



ISSN 0974-7907 (Online)
ISSN 0974-7893 (Print)

A PRELIMINARY CHECKLIST OF SPIDERS (ARANEAE: ARACHNIDA) IN CHINNAR WILDLIFE SANCTUARY, WESTERN GHATS, INDIA

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Abstract: A preliminary study was conducted to document spider diversity in Chinnar Wildlife Sanctuary, Idukki District, Kerala State in southern India. The study was conducted from October to November 2012. A total of 101 species of spiders belonging to 65 genera from 29 families were identified from the sanctuary. This accounted for 6.98% of Indian spider species, 17.81% of Indian spider genera and 48.33% of the spider families of India. The dominant families were Lycosidae (11 species) and Araneidae (10). Two endemic genera of Indian spiders such as *Annandaliella* and *Neoheterophrictus* were found at Chinnar, each representing one species each, and belonging to the family Theraphosidae. A guild structure analysis of the spiders revealed seven feeding guilds such as orb weavers, stalkers, ground runners, foliage runners, sheet web builders, space web builders and ambushers.

Keywords: Endemism, guild structure, Idukki, Kerala.

Spiders serve an important ecological role in the ecosystem functioning as they are predatory in nature and feed on several other insects and even small vertebrates. Spiders are also considered as indicators of the health of the ecosystem (Mathew et al. 2009). A world without spiders would have serious problems affecting the whole food chain and cause an imbalance in the ecosystem; however, their study has always remained neglected. And there exist lots of misunderstanding about this most ubiquitous and diverse groups of organisms. All

the spiders are regarded as poisonous creatures, and the general perception about them among the people are negative. But the fact is that very few spiders are actually poisonous and harmful to human beings (Mathew et al. 2009). However, the services these creature do to mankind by way of controlling pest species have been well documented (Riechert & Lockley 1984; Tanaka 1989; Bishop & Riechert 1990). Being a less charismatic species and the scarcity of biologists studying spiders, studies on the spiders of India in general and Western Ghats in particular remain scant. One of the earliest taxonomical documentations of the spider diversity of the country was by Pocock (1895, 1899, 1900). The important studies on spider diversity of the Western Ghats were by Hirst (1909), Gravely (1915, 1935), Sherriff (1919, 1920 a,b,c), Sinha (1951), Subramanian (1955), Smith (2004), and Sugumaran et al. (2005).

Some of the recent published work on spider diversity of the Western Ghats are as follows: Sudhikumar et al. (2005a), reported 94 species from the Kuttanad rice ecosystem, central Kerala Sudhikumar et al. (2005b), also reported 72 species from Mannavan Shola, which is part of Anamudi Shola National Park. Sebastian et al. (2005) reported 51 species from Mangalavanam Bird Sanctuary,

DOI: <http://dx.doi.org/10.11609/jott.2740.8.4.8703-8713> | **ZooBank:** urn:lsid:zoobank.org:pub:3C3B994D-DE71-431C-B6AA-ABF7907F53DF

Editor: Manju Siliwal, WILD, Coimbatore, India.

Date of publication: 26 April 2016 (online & print)

Manuscript details: Ms # 2740 | Received 11 March 2015 | Final received 01 April 2016 | Finally accepted 05 April 2016

Citation: Adarsh, C.K. & P.O. Nameer (2016). A preliminary checklist of spiders (Araneae: Arachnida) in Chinnar Wildlife Sanctuary, Western Ghats, India. *Journal of Threatened Taxa* 8(4): 8703–8713; <http://dx.doi.org/10.11609/jott.2740.8.4.8703-8713>

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Funding: Kerala Agricultural University.

Conflict of Interest: The authors declare no competing interests.

