

Checklist of spiders from Chakrashila Wildlife Sanctuary, Assam, India

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Abstract

Chakrashila Wildlife Sanctuary has rich floral diversity which provides suitable microhabitats for spider fauna. Taxonomic study on spiders in Chakrashila Wildlife Sanctuary is comparatively nil. The present study was carried out to explore spider fauna in Chakrashila Wildlife Sanctuary. Randomly six numbers of 20x20 m quadrats were used at different sites for the study including standard sampling techniques such as visual searching, hand picking and pitfall traps. Collected specimens, as well as photographs were used for identification. A total of 65 spider species belonging to 47 genera under 16 families has been recorded. Amongst the families, the Araneidae was the most abundant (21 species) with orb weavers being the dominant guild type (43%). The present study has enlightened the status and distribution of spider in Chakrashila Wildlife Sanctuary. However, further study needs to be carried out regarding molecular phylogeny, molecular barcoding etc. for the effective conservation of these species.

Keywords: araneidae, checklist, diversity, conservation, species richness, guild

1. Introduction

Spiders are one of the most varied and functionally important invertebrates. Their presence in diverse microhabitats acts as an important bioindicator. Distribution and occurrence of spiders are greatly related to habitat structure and vegetation parameters [1, 5]. Spiders are polyphagous and are known to feed on various types of insects. Spiders can play a very important role in regulating the terrestrial arthropod populations [6]. In India 1442 species belonging to 361 genera of 59 families are reported so far [7]. Very little documentation has been done on spider in Assam. According to Singh *et al.* (2012) [8], Assam is one of the State of North-east India having rich floral and faunal diversity but, till date, little work has been carried out on this fauna. Some of the published studies in Assam are those of Chetia and Kalita (2012) [9], Dey *et al.* (2013) [10], Singh *et al.* (2012) [8] and a handbook on common spiders from select protected areas of Upper Assam by Assam Biodiversity Board (2015) [11]. The present study was carried out to make an extensive pioneering study on the alpha diversity of spider fauna in Chakrashila Wildlife Sanctuary and provided an important species database to the Forest Department for taking up an action plan for conservation.

2. Materials and methods

2.1. Study area

Geographical location of Chakrashila Wildlife Sanctuary is in the latitude 26° 15' to 26° 26' N and longitude 90° 15' to 90° 20' E (Figure-1). The Sanctuary is mainly a hilly tract and the lower hilly reaches are covered with Sal coppice. The temperature throughout the year generally varies between 8°C to 30°C. Annual rainfall is between 2000 to 4000mm.

2.2. Sampling methods

The survey was conducted for 1 year from March 2015 to

February 2016 at different sites. Quadrates with 20 X 20 m were taken at random sites. Standard sampling techniques such as visual searching [12], hand picking [13] and pitfall trap [14] were used. All surveys were conducted from 8:00 am to 10:00 am and opportunistic night time survey was also carried out during the study period. Collected spiders were photographed with digital camera (Nikon COOLPIX L310) and later released to their natural habitat.

2.3. Identification

Spiders were identified with the help of literature viz., Adarsh and Nameer (2015) [15], Chetia and Kalita (2012) [9], Majumder and Talukdar (2013) [16], Sebastian and Peter (2005) [17], Tikader (1987) [13]. The taxonomy and nomenclature followed are as per the world spider catalogue by Platnick (2014) [18].

3. Results

Chakrashila Wildlife Sanctuary provides diverse habitat to various spider species. The study revealed the occurrence of 65 spider species of belonging to 47 genera under 16 families (Table 1) and the different guild types found were orb-web builders, scattered line weavers, stalkers, foliage hunters, ambushers, ground runners and burrow living (Figure-1).

A total of twenty-one species were recorded from the family Araneidae; thirteen from Salticidae; five from Tetragnathidae; four from Oxyopidae; three each from Lycosidae, Sparassidae, Thomisidae; two each from Theridiidae, Pisauridae, Eutichuridae; one each from Corinnidae, Ctenidae, Clubionidae, Gnaphosidae, Hersiliidae, Idiopidae and Scytodidae (Table 2). Araneidae was the dominant family with 21 spider species from 11 genera and was followed by Salticidae with 13 species from 12 genera (Table 2, Figure-2).

