



First record of *Pandava laminata* (Thorell, 1878) (Araneae: Titanoecidae) from India

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ABSTRACT

The genus *Pandava* Lehtinen is represented by nine species in the world, of which six have been reported from India. *Pandava laminata* (Thorell, 1878) is having wide distribution range previously reported from Africa to Marquesas Islands in French Polynesia but only record in South Asia was from Sri Lanka. In this paper, we report *P. laminata* from India for the first time. A detailed taxonomic description on both the sexes is provided along with natural history information.

Keywords: taxonomy, range extension, Gujarat

Abbreviations: ALE: Anterior Lateral Eyes; AME: Anterior Median Eyes; CD: Copulatory Duct; ER: Epigynal Rim; GP: Giant Pore; MS: Manju Siliwal; PP: Primary Pore; PLE: Posterior lateral Eyes; PLT: Prolateral Lobe of Tibial Apophysis; PME: Posterior Median Eyes; RLT: Retrolateral Lobe of Tibial Apophysis; S: Spermatheca; WILD: Wildlife Information Liaison Development Society; WSC: World Spider Catalogue; fe: Femur; mt: Metatarsus; p: Prolateral; pa: Patella; r: Retrolateral; ti: Tibia; v: Ventral.

INTRODUCTION

The family Titanoecidae Lehtinen is represented by five genera and 53 species in the World [1], of which, three genera (*Anuvinda* Lehtinen [2], *Pandava* Lehtinen [3] and *Titanoeca* Thorell [4]) with eight species have been reported from India [1].

While carrying out spider survey in Jambughoda Wildlife Sanctuary, Gujarat, we came across medium sized spiders which were identified as *Pandava* because of presence of reduced tegular process near the base of the embolus; thumb-shaped median apophysis; spermathecae elongated and multilobed [5]. *Pandava* is represented by nine species in the world of which six species, have been reported from India [1] namely, *Pandava andhraca* [6]; *P. ganesh* [5], *P. ganga* [5], *P. kama* [5], *P. nathabhahi* [7] and *P. shiva* [5]. Further, the specimen from Gujarat was identified as *Pandava laminata* based on male and female copulatory organs and diagnosis provided by [5]. This species have been reported from Tanzania, Kenya, Madagascar, and Sri Lanka to China, New Guinea and Marquesas Islands [1]. There have been also reports of it being introduced in Germany [8] and Hungary [9]. In South Asia, this species was known only from Sri Lanka and inferred to be present in India but there have been no taxonomic records to support it. Therefore, in this paper we report *Pandava laminata* from Gujarat, which is the first formal taxonomic record for the species from India. We also provide description of the species based on male and female specimens collected from Gujarat.

MATERIALS AND METHODS

During the spider survey in Jambughoda Wildlife Sanctuary (22°20'–20°33'N and 73°35'–73°45'E), Gujarat, India, the specimens were collected from under the bark of trees by hand-pick method. All measurements are in mm. Epigyne was dissected and cleaned in concentrated lactic acid for 15 minutes to 20 minutes. All illustrations were prepared with the help of camera lucida attached to a CETII™ stereomicroscope by MS. Scanning Electron Microscope images for epigynum were taken through SEM-Zeiss EVO-40EP at the Wadia Institute of Himalayan Geology, Dehradun.

Specimens are deposited at the public museum of Wildlife Information Liaison Development Society, Coimbatore, Tamil Nadu, India.

Taxonomy

Pandava laminata (Thorell, 1878) [10]



Figure 1: *Pandava laminata* (Female, WILD-14-ARA-1268)

A - cribellate web of *P. laminata* under the bark of tree and an inset picture of spider habit (red arrow), egg sac (yellow arrow); B - dorsal view; C - ventral view