Acknowledgements: We thank the Wildlife Warden, Munnar Wildlife Division and the Assistant Wildlife Warden Chinnar Wildlife Sanctuary for the logistical support. Our sincere thanks to Dr. A.V. Sudhikumar for helping us with the confirmation of the identification of the spiders. Our thanks are due to the Dean, College of Forestry, Kerala Agricultural University for encouragement and support and R. Sreehari for the map of the study area. We also thank the anonymous reviewers and the subject editor for their critical comments which greatly improved the manuscript.



while Jose et al. (2008) documented 147 species from Parambukulam Tiger Reserve, all from the Kerala part of the Western Ghats, except Kuttanad and Magalavanam which are coastal wetlands in central Kerala. Adarsh & Nameer (2015) reported 86 species of spiders from the Kerala Agricultural University campus, Thrissur, Kerala.

STUDY AREA

Chinnar Wildlife Sanctuary is located 18km north of Marayoor in the Marayoor and Kanthalloor Panchayaths of Devikulam Taluk in the Idukki District of Kerala State (Fig. 1). It is located between $10^{\circ}15' - 10^{\circ}21'N$ and $77^{\circ}5' - 77^{\circ}16'E$ and has a total area of 90.44km². The Munnar-

Udumalpet road, SH-17 passes through the Sanctuary for 16km and divides it into nearly equal portions. It is contiguous with Eravikulam National Park to the South and Indira Gandhi Wildlife Sanctuary is to the north. It forms an integral part of the 1,187km² block of protected forests in the Anamalai Hills, Western Ghats.

The terrain is undulating with hills and hillocks of varying heights. The altitude ranges from 400–2372 m. The sanctuary is situated in the rain shadow region and hence the area experiences a prolonged hot/dry season and fewer rainy days. The Chinnar plains are generally hot, but the higher altitudes are cool. The major rainfall season is during the north-east monsoons occurring