4. Discussion

The distribution of spider family in the Table-1 presented that

the Araneidae was the dominant family followed by Salticidae, Thomisidae, Tetragnathidae, Sparassidae, Oxyopidae, Lycosidae, Eutichuridae, Ctenidae, Corinnidae, Clubionidae, Gnaphosidae, Hersiliidae, Idiopidae, Pisauridae, Theridiidae. Spiders from the family Araneidae are observed in diverse habitat and are able to harmonize with their surrounding environment which may be the probable reason for their dominance in the nature. Spiders from this family are brightly coloured as for example the spiders from the Genus *Argiope*, which might serve as a warning to the predators that they are inedible. Salticidae or the jumping spiders are expert in camouflaging and are able to live in harmony with their environment. According to Gajbe (2004) [19], most spiders living on the ground or in vegetation exhibits some kind of protective colouration for camouflage. Some good examples of mimics among these species include ant-mimicking spider from the genus *Myrmarachne*, species in genus *Cyclosa*, which resemble bird-droppings; *Tetragnatha* species, which

resemble tips of twigs or reeds and *Hersilia savignyi*, which resembles the bark of tree. The abundance of different spider families in respect to their individual's numbers which prominently reflects Araneidae and Salticidae as more abundant through less diverse family in comparison to Hersiliidae, Clubionidae and Agelinidae [20].

The different guild type of spiders recorded were shown in Figure 1. Guild structure analysis revealed seven feeding guilds which are Orb weavers, stalkers, Foliage Hunters, Ambushers, Scattered line weavers, Ground runners and Funnel weavers or burrow living [4, 17, 21]. The most common explanation for the observed pattern of spider guilds is structural diversity, micro environment or the level of disturbance of the habitat [22]. Spiders showed a diverse form of guild composition at Chakrashila Wildlife Sanctuary. Guild composition can provide insight into the effect of habitat alteration and disturbances on arthropod diversity [23].

Table 1: Checklist of spiders recorded from Chakrashila Wildlife Sanctuary, Assam, India.

