



*Research Paper*

**BIODIVERSITY OF SOME POORLY KNOWN FAMILIES OF SPIDERS  
(ARENOMORPHAE: ARANEAE: ARACHNIDA) IN INDIA**

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**Abstract**

The present article deals with the faunal diversity of eleven families of spiders, viz. Palpimanidae, Pimoidae, Psechridae, Psilodercidae, Segestriidae, Selenopidae, Sicariidae, Stenochilidae, Symphytognathidae, Tetrablemmidae and Theridiosomatidae (Araneae: Arachnida) in different Indian states and union territories. None of the spider species of these families is recorded from following Indian states: Arunachal Pradesh, Chhattisgarh, Haryana, Mizoram, Telangana and Tripura and among the union territories they are reported from Andaman, Nicobar Islands, Jammu & Kashmir, Lakshadweep and Puducherry. Three families Tetrablemmidae, Selenopidae and Psechridae are represented by 10, 8 and 7 species, respectively. Other families are very poorly reported, 5 species in Segestriidae, 4 species each in Palpimanidae and Pimoidae, 3 species each in Psilodercidae and Stenochilidae, 2 species in Sicariidae while single species each in Symphytognathidae and Theridiosomatidae. Maximum number of spider species of these families were recorded in Tamil Nadu (16 species) followed by Kerala and Uttarakhand (10 species each), Maharashtra (9 species), Karnataka (8 species), and less number in other states. Endemism of these families is very high (62.5%), out of 48 species of all these families recorded in India, 30 species are strictly endemic. All the species of Pimoidae, Segestriidae, Symphytognathidae and Tetrablemmidae reported in India are endemic.

Key words: Palpimanidae, Pimoidae, Psechridae, Psilodercidae, Segestriidae, Selenopidae, Sicariidae, Stenochilidae, Symphytognathidae, Tetrablemmidae, Theridiosomatidae, spiders, faunal distribution.

## INTRODUCTION

Spiders are arachnid arthropods (Araneae: Arachnida: Chelicerata: Arthropoda) and are among the most diverse group of terrestrial invertebrates [1]. They are entomophagous predators in several agroecosystems [2] and their presence is frequently associated with the structural quality of the ecosystems, due to their effect on biocontrol of insect pests [3]. Despite knowing this fact, little is known about the spider fauna in several ecological areas. At present, a total of 49,154 species of spiders are known (4,207 genera, 128 families) [4]. The number of spider species reported from India have increased progressively from 1067 species in 1987 [5], 1442 species in 2005 [6], 1520 species in 2009 [7], 1686 species in 2012 [8] to 1855 species at present [9]. However, there are several species in wild and museum collections which still await taxonomic treatment that amount about 3 to 5 times of existing species. Despite the applied values, the spiders have received very little attention as far as their conservation is concerned. Only few tarantulas in India are listed in IUCN Red List [10]. Most of the species described in India and abroad are still known from their type locality and no attempt was made for their conservation. In spite of current researches on diversity and distribution of spiders in India, their number is meager as compared to other regions of the world. The faunal diversity of 28 families of spiders in India is currently updated [1, 11-21]. In this continuation, faunal diversity of 11 little known spider families, viz. Palpimanidae, Pimoidae, Psechridae, Psilodercidae, Segestriidae, Selenopidae, Sicariidae, Stenochilidae, Symphytognathidae, Tetrablemmidae and Theridiosomatidae, in different Indian states and union territories, are listed here.

## MATERIALS AND METHODS

This checklist is based on the literature published in recent past books, journals and few authentic theses and World Spider Catalog (WSC) up to 8 February, 2021 [4]. However, a major demerit of most of the checklists published in India is the inclusion of species names that were published in diversity studies and these studies have only the taxon name, without any other information such as descriptions or illustrations which could help in further identification of the mentioned taxa [22]. Not only this, several species reported and described from India seem to be misidentified and reported erroneously. Hence, such reports need re-examination. Also, in most of the literature, published earlier, several errors crept in their scientific names even in the recent ones. It happened because such contents become outdated quickly and, due to their perceived comprehensiveness, readers sometimes overlook newer sources of data. Additionally, the researches on spider taxonomy are continued with the description of new taxa, their modified status, and the publication of other nomenclatural decisions [12, 17, 22]. In the present checklist, attempts have been made to correct the errors in the scientific names of the spiders following WSC [4]. Only those synonymies were mentioned that were reported in India. All the endemic species are marked with (\*). Seemingly erroneous records are marked with (♠).

