

## Faunal diversity of Spiders (Arachnida: Araneae) with a new record for India in Chintamani Kar Bird Sanctuary, West Bengal

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### Abstract

Chintamani Kar Bird Sanctuary [CKBS] is the only legally protected habitat on the west bank of Adi-Ganga River amidst a rapidly urbanizing landscape adjacent to Kolkata metropolis supporting a rich insect diversity along with local flora, fauna and migratory bird species. The present work on spider diversity in CKBS, documented 33 species belonging to 29 genera across 10 families. The most notable finding was *Philoponella prominens* (Bosenberg & Strand, 1906), a kleptoparasitic species on *Cyrtophora cyatrosa* (Stoliczka, 1869), as it was documented for the first time from India and West Bengal additional to its known distribution range of China, Korea, Taiwan and Japan. The most abundant families were Salticidae and Araneidae with 10 and 9 species respectively followed by Uloboridae with 4 species, Theridiidae with 3 species, Oxyopidae with 2 species. The families Corinnidae, Lycosidae, Pholcidea, Tetragnathidae and Sparassidae were represented by one species each. Genera wise the family Salticidae was most diverse. Guild structure analysis revealed that 43% species were orb-web weavers, while, 30% were stalkers of which only one species, *Myrmarachne melanocephala* Macleay, 1839, was found as batasian mimic of ants. Other guilds were scattered line weavers (12%), foliage runner (6%), Ambush hunter (6%) and Ground runner (3%). This report providing present status of spider diversity along with guild structure in CKBS may help in developing conservation strategies and further research in future.

**Keywords:** Orb web weaver, Kolkata, spider, microhabitat, kleptoparasite

### Introduction

Spiders are very fascinating as well as illogically feared animals [1]. However, applied arachnology research proved that they are very beneficial to society for their potential role as natural insect pest controller [2], pollution indicator [3] and model organism [4] for biomimetics [5]. Recently, spiders have been shown to provide a range of ecosystem services including various types of provisioning services, regulating services, Supporting services and Cultural services [6]. Spiders are one of the most widespread organisms due to their ability to disperse through air drift with the help of silk balloons [7, 8]. They occupy a wide variety of ecosystems such as, forests, deserts, grasslands, wetlands and even aquatic habitats and thus, are one of the most divers organisms [9]. The World Spider Catalog (2025) [10] documented a total 53,189 described species belonging to

4,466 genera and 138 families worldwide. India harbors rich spider diversity due to its varied geography and ecosystems. Spider diversity is also being studied extensively in different ecosystems in India and as a result, 1,979 species across 514 genera and 63 families have been documented to date [11]. However, many regions of India remain underexplored, particularly West Bengal, as its fragmented forest patches and urban proximate sanctuaries, have been received limited attention in terms of arachnid diversity. Our present study aimed to record spider diversity along with their guild structure analysis in CKBS, a protected area located within city landscape of kolkata in south 24 parganas district, may help in understanding their biology and resource utilization pattern required for future conservation strategies balancing growing urbanization pressure.



**Fig 1:** Map of study area showing location in India along with its adjoining landscape

**Materials and Methods**

**Study Area**

The study was conducted at Chintamani Kar Bird Sanctuary (CKBS) geographically located with the coordinates 22°25'45"N and 88°24'02"E and 26m above sea level in Narendrapur locality under the district South 24 Parganas in the state of West Bengal, India (Fig – 1). The CKBS, previously a private orchard spread across 17-acre area, was declared through state government notification at its present status of bird sanctuary on 2005 [12, 13]. The CKBS is supposed to be a paradise supporting floral and faunal diversity including seasonal migratory species amidst a rapidly developing urban landscape adjacent to Kolkata metropolis [14]. The canopy of CKBS is predominated by more than 100 years old fruit trees like Mango (*Mangifera indica*), Rose apple (*Syzygium jambos*), Aash phol (*Dimocarpus longan*), Jack fruit (*Artocarpus heterophyllus*), Guava (*Psidium guajava*), Fig (*Ficus carica*), Coconut (*Coco nucifera*) etc. [12, 13]. Banana plant (*Musa paradisiaca*) Bamboo groves (*Dendrocala musstricta*) are notable in the intermediate layer. Understory weeds and dense shrubs and bushes especially *Lantana* spp. form an intricate lower layer. Open ground and grass land patches

are almost absent rather; the ground is covered with thick layers of leaf litter. Three small seasonal water bodies are present in the sanctuary area. The Adi Ganga River, now reduced to a canal flows by the area.