S. No	Family	Scientific name	Guild type
1.	Araneidae (Simon,1895)	<i>Argiope anasuja</i> (Thorell,1887)	Orb-web builders
2.	Araneidae (Simon,1895)	<i>Argiope pulchella</i> (Thorell,1881)	Orb-web builders
3.	Araneidae (Simon,1895)	<i>Araneus mitificus</i> (Simon,1886)	Orb-web builders
4.	Araneidae (Simon,1895)	<i>Cyrtarachne inequalis</i> (Thorell,1864)	Orb-web builders
5.	Araneidae (Simon,1895)	<i>Cyslosa confraga</i> (Thorell,1892)	Orb-web builders
6.	Araneidae (Simon,1895)	<i>Cyclosa hexatuberculata</i> (Tikader,1982)	Orb-web builders
7.	Araneidae (Simon,1895)	<i>Cyclosa purnai</i> (Keswani, 2013)	Orb-web builders
8.	Araneidae (Simon,1895)	<i>Cyrtophora citricola</i> (Forsk., 1775)	Orb-web builders
9.	Araneidae (Simon,1895)	<i>Cyrtophora moluccensis</i> (Doleschall,1857)	Orb-web builders
10.	Araneidae (Simon,1895)	<i>Eriovixia excelsa</i> (Simon, 1889)	Orb-web builders
11.	Araneidae (Simon,1895)	<i>Gasteracantha hasselti</i> (CL Koch,1837)	Orb-web builders
12.	Araneidae (Simon,1895)	<i>Gasteracantha kuhli</i> (CL Koch,1837)	Orb-web builders
13.	Araneidae (Simon,1895)	<i>Neoscona bengalensis</i> (Tikader & Bal,1981)	Orb-web builders
14.	Araneidae (Simon,1895)	<i>Neoscona mukerjei</i> (Tikader, 1980)	Orb-web builders
15.	Araneidae (Simon,1895)	<i>Neoscona theisi</i> (Walckenaer)	Orb-web builders
16.	Araneidae (Simon,1895)	<i>Neoscona odites</i> (Simon,1906)	Orb-web builders
17.	Araneidae (Simon,1895)	<i>Parawixia dehaani</i> (Doleschall,1859)	Orb-web builders
18.	Araneidae (Simon,1895)	<i>Nephila kuhli</i> (Doleschall,1859)	Orb-web builders
19.	Araneidae (Simon,1895)	<i>Nephila pilipes</i> (Fabricus, 1793)	Orb-web builders
20.	Araneidae (Simon,1895)	<i>Nephila maculate</i> (Fabricus, 1793)	Orb-web builders
21.	Araneidae (Simon,1895)	<i>Herennia multipuncta</i> (Doleschall,1859)	Orb-web builders
22.	Corinnidae (Karsch,1880)	<i>Castianeira albopicta</i> (Gravely,1931)	Ground runners
23.	Ctenidae (Keyserling,1877)	<i>Ctenus sp.</i>	Ground runners
24.	Clubionidae (Wagner,1887)	<i>Clubiona sp.</i>	Foliage runners
25.	Eutichuridae (Lehtinen, 1967)	<i>Cheiracanthium danieli</i> (Tikader,1975)	Foliage runners
26.	Eutichuridae (Lehtinen, 1967)	<i>Cheiracanthium melanostomum</i> (Thorell,1895)	Foliage runners
27.	Gnaphosidae (Pocock,1898)	<i>Poecilochroa sp.</i>	Ground runners
28.	Hersiliidae (Thorell,1870)	<i>Hersilia savignyi</i> (Lucas,1836)	Ambushers
29.	Idiopidae (Simon,1889)	<i>Scalidognathus sp.</i>	Burrow living
30.	Lycosidae (Sundevall,1833)	<i>Lycosa mackenziei</i> (Gravely,1924)	Ground runners
31.	Lycosidae (Sundevall,1833)	<i>Pardosa sp.</i>	Ground runners
32.	Lycosidae (Sundevall,1833)	<i>Pardosa pseudoannulata</i> (Bosenberg & Strand,1906)	Ground runners
33.	Oxyopidae (Thorell,1870)	<i>Oxyopes naliniae</i> (Gajbe,1999)	Stalkers
34.	Oxyopidae (Thorell,1870)	<i>Oxyopes pankaji</i> (Gajbe & Gajbe,2000)	Stalkers
35.	Oxyopidae (Thorell,1870)	<i>Oxyopes shweta</i> (Tikader,1970)	Stalkers
36.	Oxyopidae (Thorell,1870)	<i>Oxyopes sitae</i> (Tikader,1970)	Stalkers
37.	Pisauridae (Simon,1890)	<i>Nilus albocinctus</i> (Doleschall,1859)	Ambushers
38.	Pisauridae (Simon,1890)	<i>Perenethis sp.</i>	Ambushers
39.	Salticidae (Blackwall,1841)	<i>Carrhotus viduus</i> (CL Koch,1846)	Stalkers
40.	Salticidae (Blackwall,1841)	<i>Chryzilla sp.</i>	Stalkers