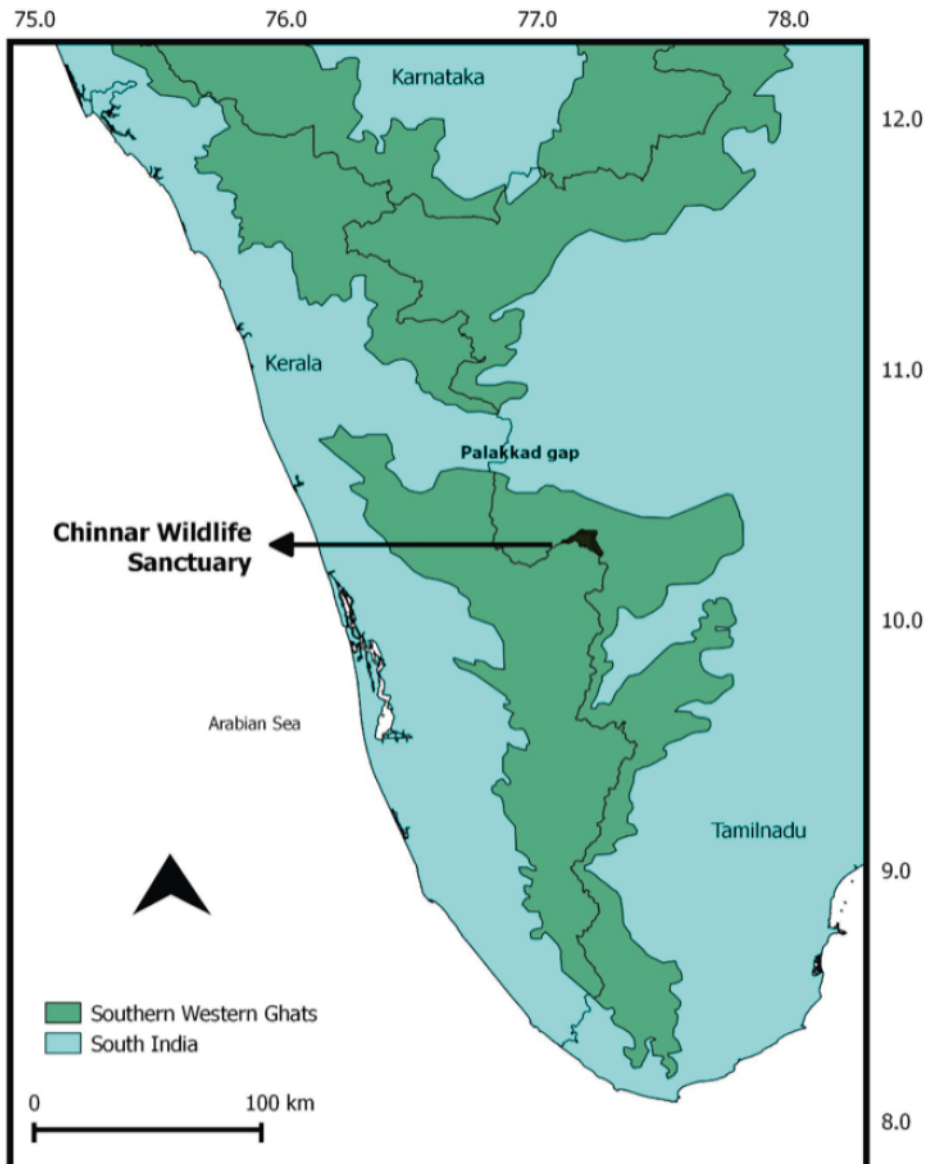


Figure 1. Location map of Chinnar Wildlife Sanctuary, southern Western Ghats

from October to December. The rainy days in a year range from between 30–40 days which account for about 300–500 mm rainfall in Chinnar. But the higher altitudes areas like Olikkudy and Mangappara receive rain during both the north-east and south-west monsoons with comparatively much higher rainfall. The recorded lowest temperature is 12°C and the highest is 38°C.

The vegetation shows an entire spectrum ranging from temperate shola to dry scrub of the arid plains. The vegetation of the sanctuary can be broadly classified into the following types according to Champion & Seth (1968). They are southern tropical thorn forest (scrub jungle), southern dry mixed deciduous forest (dry deciduous forest), southern moist mixed deciduous forest (moist deciduous forest), tropical riparian fringing forest (riparian forest), southern montane wet temperate forest (montane shola forest) and southern montane wet grassland (grasslands).

METHODS

The study was conducted from October to November 2012. Bushes, tree trunks, ferns, forest floor, foliage and grasslands were all searched for spiders and collected by handpick method as suggested by Tikader (1987). The identification of spiders was done following Tikader (1970, 1977, 1980, 1982, 1987), Koh (1996), Murphy & Murphy (2000), Sebastian & Peter (2009). The checklist of the spiders of Chinnar Wildlife Sanctuary is prepared and is presented in this paper. The taxonomy and nomenclature followed is as per the world spider catalogue (Platnick 2014).

RESULTS AND DISCUSSION

Out of 1447 spiders recorded from India (Siliwal & Molur 2005, 2007), 101 species belonging to 65 genera of 29 families were recorded during the present study (Appendix 1). This accounts for 6.98% of the total species of spiders and 48.33% of the total spider families recorded in India. *Stegodyphus sarasinorum* (Image 10) was found to be the most abundant species followed by *Hersilia savignyi* (Image 16), *Palpimanus gibbulus* (Image 33), *Cyclosa hexatuberculata* (Image 2), *Selenops radiates* (Image 48), *Heteropoda hampsoni* (Image 49), *Gnaphosa kailana* (Image 13). The most speciose spider family of Chinnar was Lycosidae (11 species) followed by Araneidae (10), Salticidae (8 species), Tetragnathidae (8 species), Oxyopidae (6 species) and Theridiidae (6 species).