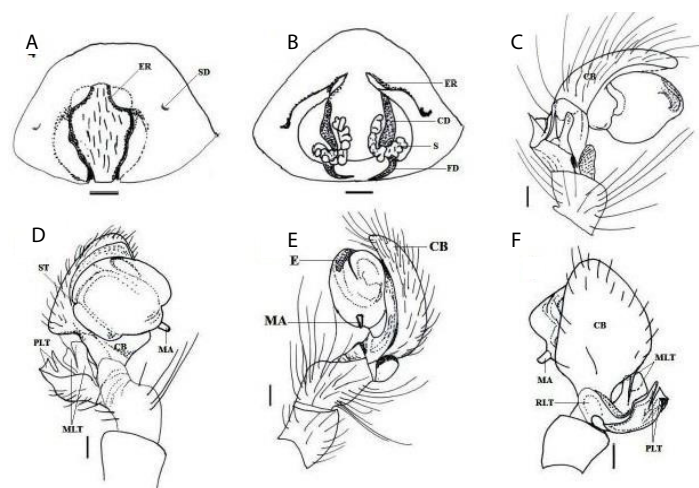


Figure 2: *Pandava laminata* female epigyne (WILD-14-ARA-1268), male palp (WILD-14-ARA-1267). A - external view; B - internal view; C - prolateral view; D - ventral view; E - retrolateral view; F - dorsal view. Abbreviations: CB: Cymbium; CD: Copulatory Duct; E: Embolus; ER: Epigynal Rim; FD: Fertilization Duct; MA: Median Apophysis; MLT: Median Lobe of Tibial Apophysis; PLT: Prolateral Lobe of Tibial Apophysis; RLT: Retrolateral Lobe of Tibial Apophysis; S: Spermathecae; SD: Sinuous Depression; ST: Subtegulum. Scale=0.1mm.

Amaurobius laminatus Thorell [10]: 168 (holotype male, from Ambon, Indonesia, deposited in MCSN, Genoa, not examined) [3]: 255.

Amaurobius castaneiceps Simon, [11]: 69, figure: 1 (holotype male, from Philippines, deposited in Muséum National d'Histoire Naturelle, Paris, not examined); [3] (Syn.).

Titanoeca birmanica Thorell [12]: 62 (holotype female, from Burma, nowadays Myanmar, should be deposited in MCSN, Genoa, not examined); Thorell [13]: 261 (Descr. %, deposited in Naturhistoriska Riksmuseet, Stockholm, Sweden, not examined); [3]: 255 (Syn.).

Amaurobius taprobanicola Strand [14]: 110, figure: 49, 50b (holotype female, from Ceylon, nowadays Sri Lanka, originally deposited in Staatliches Museum für Naturkunde in Stuttgart, destroyed according to [3], page 255); [3] (Syn.).

Amaurobius chinesisicus Strand [14]: 113, figure: 50a (holotype female from Southern China, originally deposited in Staatliches Museum für Naturkunde in Stuttgart, destroyed, according to [3] page 255); [3] (Syn.).

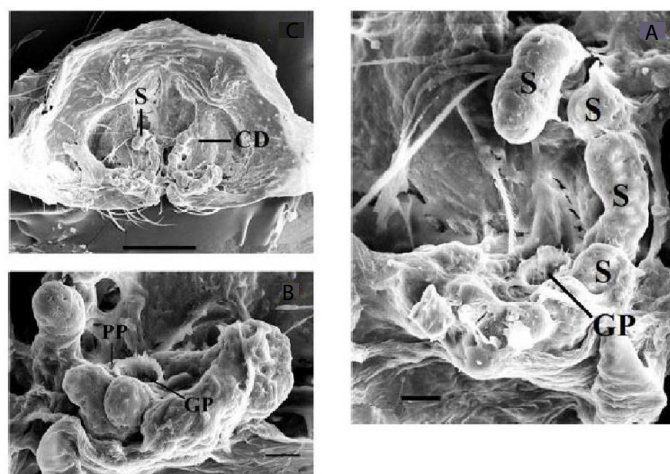


Figure 3: Epigyne of *Pandava laminata* (WILD-14-ARA-1268).