41.	Salticidae (Blackwall,1841)	<i>Hyllus semicupreus</i> (Simon, 1885)	Stalkers
42.	Salticidae (Blackwall,1841)	<i>Myrmarachne orientales</i> (Tikader,1973)	Stalkers
43.	Salticidae (Blackwall,1841)	<i>Myrmarachne plataleoides</i> (OP Cambridge,1869)	Stalkers
44.	Salticidae (Blackwall,1841)	<i>Phintella vittata</i> (CL Koch,1846)	Stalkers
45.	Salticidae (Blackwall,1841)	<i>Plexippus paykulli</i> (Audouin,1826)	Stalkers
46.	Salticidae (Blackwall,1841)	<i>Phaeacius sp.</i>	Stalkers
47.	Salticidae (Blackwall,1841)	<i>Siler semiglaucus</i> (Simon,1901)	Stalkers
48.	Salticidae (Blackwall,1841)	<i>Telamonia dimidiata</i> (Simon,1899)	Stalkers
49.	Salticidae (Blackwall,1841)	<i>Zebraplatys sp.</i>	Stalkers
50.	Salticidae (Blackwall,1841)	<i>Zygoballus narmadaensis</i> (Tikader,1975)	Stalkers
51.	Salticidae (Blackwall,1841)	<i>Bavia insularis</i> (Malamel, Sankaran and Sebastian, 2015)	Stalkers
52.	Sparassidae (Bertkaw,1872)	<i>Heteropoda venatoria</i> (Linnaeus 1767)	Foliage runners
53.	Sparassidae (Bertkaw,1872)	<i>Heteropoda sp.</i>	Foliage runners
54.	Sparassidae (Bertkaw,1872)	<i>Olios milleti</i> (Pocock,1901)	Foliage runners
55.	Scytodidae (Blackwall, 1864)	<i>Scytodes pallidus</i> (Wang, 1994)	Foliage runners
56.	Tetragnathidae (Menge,1866)	<i>Leucauge decorata</i> (Blackwall,1864)	Orb-web builders
57.	Tetragnathidae (Menge,1866)	<i>Leucauge tessellata</i> (Thorell,1887)	Orb-web builders
58.	Tetragnathidae (Menge,1866)	<i>Opadometa fastigata</i> (Simon,1877)	Orb-web builders
59.	Tetragnathidae (Menge,1866)	<i>Tetragnatha javana</i> (Thorell,1890)	Orb-web builders
60.	Tetragnathidae (Menge,1866)	<i>Tylorida striata</i> (Thorell,1877)	Orb-web builders
61.	Theridiidae (Sundevall,1833)	<i>Chryso angula</i> (Tikader,1970)	Scattered line weavers
62.	Theridiidae (Sundevall,1833)	<i>Parasteatoda sp.</i>	Scattered line weavers
63.	Thomisidae (Sundevall,1883)	<i>Camaricus formosus</i> (Thorell,1887)	Ambushers
64.	Thomisidae (Sundevall,1883)	<i>Thomisus lobosus</i> (Tikader, 1965)	Ambushers
65.	Thomisidae (Sundevall,1883)	<i>Tmarus sp.</i>	Ambushers

Table 2: Total number of families, genera and species composition sampled from Chakrashila Wildlife Sanctuary, Assam, India.

Sr. No	Family	No. of genus	No. of species
1.	Araneidae	11	21
2.	Corinnidae	1	1
3.	Ctenidae	1	1
4.	Clubionidae	1	1
5.	Eutichuridae	1	2
6.	Gnaphosidae	1	1
7.	Hersiliidae	1	1
8.	Idiopidae	1	1
9.	Lycosidae	2	3
10.	Oxyopidae	1	4
11.	Pisauridae	2	2
12.	Salticidae	12	13
13.	Sparassidae	2	3
14.	Scytodidae	1	1
15.	Tetragnathidae	4	5
16.	Theridiidae	2	2
17.	Thomisidae	3	3
	<i>Total</i>	47	65

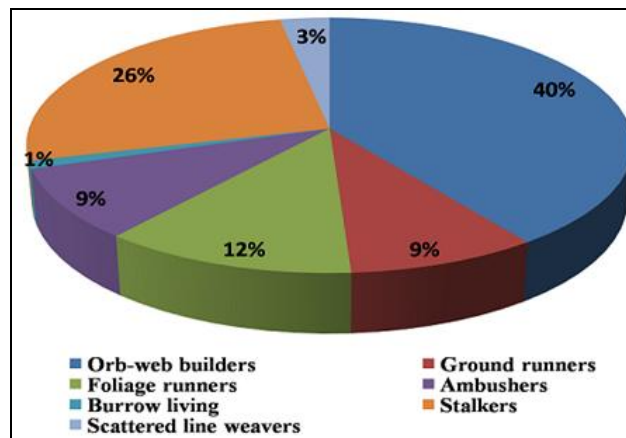


Fig 1: Guild structure of the spiders in Chakrashila Wildlife Sanctuary, Assam, India.



Fig 2: (a)-(t) Spiders observed during the study in Chakrashila Wildlife Sanctuary, India.

5. Conclusion

The study documented 65 spider species of belonging to 47 genera under 16 families with Araneidae being the dominant family. The orb weavers were the major guild structure. Diverse forms of spiders are present in Chakrashila Wildlife Sanctuary. The rich fauna and flora of the Chakrashila Wildlife Sanctuary is the key to build the microhabitats that support diverse spider species. They are maintaining

ecological equilibrium by suppressing insect pest. However, the forest is under pressure from habitat loss and degradation due to deforestation which is the primary threats to spider diversity.

