov. closely resembles *P. satarensis* Gravely, 1915 in having (i) anterior lateral eyes larger than anterior median; (ii) cephalothorax length slightly smaller than the length of patella and tibia of leg I or IV; (iii) all tarsi scopulae divided. However, *P. nilagiriensis* sp. nov. differs from *P. satarensis* in the following characters: (i) cephalothorax length is as long as tibia and metatarsus of leg I, slightly shorter than femur and patella of leg II or metatarsus and tarsus of leg IV (in *P. satarensis* cephalothorax length is slightly smaller than patella and tibia of leg I or leg IV, to tibia and metatarsus with patella or tarsus of leg II or leg III); (ii) Presence of only one apical/distal spine on metatarsi I-II (3 apical/distal spine on metatarsi II in *P. satarensis*); (iii) absence of apical/distal spine on tibia II (apical spine present on tibia II in *P. satarensis*); (iv) scopulae on metatarsi I-II is in $\frac{3}{4}$ distal length (in *P. satarensis*, scopulae on metatarsi I-II is in distal half); (v) spermathecae on long stalks with distinct bilobed ending, lobes bulb shaped (in *P. satarensis* the spermathecae end bluntly curving away from each other)

Table 1. Morphometry of legs and palp of female *Plesiophrictus nilagiriensis* sp. nov. from Mettupalayam, Tamil Nadu (measurements in mm).

Leg / Parts	I	II	III	IV	Palp
Femur	4.68	3.9	3.14	4.64	3.64
Patella	3.16	2.66	1.96	2.82	2.0
Tibia	3.54	2.56	2.0	3.92	2.36
Metatarsus	2.86	2.42	2.9	4.18	-
Tarsus	2.4	1.98	1.98	2.34	2.6
Total	16.64	13.52	11.98	17.9	10.6
Midwidth					
Femur	1.0	1.0	1.16	1.1	1.0
Tibia	0.88	0.9	1.0	0.9	1.0

P. nilagiriensis sp. nov. differs from *P. fabrei* (Simon, 1892) in: (i) leg length, much longer in *P. fabrei* in comparison to the total length; (ii) cephalothorax length not equal to the length of patella and tibia of leg IV (in *P. fabrei*, cephalothorax length is equal to patella and tibia of leg IV); (iii) ALE clearly larger than AME (in *P. fabrei* anterior eyes are subequal). The only character of *P. nilagiriensis* sp. nov. matching *P. fabrei* is the divided tarsi scopulae.

P. nilagiriensis sp. nov. differs from *P. collinus* Pocock, 1899 in: (i) smaller cephalothorax size than latter (6.44:8.5); (ii) cephalothorax length not equal to the length of tibia and metatarsus of leg IV (cephalothorax length is equal to the length of tibia and metatarsus of leg IV in *P. collinus*). Common character between *P. collinus* and *P. nilagiriensis* sp. nov. is in the number of promargin teeth (8-9:9) and presence of basomesal teeth.

P. nilagiriensis sp. nov. differs from *P. madraspatanus* Gravely, 1935 in: (i) being smaller in size than the latter (13.44:19); and (ii) presence of metatarsi spines on leg II-IV (in *P. madraspatanus* only on metatarsi I spines present); (iii) spermathecae on long stalks with distinct bilobed ending, lobes bulb shaped (in *P. madraspatanus* the spermathecae end bluntly curving inside towards each other).

P. nilagiriensis sp. nov. differs from *P. raja* Gravely, 1915 in: (i) body and legs reddish-brown (body of *P. raja* is steel-blue and metatarsi and tarsi of leg I paler than the rest of the leg segments); (ii) straight fovea (in *P. raja*, fovea is slightly procurved); and (iii) ALE larger than AME (in *P. raja*, ALE as large as AME).

P. nilagiriensis sp. nov. differs from *P. bhori* Gravely, 1915 in: (i) being smaller in size, cephalothorax is almost half the length of *P. bhori* (6.44: 12); (ii) cephalothorax as long as tibia and metatarsus of leg I (cephalothorax of *P. bhori* is slightly shorter than femur and patella or tibia metatarsus and tarsus of leg I; about equal to patella and tibia of leg I); (iii) spines absent on tibia of palp, leg I-II (in *P. bhori*, two apical spines present on tibia of palp); (iv) scopulae on metatarsae I-II distal $\frac{3}{4}$ (scopulae on metatarsae I-II of *P. bhori* is distal half); (v) distinctly bilobed spermathecae on long stalks (in *P. bhori*, the stalk ends in a single bulb-shaped or partly flattened mushroom-shaped lobe). The only common character between the new species and *P. bhori* is that the tarsi scopulae is completely divided.