A- vulva-left spermathecae, B - vulva-right spermathecae, C - internal view;; showing primary pore and giant pore. Abbreviations: CD: Copulatory duct; GP: Giant pore; PP: Primary pore; S: Spermathecae

Titanoeca fulmeki Reimoser, [15]: 1, figure: 1 (holotype female, from Sumatra, deposited in Naturhistorisches Museum, Vienna, not examined); [3] (Syn.); [2]: 102, figures: 52-54, 58-59 (Descr. %).

Syroris mumfordi Berland [16]: 69, figures: 60-62 (holotype female, from Marquesas Islands, deposited in Muséum National d'Histoire Naturelle, Paris, not examined); [3] (Syn.).

Pandava laminata: [3]: 255, figures: 425-426, 440; Song, Zhu & Chen [17]: 396, figures: 230Q, U; [8]: 4, figures: 1-9; Ono & Ogata [18]: 133, figures: 7-10; [5]: 34, figures: 1-37; [9]: 184, figures: 1d, 2l-m.

Material Examined

INDIA: Katkuva, Jambughoda Wildlife Sanctuary, Gujarat, 1♂ and 2 ♀, 16.x.2014, coll. R. Solanki (WILD-14-ARA-1267, WILD-14-ARA-1268, WILD-14-ARA-1269).

Description, female (WILD-14-ARA-1268): Total length: 6.95. Carapace 3.00 long; 1.74 wide; Abdomen 3.95 long; 2.68 wide. Eye diameters and interdistances: AME 0.13; ALE 0.16; PME 0.18; PLE 0.16; AME-AME 0.105; AME-ALE 0.16; PME-PME 0.18; PME-PL 0.24; AME-PME 0.07; ALE-PL 0.05. Chelicerae 0.76 long. Sternum 1.47 long; 1.05 wide. Endite 0.89 long; 0.37 wide. Labium 0.48 long; 0.46 wide. Leg measurements (femur, patella, tibia, metatarsus, tibia, total length): I: 2.37, 1.05, 2.00, 1.79, 1.00, 8.21; II: 2.21, 0.95, 1.74, 1.68, 0.79, 7.37; III: 2.00, 0.95, 1.42, 1.47, 0.84, 6.68; IV: 2.42, 1.00, 2.00, 1.74, 1.00, 8.16; Palp (femur, patella, tibia, tarsus, total length): 0.84, 0.31, 0.53, 0.84, 2.52. Leg formula 1423. Leg spines: I fe p1, ti p2 r1 v5, mt p2 r1 v4; II ti p1 v2, mt p2 r1 v5; III fe p1, ti p1 r1 v1, mt p3 r3 v3-3; IV ti p1 r1 v1, mt p1 r1 v3-3. Carapace reddish-brown with lighter thoracic area, uniformly covered with black bristles and setae intermixed. Anterior row of eyes straight, posterior row of eyes slightly procurved. Chelicerae long reddish-brown covered with setae. Sternum oval, posteriorly acute, projecting between coxae IV, yellowish-brown in color, uniformly covered with black long setae. Endites longer than wide, almost parallel, pale brown. Labium apex sub-circular to rectangular. Abdomen beige, oval, longer than broad, uniformly covered with short and long black setae, dorsally as well as ventrally. Cribellum divided, as broad as spinneret area width. Calamistrum uniseriate and extending in the middle of the metatarsus IV, leaving one-fourth space on both the sides. Anterior spinneret two segmented with distal segment dome-shaped, posterior median pair of spinnerets smallest, posterior pair cylindrical with very short distal segment. Distally curved setae absent on all legs. Tarsi with three claws, true claw tufts absent. Epigyne with posterior border round, epigynal rim separated by less than their length; median field ending slightly before posterior margin and partly sclerotized. Vulvae, spermathecae with multiple lobes (bunches) arranged in sickle shape; primary pore clearly visible near giant pore.

Palp: Short rounded tibia without any apophysis, cymbium long covered with bristles and hairs. Tegular lobe triangular on prolateral side, retrolaterally with wide long scape like protrusion. Embolus short, sub-triangular embolic base wide gradually narrowing down to pointed tip. Three tegular apophyses (TA), TA1 extremely wide and long with a deep cut on lateral side and hollow inside. TA 2 and TA3 thin long with broad tips.