**Methods**

Field works were carried out during the months of December 2024, February 2025 and May 2025. During our study the foliage of trees, shrubs and bushes upto about 10 ft, tree trunk, bark and leaf litters were searched to visually locate spider in their webs or in actively foraging condition. Spiders were photographed and observed their activity. These photographs served as supplementary records. These images were compared with taxonomic keys and illustrations published in literature cited in table 1 for each species. The world spider catalogue, version 26 (2025) [10] was consulted current accepted scientific names of each spider. Spiders were observed and classified into functional foraging guilds directly in the field or based on their behavior, microhabitat, and web architecture according to [15, 16]. Each spider encountered during field work, the vertical height from the ground to the point of observation was measured using a measuring tape in inches for vertical stratification of habitat.

**Table 1:** List of spiders observed in CKBS with identification references

	Genus/Species
	<b>I. Araneidae</b>
1.	<i>Anepsion maritatum</i> (O. Pickard-Cambridge, 1877) <sup>[19]</sup>
2.	<i>Argiope pulchella</i> Thorell, 1881 <sup>[20]</sup>
3.	<i>Argiope</i> sp. <sup>[20]</sup>
4.	<i>Bijuaraneus mitificus</i> (Simon, 1886) <sup>[20]</sup>
5.	<i>Cyclosa confraga</i> (Thorell, 1893) <sup>[20]</sup>
6.	<i>Cyclosa mulmeinensis</i> (Thorell, 1887) <sup>[20]</sup>
7.	<i>Cyrtophora cicatrosa</i> (Stoliczka, 1869) <sup>[20]</sup>
8.	<i>Eriovixia poonaensis</i> (Tikader&Bal, 1981) <sup>[21]</sup>
9.	<i>Gea</i> sp. <sup>[22]</sup>
	<b>II. Corinnidae</b>
10.	<i>Castianeira albopicta</i> Gravely, 1931 <sup>[23]</sup>
	<b>III. Lycosidae</b>
11.	<i>Pardosa sumatrana</i> (Thorell, 1890) <sup>[24]</sup>
	<b>IV. Oxyopidae</b>
12.	<i>Hamadruas sikkimensis</i> (Tikader, 1970) <sup>[25]</sup>
13.	<i>Hamadruas</i> sp. <sup>[26]</sup>
	<b>V. Pholcidae</b>
14.	<i>Crossopriza lyoni</i> (Blackwall, 1867) <sup>[25]</sup>
	<b>VI. Salticidae</b>
15.	<i>Asemona tenuipes</i> (O. Pickard-Cambridge 1869) <sup>[27]</sup>
16.	<i>Brettus cingulatus</i> (Thorell 1895) <sup>[28]</sup>
17.	<i>Hasarius adansonii</i> (Audouin, 1826) <sup>[29]</sup>
18.	<i>Myrmarachne melanocephala</i> Macleay, 1839 (female) <sup>[29]</sup>
19.	<i>Neobrettus</i> sp. <sup>[30]</sup>
20.	<i>Phintella vittata</i> (C.L. Koch, 1846) <sup>[29]</sup>
21.	<i>Plexippus paykulli</i> (Audouin, 1826) <sup>[29]</sup>
22.	<i>Siler semiglaucus</i> (Simon, 1901) <sup>[25]</sup>
23.	<i>Telamonia dimidiata</i> (Simon, 1899) <sup>[29]</sup>
24.	<i>Thiania bhamoensis</i> (Thorell, 1887) <sup>[31]</sup>
	<b>VII. Tetragnathidae</b>
25.	<i>Tylorida ventralis</i> (Thorell, 1877) Female & Male <sup>[20]</sup>
	<b>VIII. Theridiidae</b>
26.	<i>Chryso viridiventris</i> Yoshida, 1996 <sup>[32]</sup>
27.	<i>Nihonhimea tikaderi</i> (Patel, 1973) <sup>[33]</sup>
28.	<i>Thwaitesia margaritifera</i> O. Pickard-Cambridge, 1881 <sup>[34]</sup>
	<b>IX. Uloboridae</b>
29.	<i>Philoponella prominens</i> (Bosenberg& Strand, 1906) <sup>[17]</sup>
30.	<i>Uloborus krishnae</i> Tikader, 1970 <sup>[35]</sup>