Out of the 101 species identified from Chinnar Wildlife Sanctuary, 34 species are endemic to India (Appendix 1). The spiders of Chinnar are spread across 65

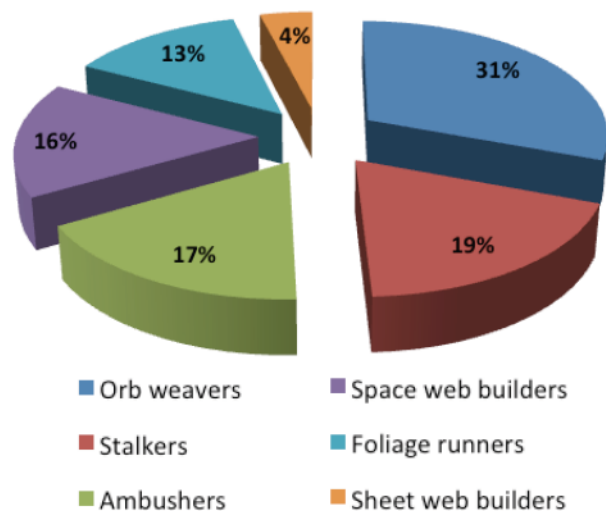


Figure 2. Guild structure of spiders recorded from Chinnar Wildlife Sanctuary

genera, of which two are endemic to India. The endemic genera of spiders seen at Chinnar are *Annandaliella* and *Neoheterophrius* (Image 65), and belonging to the family Theraphosidae.

The spiders of Chinnar Wildlife Sanctuary can be divided into seven feeding guilds based on the foraging behavior (Uetz et al.1999). They are the orb weavers, stalkers, ground runners, foliage runners, sheet web builders, space web builders and ambushers. The dominant guild was of the ground runners with 26 species and is followed by orb weavers (23 species), stalkers (14 species), ambushers (13 species), space web builders (12 species), foliage runners (10 species) and sheet web builders (3 species) (Table 1, Fig. 2).

The present report of *Latrodectus hasselti* (Image 56) from Chinnar Wildlife Sanctuary is the first record of the species from Kerala State. There are only very few reports on the occurrence of *Latrodectus hasselti* from India. It was first reported from Pune (Simon, 1897; Pocock, 1900), later by Daniel & Soman (1961) from Suriamal in northern Thana, Bombay, then from Vadodara (Baroda) by Siliwal & Kumar (2001) and finally by Kumar & Siliwal (2005) from Coimbatore, Tamil Nadu.

CONCLUSION

A preliminary checklist on the spiders of the Chinnar Wildlife Sanctuary, Western Ghats is given in this paper. This is the first ever documentation of the spiders of Chinnar. However, this by no means is comprehensive and it only suggest the great diversity of the spider fauna of Chinnar and thus warranting more detailed and systematic exploration of the spiders of Chinnar Wildlife

Table 1. Total number of families, genera, species and functional guilds of spiders in Chinnar Wildlife Sanctuary

	Family	No. of genera	No. of species	Guild
1	Agelenidae	1	1	Space web builders
2	Araneidae	5	10	Orb weavers
3	Clubionidae	1	2	Foliage runners
4	Ctenidae	1	3	Ground runners
5	Eresidae	1	1	Space web builders
6	Filistatidae	1	1	Space web builders
7	Gnaphosidae	4	4	Ground runners
8	Hersiliidae	1	2	Ambushers
9	Linyphiidae	1	2	Sheet web builders
10	Lycosidae	5	11	Ground runners
11	Miturgidae	1	3	Foliage runners
12	Nephilidae	2	2	Orb weavers
13	Oxyopidae	2	6	Stalkers
14	Palpimanidae	1	1	Ground runners
15	Philodromidae	1	1	Ambushers
16	Pholcidae	2	2	Space web builders
17	Pimoidae	1	1	Sheet web builders
18	Pisauridae	4	5	Ambushers
19	Psecridae	1	1	Space web builders
20	Salticidae	7	8	Stalkers
21	Scytodidae	1	2	Ground runners
22	Selenopidae	1	1	Ground runners
23	Sparassidae	1	5	Foliage runners
24	Tetragnathidae	3	8	Orb weavers
25	Theraphosidae	3	3	Ground runners
26	Theridiidae	5	6	Space web builders
27	Thomisidae	5	5	Ambushers
28	Uloboridae	2	3	Orb weavers
29	Zodariidae	1	1	Ground runners

Sanctuary and other protected areas too.

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Appendix 1. Checklist of spiders of Chinnar Wildlife Sanctuary, Kerala.