Size variations: female (WILD-14-ARA-1269): Total length: 6.95. Carapace 4.05 long; 2.25 wide; Abdomen 5.85 long; 3.25 wide. Chelicerae 0.82 long. Sternum 1.85 long; 1.15 wide; endite 0.95 long; 0.36 wide; labium 0.50 long; 0.47 wide. Leg measurements (femur, patella, tibia, metatarsus, tibia, total length): I: 2.25, 1.00, 2.05, 1.95, 0.95,

8.20; II: 2.45, 0.92, 2.00, 1.75, 0.75, 7.87; III: 2.00, 0.92, 1.43, 1.53, 0.85, 6.73; IV: 2.32, 1.00, 2.05, 1.55, 1.00, 7.92; Palp (femur, patella, tibia, tarsus, total length): 0.85, 0.30, 0.52, 0.85, 2.52.

Description of male (WILD-14-ARA-1267): Total length 6.32. Carapace 2.95 long; 2.05 wide, Abdomen 3.37 long; 2.21 wide. Eye diameters and interdistances: AME 0.105; ALE 0.18; PME 0.13; PLE 0.16; AME–AME 0.105; AME–ALE 0.16; PME–PME 0.18; PME–PLE 0.24; AME–PME 0.105; ALE–PLE 0.05. Chelicerae: 1.37 long. Sternum 1.53 long; 1.56 wide. Endite 0.95 long; 0.37 wide. Labium 0.47 long; 0.45 wide. Leg measurements (femur, patella, tibia, metatarsus, tibia, total length): I: 3.05, 1.21, 2.84, 2.74, 1.21, 11.05; II: 2.79, 1.16, 2.42, 2.37, 1.00, 9.74; III: 2.37, 1.00, 1.84, 2.00, 0.95, 8.16; IV: 2.74, 1.00, 2.37, 2.31, 1.05, 9.47; Palp (femur, patella, tibia, tarsus, total length): 1.89, 0.68, 0.89, 2.05, 5.51. Leg formula: 1243. Leg spines: I fe p1, ti p2 r4 v8, mt p3 r3 v4; II fe p1, ti p2 r2 v4, mt p3 r2 v5; III fe p1, ti d1 p1 r1 v1, mt p3 r3 v5; IV ti p1 r2, mt p3 r2 v6. Distally curved setae on prolateral face of leg I and II on femur, patella, tibia and metatarsus. Tibia apophysis consists of three lobes: RLT, MLT, PLT. RLT with rounded margins and lateral partial outward fold; MLT and PLT dividing into two unequal lobes; main lobe of PLT shorter than RLT. Rest of the characters are like in female.

Distribution: Tanzania, Kenya, Madagascar, Sri Lanka, India, China, New Guinea and Marquesas Is, introduced in Germany and Hungary.

Natural history: The spiders were collected in October at southern tropical dry deciduous forest of the Jambughoda Wildlife Sanctuary, Gujarat. They were under the bark on a tree trunk and camouflaged with the darker barks. These spiders could be easily spotted by the presence of cribellate, short, sticky, irregular web extending from their nest under the bark on the tree trunk. The web extensions patches on the tree trunk were about 50 mm to 80 mm in length (Figure 1). Under the bark in the middle of the web there was a hollow space surround by plain sheet of web in which the spider rested. Probably, the insects that entered under these bark in search of hiding place or wander near web were caught by these spiders. Exoskeleton of coleopteran and lepidopteran were found entangled in their web.

DISCUSSION

The male specimen of *P. laminata* from Gujarat resembles *P. sarasvati* by presence of median apophysis and PLT with two sub-lobes but differed from it by having blunt median apophysis; PLT undivided base short than RLT; presence of distally curved setae on prolateral face of leg I and II on femur, patella, tibia and metatarsus. Whereas, female specimen of *P. laminata* resembles *P. sarasvati* and *P. ganesha* by the general shape of epigynum; median field of epigynum partly sclerotized but differed from both the later species by posterior border of epigynum rounded. ER forming an acute angle and separated by less than their length as provided.

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