## Results and Discussion

**A. Family: Palpimanidae Thorell, 1870.** The spiders of the family Palpimanidae are commonly known as palp-footed spiders and are widely distributed in tropical and subtropical region of the world except in Australia but is not a common family and also

the extent of endemism is very high [23]. The palp-footed spiders are torpedo-shaped in appearance and can be recognized by having greatly enlarged and sclerotised powerful front legs; metatarsus being quite short and as long as tarsus. Eyes are eight in number and arranged in two rows of four. Unlike most of the other spider species, the abdomen of these spiders is somewhat less hairy than cephalothorax which is heavily sclerotised and has only 2 spinnerets. Some species like *Palpimanus gibbulus* Dufour, 1820 have file-and-scrape type stridulatory organs with pars striden on the outer surface of the chelicerae and the plectrum on the femur of the pedipalpus. The function of stridulation is to defend themselves from predators and intraspecific communication during courtship and mating [24]. These spiders are nocturnal and araneophagous and hunt spiders freely on the ground or that hide in a retreat [25]. Since they do not construct web, hide themselves during day in undergrowth or under stones in a silken retreat.

The family Palpimanidae is a small and uncommon spider family with only 157 described species under 20 genera and is widely distributed in tropical and subtropical region of the world except in Australia [4]. The extent of endemism is very high [23]. In India, only 4 species under 2 genera are recorded in coastal states and half of them are endemic. Following is the distribution of the palpimanid spiders in different states and union territories.

**1. *Otiotops namratae* Pillai, 2006 (\*)**

- Gujarat [26, 27]

**2. *Palpimanus gibbulus* Dufour, 1820**

- Kerala [28]
- Puducherry [29]

Elsewhere: Central Asia, Iran, Mediterranean

**3. *Palpimanus vultuosus* Simon, 1897 (\*)**

- Maharashtra [30, 31]
- Kerala [32]

**4. *Palpimanus* sp.**

- Gujarat [33]
- Kerala [34]
- Uttarakhand [35]

**5. *Sarascelis raffrayi* Simon, 1893**

- Odisha [36]

Elsewhere: Singapore

**B. Family: Pimoidae Wunderlich, 1986.** Pimoidae is a small family of araneomorph spiders containing 53 species in 4 genera. They are monophyletic and form a relictual group along the western coast of North America, Europe and the Himalayas [37]. These spiders are possibly closest relative to the Linyphidae [38] and like them construct large sheet-webs, usually on railings of bridges or other buildings. The members of the genus *Pimoa* Chamberlin & Ivie, 1943 are large spiders and measure up to 12 mm in length. In India, Pimoidae is represented in Himalayan states (Uttarakhand, Jammu, Kashmir and

West Bengal) by 4 species of *Pimoa* Chamberlin & Ivie, 1943 and all are endemic. Its record in Kerala is doubtful [28].

**1. *Pimoa crista* (Fage, 1946) (\*)**

- Uttarakhand [38]

**2. *Pimoa gandhii* Hormiga, 1994 (\*)**

- Jammu, Kashmir [38]

**3. *Pimoa indiscreta* Hormiga, 1994 (\*)**

- Kerala [28]
- West Bengal [38]

**4. *Pimoa thaleri* Trotta, 2009 (\*)**

- Sikkim [39]

**C. Family: Psechridae Simon, 1890.** The spiders of the family Psechridae are commonly known as lace-sheet-weavers and occur in southeast Asia, northern Australia and China [40] and are phylogenetically closely related to the lynx spiders (Oxyopidae), wolf spiders (Lycosidae) and nursery web spiders (Pisauridae) [41]. They are mostly found in forest, rocky areas, and even in caves. They are araneomorphic, entelegyne and cribellate spiders with body length up to 20 mm. These spiders have long legs, tarsus being very flexible. The female spiders carry their eggs-sac in the chelicerae. They build horizontal webs, lace webs (e.g., *Psechrus* spp.) and pseudo-orbs (e.g., *Fecenia* spp.). In some cases, the diameter of webs may be more than 100 cm.