Family Agelenidae C.L. Koch, 1837

1. *Agelena inda* Simon, 1897* (Image 1)

Family Araneidae Simon, 1895

2. *Araneus bilunifer* Pocock, 1900*
3. *Araneus* sp.
4. *Cyclosa hexatuberculata* Tikader, 1982* (Image 2)
5. *Cyclosa spirifera* Simon, 1889* (Image 3)
6. *Cyrtarachne gravelyi* Tikader, 1961 (Image 4)
7. *Cyrtarachne* sp. (Image 64)
8. *Cyrtophora bidenta* Tikader, 1970*
9. *Cyrtophora cicatrosa* (Stoliczka, 1869)
10. *Cyrtophora citricola* (Forsk., 1775) (Image 5)
11. *Gasteracantha geminata* (Fabricius, 1798) (Image 6)

Family Clubionidae Wagner, 1887

12. *Clubiona drassodes* O. P. Cambridge, 1874 (Image 7)
13. *Clubiona* sp.

Family Ctenidae Keyserling, 1877

14. *Ctenus cochinchinensis* Gravely, 1931* (Image 8)
15. *Ctenus indicus* Gravely, 1931* (Image 9)
16. *Ctenus* sp. (Image 65)

Family Eresidae Koch, 1851

17. *Stegodyphus sarasinorum* Karsch, 1891 (Image 10)

Family Filistatidae Ausserer, 1867

18. *Filistata rufa* Caporiacco, 1934* (Image 11)

Family Gnaphosidae Pocock, 1898

19. *Drassodes carinivulvus* Caporiacco, 1934* (Image 12)
20. *Gnaphosa kailana* Tikader, 1966* (Image 13)
21. *Poecilochroa barmani* Tikader, 1982* (Image 14)
22. *Zelotes ashae* Tikader & Gajbe, 1976* (Image 15)

Family Hersiliidae Thorell, 1870

23. *Hersilia savignyi* Lucas, 1836 (Image 16)
24. *Hersilia* sp. (Image 17)

Family Linyphiidae Blackwall, 1859

25. *Linyphia perampla* O.P. Cambridge, 1885* (Image 18)
26. *Linyphia* sp.

Family Lycosidae Sundevall, 1833

27. *Evipa banarensis* Tikader and Malhotra, 1980* (Image 19)
28. *Hippasa greenalliae* (Blackwall, 1867) (Image 20)
29. *Hippasa holmerae* Thorell, 1895* (Image 21)
30. *Lycosa barnesi* Gravely, 1924* (Image 22)
31. *Lycosa bistrata* Gravely, 1924
32. *Lycosa tista* Tikader, 1970* (Image 23)
33. *Lycosa* sp 1.
34. *Lycosa* sp 2.
35. *Pardosa pseudoannulata* Bosenberg and Strand, 1906 (Image 24)
36. *Pardosa sumatrana* (Thorell, 1890) (Image 25)
37. *Wadicosa quadrifera* (Gravely, 1924) (Image 26)

Family Miturgidae Simon, 1885

38. *Cheiracanthium danieli* Tikader, 1975*
39. *Cheiracanthium melanostomum* (Thorell, 1895)
40. *Cheiracanthium* sp. (Image 66)

Family Nephilidae Simon, 1894

41. *Nephila pilipes* (Fabricius, 1793) (Image 27)
42. *Nephilengys malabarensis* (Walckenaer, 1842) (Image 28)

Family Oxyopidae Thorell, 1870

43. *Oxyopes birmanicus* Thorell, 1887 (Image 29)
44. *Oxyopes javanus* Thorell, 1887 (Image 30)
45. *Oxyopes shweta* Tikader, 1970 (Image 31)
46. *Peucetia viridana* (Stoliczka, 1869) (Image 32)
47. *Oxyopes* sp. 1
48. *Oxyopes* sp. 2

Family Palpimanidae Thorell, 1870

49. *Palpimanus gibbulus* Dufour, 1820 (Image 33)

Family Philodromidae Thorell, 1870

50. *Tibellus elongatus* Tikader, 1960* (Image 34)