P. nilagiriensis sp. nov. differs from *P. mahabaleshwari* Tikader, 1977 in: (i) being smaller in size, cephalothorax is 60% of the length of *P. mahabaleshwari* (6.44:11); (ii) distinctly bilobed

spermathecae on long stalks (in *P. mahabaleshwari*, the stalk ends in a single bulb-shaped lobe).

P. nilagiriensis sp. nov. differs from *P. linteatus* (Simon, 1891) in: (i) abdomen covered with golden, brown and pallid hair (in *P. linteatus* the abdomen is covered with long and dense yellowish- to reddish-brown hair); (ii) ocular tubercle more than twice wide than long (in *P. linteatus*, ocular tubercle not twice as wide as long); (iii) ALE clearly larger than AME (in *P. linteatus* anterior eyes are subequal); (iv) metatarsi I-II clearly longer than tarsi (in *P. linteatus* metatarsi of anterior legs is barely longer than tarsi)

Comparisons between the new description and previously described *Plesiophrictus* species are made based on type descriptions. In the case of *P. bhoiri*, *P. blatteri*, *P. madraspatanus*, *P. mahabaleshwari* and *P. satarensis*, the structure of the spermathecae have been compared from the type specimens as well. *P. bhoiri*, *P. blatteri* and *P. madraspatanus* occur geographically close to the new species, but show very distinct differences in the structure of the spermathecae. Also, based on the morphological characters described of other *Plesiophrictus* species, it is evident that the specimen collected from Mettupalayam is different justifying description of a new species.

There is a strong need for a redescription of all known species in this genus in India along with establishing neotypes as most of the types in Indian museums are badly preserved. This will also help in standardising descriptions as per recent taxonomy.

Natural history

The specimen was found in a rocky area 10m from the edge of a rivulet on the hilly spur of the Nilagiri mountains south of river Bhavani. The riverine habitat of the spider in moist evergreen forest in Mettupalayam reserve forest is at an elevation of 327m. The burrow of this spider opened to the outside as a meshy web and majority of the burrows had multiple openings (Image 23). Burrows were observed on dead wood, on stumps of trees within crevices, tree holes and between roots (Image 24). Burrows were also found in leaf litter and below rocks. In a survey of 8-km stretch of forest trail, this species was found patchily distributed only in a small area and not the entire length. The burrows were located in three patches within a distance of 1km from each other along the river bank. Approximately, 25-30 burrows were counted in 1m² quadrat in patches where they occurred; the density of burrows was highly reduced or non-existent between these patches. Burrows were not observed inside the forest away from the river. It seems like this species is restricted to the banks of the river, or occurs close to the high flow mark. As such no threats were observed either to the area or the spiders.

Comparative materials (females)

The specimens stored at the National Collection, Zoological Survey of India, Kolkata were examined to the extent possible. The state of the spermathecae is as available in the collection and were not worked on (see Images 25-30).

Plesiophrictus bhoiri, Co-type, ZSIK 2218/17 Parambikulam, 18-24.ix.1914, 1700-3200ft (Image 25);

Plesiophrictus ?bhoiri, Co-type, ZSIK (no registration number) Kovalai, Cochin state, 24-27.ix.1914, 1300-3000ft, coll. F.H. Gravely (Image 26).

Plesiophrictus blatteri, Type, ZSIK 1491/18, Panchgani, Satara district, Bombay Presidency, date unknown, coll. Blatter. (Image 27)

Plesiophrictus madraspatanus, Type, ZSIK 1493/18, Nagalapuram hill, Chengalpet district, Madras state, 30.x.1911, coll. Barnes (Image 28).

Plesiophrictus satarensis, Co-type, ZSIK 2207/17, Taloshi, Koyna valley, Satara district, Bombay Presidency, 2000ft, 27-28.iv.1912, coll. F.H. Gravely (Image 29).

Plesiophrictus mahabaleshwari, Holotype, ZSIK (no registration number) Mahabaleshwar, Satara district, Maharashtra, 31.v.1976, coll. B.K. Tikader (Image 30).

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