Psechridae is a very small family with only 61 described species under 2 genera [4]. In India, only 7 species under both genera are recorded and only one species *Psechrus crepido* Bayer, 2012 is endemic. Following is the distribution of these spiders in different states and union territories.

**1. *Fecenia protensa* Thorell, 1891**

Syn. *Fecenia nicobarensis* (Tikader, 1977); *Fecenia travancoria* Pocock, 1899; *Psechrus nicobarensis* Tikader, 1977; *Psechrus alticeps* Pocock, 1899, misidentified [42]

- Andaman, Nicobar Islands [43, 44, 45]
- Kerala [42, 45-51]
- Tamil Nadu [52]

Elsewhere: Brunei, Indonesia, Malaysia, Singapore, Sri Lanka, Thailand, Vietnam

**2. *Fecenia* sp.**

- Tamil Nadu [53]

**3. *Psechrus crepido* Bayer, 2012 (\*)**

Syn. *Psechrus ghecaunus* Thorell, 1897, misident. [54]; *Psechrus torvus* (O. Pickard-Cambridge, 1869), misidentified [55]

- Tamil Nadu [40, 54-56]
- Kerala [32]

**4. *Psechrus ghecaunus* Thorell, 1897**

- Tamil Nadu [54]

Elsewhere: China, Laos, Myanmar, Thailand

**5. *Psechrus himalayanus* Simon, 1906**

- Himachal Pradesh [40, 54]
- Uttarakhand [35, 40, 54, 57, 58]

Elsewhere: Bhutan, Nepal

**6. *Psechrus inflatus* Bayer, 2012**

- Assam [59]

Elsewhere: China

**7. *Psechrus libelti* Kulczyński, 1908 ?**

- Andaman, Nicobar Islands [40]

Elsewhere: Indonesia, Singapore, Thailand

**8. *Psechrus torvus* (O. Pickard-Cambridge, 1869)**

syn. *Psechrus alticeps* Pocock, 1899

- Kerala [28, 40, 42, 46, 47, 60-63]
- Maharashtra [64-66]
- Manipur [67]
- Tamil Nadu [40, 53, 68, 69]
- Uttarakhand [70]

Elsewhere: Sri Lanka

**9. *Psechrus* sp.**

- Assam [71]
- Goa [72]
- Kerala [73]

**D. Family: Psilodercidae Machado, 1951.** The Psilodercidae Machado, 1951, a monophyletic family [74] was raised to family rank from a subfamily of the family Ochyroceratidae Fage, 1912 [75]. These spiders can be differentiated by other having the segestriid positioning of their six eyes, *i.e.* six eyes are arranged in three groups of two each that are positioned near the front of the head region. In addition, these spiders lack leg bristles, strong apical bristles on the cymbium, and several pairs of spermathecae in females [75].

At present, Psilodercidae comprises 224 species in 11 genera distributed in Southeast Asia, southern China, and parts of South Asia [4, 76]. In India, only 3 species of a single genus *Althepus* Thorell, 1898 are recorded from Western Ghat and two of them are endemic. Following is the distribution of these spiders in the country.