Family Pholcidae C. L. Koch, 1851

51. *Artema atlanta* Walckenaer, 1837 (Image 35)
52. *Pholcus phalangoides* (Fuesslin, 1775) (Image 36)

Family Pimoidae Wunderlich, 1986

53. *Pimoida indiscreta* Hormiga, 1994* (Image 37)

Family Pisauridae Simon, 1890

54. *Perenethis unifasciata* (Doleschall, 1859)
55. *Pisaura* sp. (Image 38)
56. *Polyboea vulpina* Thorell, 1895
57. *Thalassius albocinctus* (Doleschall, 1859) (Image 67)
58. *Thalassius* sp.

Family Psechridae Simon, 1890

59. *Psechrus torvus* (Cambridge, 1869) (Image 39)

Family Salticidae Blackwall, 1841

60. *Aelurillus improvises* Azarkina, 2002* (Image 40)
61. *Hasarius adansonii* (Audouin, 1826)
62. *Menemerus bivittatus* (Dufour, 1831) (Image 41)
63. *Phaeacius lancearius* (Thorell, 1895) (Image 42)
64. *Phaeacius* sp.

65. *Phintella vittata* (C.L. Koch, 1846) (Image 43)

66. *Portia fimbriata* Doleschall, 1859 (Image 44)

67. *Siler semiglaucus* Simon, 1901 (Image 45)

Family Scytodidae Blackwall, 1864

68. *Scytodes fusca* Walckenaer, 1837 (Image 46)
69. *Scytodes thoracica* (Latreille, 1802) (Image 47)

Family Selenopidae Simon, 1897

70. *Selenops radiatus* Latreille, 1819 (Image 48)

Family Sparassidae Bertkau, 1872

71. *Heteropoda hamptoni* Pocock, 1901* (Image 49)
72. *Heteropoda lentula* Pocock, 1901*
73. *Heteropoda leprosa* Simon, 1884 (Image 50)
74. *Heteropoda venatoria* (Linnaeus, 1767)
75. *Heteropoda* sp. (Image 68)

Family Tetragnathidae Menge, 1866

76. *Leucauge decorate* (Blackwall, 1864)
77. *Leucauge pondae* Tikader, 1970* (Image 51)
78. *Leucauge tessellata* (Thorell, 1887)
79. *Leucauge* sp.
80. *Opadometa fastigata* Simon, 1877) (Image 52)
81. *Tetragnatha andamanensis* Tikader, 1977
82. *Tetragnatha fletcheri* Gravely, 1921*
83. *Tetragnatha maxillosa* Thorell, 1895 (Image 53)

Family Theraphosidae Thorell, 1870

84. *Annandaliella* sp.*
85. *Neoheterophrictus* sp.* (Image 63)
86. *Poecilotheria striata* Pocock, 1895* (Image 54)

Family Theridiidae Sundevall, 1833

87. *Achaeearanea mundula* (L. Koch, 1872)

88. *Argyrodes argentatus* O.P. Cambridge, 1880

89. *Chryso argyrodiformis* (Yaginuma, 1952) (Image 55)

90. *Latrodectus hasselti* Thorell, 1870 (Image 56)

91. *Achaeearanea* sp. 1 (Image 69)

92. *Achaeearanea* sp. 2

Family Thomisidae Sundevall, 1833

93. *Misumena decorata* Tikader, 1980 (Image 57)

94. *Runcinia roonwali* Tikader, 1965* (Image 58)

95. *Synema decoratum* Tikader, 1960

96. *Talaus opportunus* (O.P. Cambridge, 1873)* (Image 59)

97. *Xysticus breviceps* O.P. Cambridge, 1885* (Image 60)

Family Uloboridae Thorell, 1869

98. *Miagrammopes extensus* Simon, 1889* (Image 61)

99. *Miagrammopes* sp.