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7. References

1. Buddle CM, Spence JR, Langor DW. Succession of boreal spider assemblages following wildfire and harvesting. *Ecography*. 2000; 23:424-436.
2. De Souza ALT, Martins RP. Distribution of plant-dwelling spiders: inflorescences versus vegetative branches. *Austral Ecol*. 2004; 29:342-349.
3. Greenstone MH. Determinants of web spider species diversity: vegetation structural diversity vs. prey availability. *Oecologia*. 1984; 62:299-304.
4. Uetz GW. Habitat structure and spider foraging. In: *Habitat structure: The Physical Arrangement of Objects in Space*, McCoy, E.D., S.S. Bell and H.R. Mushinsky, Eds. Chapman and Hall, London. 1991, 325-348.
5. Wise DH. *Spiders in Ecological Webs*. University Press, Cambridge, UK, 1993.
6. Coddington JA, Levi HW. Systematics and evolution of spiders Araneae. *Annu. Rev. Ecol. Evol. Syst.* 1991; 22:565-592.
7. Siliwal M, Molurand S, Biswas BK. Indian spiders Arachnida: Araneae: updated checklist 2005. *Zoos' Print J*. 2005; 20:1999-2049.
8. Singh S, Borkotoki A, Sarmah CK. Species distribution of spiders in Barpeta district of Assam: A diversity measure. *E-International Scientific Research Journal*. 2012; 1:47-57.
9. Chetia P, Kalita DK. Diversity and distribution of spiders from Gibbon Wildlife Sanctuary, Assam, India. *Asian Journal of Conservation Biology*. 2012; 1:5-15.
10. Dey A, Debnath S, Debbarma B, Chaudhuri PS. A preliminary study on spider diversity from a house hold garden artificial mixed plantation in West Tripura, India. *Journal of Research in Biology*. 2013; 3:1009-1017.
11. Assam State Biodiversity Board. *Common spiders from select protected areas of upper Assam*. Assam State Biodiversity Board, Guwahati, India, 2015.
12. Sebastian PA, Peter KV. *Spiders of India*. University Press, Hyderabad, 2009.
13. Tikader BK. *Handbook of Indian spiders*. Zoological Survey of India, Calcutta, 1987.
14. Curtis DJ. Pitfalls in spider community studies Arachnida, Araneae, *J. Arachnol.* 1980; 8:271-280.
15. Adarsh CK, Nameer PO. Spiders of Kerala Agricultural University Campus, Thrissur, Kerala, India. *J. threat. taxa*. 2015; 7:8288-8295.
16. Majumder SC, Talukdar S. Studies on Taxonomy and Diversity of spiders from Darjeeling Hills with special reference to family Clubionidae in light of conservation. In: *Records of Zoological Survey, India*. 2013, 1-96.
17. Sebastian PA, Murugesan S, Mathew MJ, Sudhikumar MJ, Sunish E. Spiders in Mangalavanam, an ecosensitive mangrove forests in Cochin, Kerala, India Araneae. *Acta Zool. Bulg.* 2005; 1:315-318.
18. Platnick NI. *World Spider Catalog*. Natural History Museum Bern. 2014. Available from: <http://wsc.nmbe.ch>, version 18.0 accessed, 2017.
19. Gajbe PU. Spiders of Jabalpur, Madhya Pradesh Arachnida: Araneae, In: *Records Zoological Survey of India*. 2004, 1-154.
20. Ganesan R, Shunmugavelu M. Spider faunal diversity in Perumalmalia forest area, Kodaikanal Hills, Dindigul district, Tamil Nadu, India. *J. Bioscience Research*. 2012; 3: 1-5.
21. Sudhikumar AV, Mathew MJ, Sunish E, Murugesan S, Sebastian PA. Preliminary studies on the spider fauna in Mannavanshola forest, Kerala, India Araneae. *Acta Zool. Bulg.* 2005; 1:319-327.
22. Jiang SL, Li BP. Composition and distribution of soil spider assemblages in three natural secondary forests in Ziwuling, Gansu. *Zool. Res.* 2006; 27:569-574.
23. Stork NE. Guild structure of arthropods from Bomean rain forests trees. *Ecol. Entomol.* 1987; 12:69-80.