**1. *Althepus devraii* Kulkarni & Dupérré, 2019 (\*)**

- Maharashtra [77]

**2. *Althepus incognitus* Brignoli, 1973 (\*)**

- Tamil Nadu [77, 78]

**3. *Althepus pictus* Thorell, 1898**

- Tamil Nadu [55]

Elsewhere: Myanmar

**E. Family: Segestriidae Simon, 1893.** The Segestriidae is a haplogyne family of araneomorph spiders dwelling in tubes and commonly known as tube web spiders or tunnel spiders. The adult spiders measure 6-22 mm long with short legs, the first three pairs arranged forwardly, with six eyes arranged as a pair of separate medians and two pairs of smaller laterals. The abdomen is cigar-shaped. The tunnel spider builds tubular retreat with trip-lines radiating from the opening in the wall crevices, in bark fissures or under stones. These trip-lines are used by the spiders to detect preys [79]. These spiders are nocturnal sedentary hunters that live in a variety of habitats. The female deposits eggs deep in her silken tube and care her offspring after hatching until they spread.

Presently, Segestriidae comprises 136 species in 4 genera distributed in the tropical and subtropical regions of the world [4]. In India, only 5 species of only 2 genera are recorded from mostly Western Ghat and all are endemic. Following is the distribution of these spiders in the country.

**1. *Ariadna chhotae* Siliwal & Yadav, 2017 (\*)**

- Karnataka [80]

**2. *Ariadna molur* Siliwal & Yadav, 2017 (\*)**

- Karnataka [80]

**3. *Ariadna nebulosa* Simon, 1906 (\*)**

- Odisha [36]
- Tamil Nadu [81, 82]

**4. *Ariadna vansda* Siliwal *et al.*, 2017 (\*)**

- Gujarat [80]

**5. *Ariadna* sp.**

- Gujarat [33]
- Odisha [83]

**6. *Segestria inda* Simon, 1906 (\*)**

- Tamil Nadu [81, 82, 84]

**7. *Segestria* sp.**

Uttarakhand [35]

**F. Family: Selenopidae Simon, 1897.** Selenopidae is an entelegyne araneomorph spider family. The spiders of this family are commonly known as wall crab spiders, wall spiders and flatties. Body is about 5-23 mm long and extremely flattened dorsoventrally with eight eyes arranged in two rows with the wide anterior row of six eyes located

near the anterior rim of the carapace and the posterior row of two large eyes located one on each side, and laterigrade legs having two tarsal claws. They are one of the fastest creatures in the world with camouflage on their usual habitat of walls, rocks and trees that often makes them difficult to locate [85]. Females lay eggs in papery disc-shaped egg sacs which are secured against the substrata.

The family Selenopidae is a small spider family with only 260 described species under 9 genera and is widely distributed in tropical and subtropical region of the world [4]. In India, only 8 species under 2 genera are recorded and out of them 5 species are endemic. The record of *Selenops insularis* Keyserling, 1881 in Rajasthan [86, 87] seems doubtful and requires re-examination. Following is the distribution of the selenopid spiders in different states and union territories.

**1. *Makdiops agumbensis* (Tikader, 1969) (\*)**

Syn. *Selenops agumbensis* Tikader, 1969

- Karnataka [85, 88, 89]
- Uttarakhand [90]

**2. *Makdiops mahishasura* Crews & Harvey, 2011 (\*)**

- Karnataka [85]

**3. *Makdiops montigena* (Simon, 1889)**

Syn. *Selenops montigena* Simon, 1889

- Himachal Pradesh [85]
- Jharkhand [85, 89, 91]
- Tamil Nadu [92]
- Uttarakhand [47, 85, 89, 91, 93]

Elsewhere: Nepal

**4. *Makdiops nilgirensis* (Reimoser, 1934) (\*)**

Syn. *Selenops nilgirensis* Reimoser, 1934

- Tamil Nadu [55, 82, 85]
- Uttarakhand [82]

**5. *Makdiops shevaroyensis* (Gravely, 1931) (\*)**

syn. *Selenops shevaroyensis* Gravely, 1931

- Tamil Nadu [82, 89, 91]

**6. *Makdiops shiva* Crews & Harvey, 2011 (\*)**

- Maharashtra [85]

**7. *Makdiops* sp.**

- Odisha [83]