100. *Uloborus danolius* Tikader, 1969*

Family Zodariidae Thorell, 1881

101. *Asceua cingulata* (Simon, 1905)* (Image 62)

*Endemic to India



Image 1. *Agelena inda*



Image 2. *Cyclosa hexatuberculata*



Image 3. *Cyclosa spirifera*



Image 4. *Cyrtarachne gravelyi*

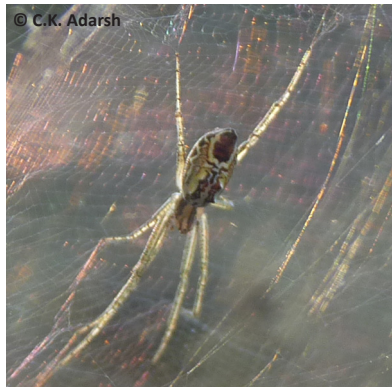


Image 5. *Cyrtophora citricola*



Image 6. *Gasteracantha geminata*



Image 7. *Clubiona drassodes*



Image 8. *Ctenus cochinensis*



Image 9. *Ctenus indicus*



Image 10. *Stegodyphus sarasinorum*



Image 11. *Filistata rufa*



Image 12. *Drassodes carinivulvus*



Image 13. *Gnaphosa kailana*



Image 14. *Poecilochroa barmani*



Image 15. *Zelotes ashae*



Image 16. *Hersilia savignyi* Lucas



Image 17. *Hersilia* sp.



Image 18. *Linyphia perampla*



Image 19. *Evippa banarensis*



Image 20. *Hippasa greenalliae*



Image 21. *Hippasa holomerae*



Image 22. *Lycosa barnesi*



Image 23. *Lycosa tista*



Image 24. *Pardosa pseudoannulata*



Image 25. *Pardosa sumatrana*



Image 26. *Wadicosa quadrifera*



Image 27. *Nephila pilipes*



Image 28. *Nephilengys malabarensis*



Image 29. *Oxyopes biramicus*



Image 30. *Oxyopes javanus*



Image 31. *Oxyopes shweta*



Image 32. *Peucetia viridana*



Image 33. *Palpimanus gibbulus*



Image 34. *Tibellus elongatus*



Image 35. *Artema atlanta*



Image 36. *Pholcus phalangioides*



Image 37. *Pimosa indiscreta*



Image 38. *Pisaura* sp.



Image 39. *Psechrus torvus*



Image 40. *Aelurillus improvisus*



Image 41. *Menemerus bivittatus*



Image 42. *Phaeacius lancearius*



Image 43. *Phintella vittata*



Image 44. *Portia fimbriata*



Image 45. *Siler semiglaucus*



Image 46. *Scytodes fusca*



Image 47. *Scytodes thoracica*



Image 48. *Selenops radiatus*



Image 49. *Heteropoda hampsoni*



Image 50. *Heteropoda leprosa*



Image 51. *Leucauge pondae*



Image 52. *Opadometa fastigata*



Image 53. *Tetragnatha maxillosa*



Image 54. *Poecilotheria striata*



Image 55. *Chryso argyrodiformis*



Image 56. *Latrodectus hasselti*



Image 57. *Misumena decorata*



Image 58. *Runcinia roonwali*



Image 59. *Talaus opportunus*

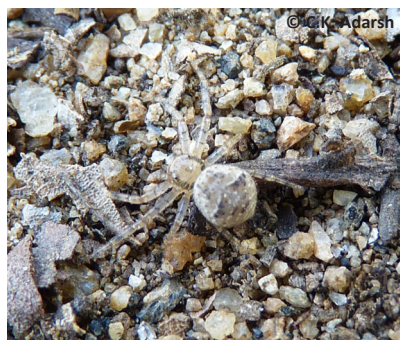


Image 60. *Xysticus breviceps*

Image 61. *Miagrammopes extensus*Image 62. *Asceua cingulata*Image 63. *Neoheterophriectus* sp.image 64. *Cyrtarachne* sp.image 65. *Ctenus* sp.image 66. *Cheiracanthium* sp.Image 67. *Thalassius albocinctus*image 68. *Heteropoda* sp.image 69. *Achaearanea* sp.

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