**8. *Selenops insularis* Keyserling, 1881 (♠)**

- Rajasthan [86, 87]



Elsewhere: Greater Antilles, USA

### 9. *Selenops radiatus* Latreille, 1819

Syn. *Selenops birmanicus* Thorell, 1895; *Selenops malabarensis* Simon, 1880; *Selenops sumitrae* Patel & Patel, 1973

- Gujarat [47, 94, 95]
- Karnataka [47, 96]
- Kerala [28, 47, 97]
- Maharashtra [47, 91]
- Nagaland [91]
- Odisha [98]
- Puducherry [29]
- Punjab [99]
- Tamil Nadu [68, 82, 91]
- Uttar Pradesh [47, 100]
- Uttarakhand [29, 35, 100, 101, 102]
- West Bengal [91, 103]

Elsewhere: Africa, China, Mediterranean, Middle East, Myanmar

### 10. *Selenops* sp.

- Rajasthan [104]
- Tamil Nadu [68]
- Uttar Pradesh [105, 106]

**G. Family: Sicariidae Keyserling, 1880.** Sicariidae is a haplogyne family of araneomorph spiders commonly known as recluse spiders, violin spiders, assassin spiders and sand spiders depending upon the species. The body is 6 to 19 mm in length with six eyes arranged in three sets of two eyes each and usually the thorax bears a violin-shaped mark. Some species usually construct sheet webs to trap preys, others simply chase and capture the preys. They are venomous and known for deadly necrotic bites. The females lay eggs inside egg sacs made with a mixture of sand and silk. They usually live in dark corners of houses, garages, burrows, under rocks, deserts and other abandoned areas.

The family Sicariidae is also a small family consisting of 169 species placed in only 3 genera and is distributed nearly worldwide in warmer areas. In India, only two species of a single genus *Loxosceles* Heineken & Lowe, 1832 is recorded from 8 states, however, the record of one species *Loxosceles reclusa* Gertsch & Mulaik, 1940 from Karnataka [107] is doubtful and need further exploration. Following is the distribution of these spiders in different states and union territories.

#### 1. *Loxosceles reclusa* Gertsch & Mulaik, 1940 (♠)

- Karnataka [107]

Elsewhere: North America



## 2. *Loxosceles rufescens* (Dufour, 1820)

Syn. *Loxosceles indrabeles* Tikader, 1963; *Loxosceles erythrocephala* (C.L. Koch, 1838)

- Gujarat [33, 108, 109]
- Jammu, Kashmir [110]
- Karnataka [111]
- Lakshadweep [112]
- Maharashtra [31, 64, 65, 66, 113, 114, 115]
- Manipur [67]
- Sikkim [116]
- Tamil Nadu [68, 84, 117]

Elsewhere: Africa, Australia, China, Hawaii, Iran, Japan, Korea, Laos, Macaronesia, Mexico, South Africa, Southern Europe, Thailand, USA

## 3. *Loxosceles* sp.

- Tamil Nadu [68]

**H. Family: Stenochilidae Thorell, 1873.** Stenochilidae is a very small family of araneomorph and ecribellate spiders containing only 13 species placed in 2 genera globally [4]. Its family status was raised from a subfamily of Palpimanidae [118]. The major differences between two families are in morphology of genitalia and carapace shape. Very little is known about their biology and ecology. In India, only 3 species of a single genus *Stenochilus* O. Pickard-Cambridge, 1871 were recorded from 9 states and single union territory (Puducherry). Of them, two species are endemic. Following is the distribution of these spiders in different states and union territories.

### 1. *Stenochilus crocatus* Simon, 1884

- Madhya Pradesh [119]
- Maharashtra [31,120]

Elsewhere: Cambodia, Myanmar, Sri Lanka

### 2. *Stenochilus hobsoni* O. Pickard-Cambridge, 1871 (\*)

syn. *Stenochilus raudus* Simon, 1884

- Andhra Pradesh [118]
- Gujarat [108]
- Karnataka [118]
- Kerala [62]
- Maharashtra [31, 118]
- Odisha [36, 98]
- Puducherry [121]
- Tamil Nadu [118]

### 3. *Stenochilus scutulatus* Platnick, Shadab, 1974 (\*)

- Rajasthan [118]

**I. Family: Symphytognathidae Hickman, 1931.** Symphytognathidae is also a very small family of spiders containing 90 species in 8 genera [4]. They are mostly distributed in the tropics of Central and South America and Australia, few are recorded in Africa and Asia. They are remarkable for minute size (mostly less than 1.0 mm and some species, e.g. *Patu digua* Forster & Platnick, 1977 measures only 0.37 mm), absence of book lungs and female pedipalps, and the fusion of the chelicerae [122]. These spiders mainly live within soil, leaf litter layer of forests and some inhabit dark caves and they are rarely seen in open air [123]. Only one species is described from Tamil Nadu [124].

**1. *Iardinis mussardi* Brignoli, 1980 (\*)**

Tamil Nadu [124]

**J. Family: Tetrablemmidae O. Pickard-Cambridge, 1873.** Tetrablemmidae is a less well-known family of tropical haplogyne araneomorph spiders. They are commonly known as armoured spiders due to complicated patterns of abdominal scuta. These spiders measure 0.8 to 2.0 mm in body length. Number of eyes may be 2, 4 or 6 in different genera. They are cryptozoic and live in leaf litter, soil, and some live in caves with typical cave adaptation (loss of eyes and weak sclerotisation) [125]. The family contains 145 species placed in 27 genera and is distributed in tropical and subtropical region of the world, mostly in eastern and southern Asia [126]. In India, only 10 species under 5 genera are described and recorded and all of them are endemic. Following is the distribution of the selenopid spiders in different states and union territories.

**1. *Brignoliella besuchetiana* Bourne, 1980 (\*)**

- Meghalaya [127, 128]

**2. *Choiroblemma bengalense* Bourne, 1980 (\*)**

- West Bengal [127, 128]

**3. *Choiroblemma rhinoxunum* Bourne, 1980 (\*)**

- West Bengal [127, 128]

**4. *Indicoblemma sheari* Bourne, 1980 (\*)**

- West Bengal [127, 128]

**5. *Shearella alii* Sankaran & Sebastian, 2016 (\*)**

- Kerala [128]

**6. *Tetrablemma brignolii* Lehtinen, 1981 (\*)**

- Tamil Nadu [128, 129]

**7. *Tetrablemma deccanense* (Tikader, 1976) (\*)**

syn. *Indonops deccanensis* Tikader, 1976

- Maharashtra [120, 128, 130, 131]
- Uttar Pradesh [132]

**8. *Tetrablemma loebli* Bourne, 1980 (\*)**

- Uttarakhand [127, 128]

**9. *Tetrablemma medioculatum cochinese* Lehtinen, 1981 (\*)**

- Kerala [128, 129]

**10. *Tetrablemma medioculatum gangeticum* Lehtinen, 1981 (\*)**

- Bihar [128, 129]

**11. *Tetrablemma* sp.**

- Uttar Pradesh [133, 134, 135]

**K. Family: Theridiosomatidae Simon, 1881.** Theridiosomatidae, commonly known as ray spiders, is a little-known and poorly understood family mostly distributed in Neotropical (Central and South America) and tropical Africa, Australia, Malaysia and New Guinea. The body length hardly exceeds 2.0 mm and can be distinguished from all other spiders by the presence of pits on the prolateral margins of the sternum in both sexes, and the connate spermathecae [136]. Abdomen of these spiders is mostly silver-shining and spherical. These spiders build derived cone-shaped orb webs. Globally 133 species placed in 19 genera are known [4] but in India only one species *Wendilgarda assamensis* Fage, 1924 was described from Siju Cave, Meghalaya [137] which was also recorded from China [138].

**1. *Wendilgarda assamensis* Fage, 1924**

syn. *Vendilgardia assamensis* Fage, 1924

- Meghalaya [137, 139]

Elsewhere: China

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