31.	<i>Uloborus plumipes</i> Lucas, 1846 <sup>[36]</sup>
32.	<i>Zosis geniculata</i> (Olivier, 1789) <sup>[37]</sup>
	X. Sparassidae
33.	<i>Heteropoda venatoria</i> (Linnaeus, 1767) <sup>[38]</sup>



**Fig 2:** Habitus of Spiders found in CKBS under family Araneidae (A-J), Corinnidae (K), Lycosidae (L) and Oxyopidae (M-O); A- *Anepsion maritatum* (O. Pickard-Cambridge, 1877) | B- *Argiope pulchella* Thorell, 1881| C- *Argiope* sp. juvenile | D- *Bijoaraneus mitificus* (Simon, 1886)| E- *Cyclosa confraga* (Thorell, 1893)| F- *Cyclosa mulmeinensis* (Thorell, 1887)| G- *Cyrtophora cicatrosa* (Stoliczka, 1869)| H- *Eriovixia poonaensis* (Tikader&Bal, 1981) Adult | I- *Eriovixia poonaensis* (Tikader&Bal, 1981) Juvenile | J- *Gea* sp. | K- *Castianeira albopicta* Gravely, 1931/ L- *Pardosa sumatrana* (Thorell, 1890) | M, N and O - *Hamadruas sikkimensis* (Tikader, 1970) Different morph.



**Fig 3:** Habitus of Spiders found in CKBS under family Oxyopidae (A), Pholcidae (B) and Salticidae (C-O); A- *Hamadruas* sp. | B- *Crossopriza lyoni* (Blackwall, 1867) | C- *Asemonea tenuipes* (O. Pickard-Cambridge 1869) Male | D- *Asemonea tenuipes* (O. Pickard-Cambridge 1869) Female | E- *Brettus cingulatus* (Thorell 1895) Female | F- *Brettus cingulatus* (Thorell 1895) Male | G- *Brettus cingulatus* (Thorell 1895) Penultimate Female | H- *Hasarius adansoni* (Audouin, 1826) Male | I- *Myrmarachne melanocephala* Macleay, 1839 Female | J- *Neobrettus* sp. Female | K- *Neobrettus* sp. Male | L- *Phintella vittata* (C.L. Koch, 1846) Male | M- *Plexippus paykulli* (Audouin, 1826) Male | N- *Siler semiglaucus* (Simon, 1901) | O- *Telamonia dimidiata* (Simon, 1899) Male



**Fig 4:** Habitus of Spider under family Salticidae (A), Tetragnathidae (B&C), Theridiidae (C-E), Uloboridae (G-N) and Sparassidae (O); A- *Thiania bhomoensis* (Thorell, 1887) | B- *Tylorida ventralis* (Thorell, 1877) Male | C- *Tylorida ventralis* (Thorell, 1877) Female | D- *Chryso viridiventris* Yoshida, 1996 | E- *Nihonhimea tikaderi* (Patel, 1973) | F- *Thwaitesia margaritifera* O.Pickard-Cambridge, 1881 | G - *Philoponella prominens* (Bosenberg & Strand, 1906) | H- *Philoponella prominens* (Bosenberg& Strand, 1906) side view | I – *Uloborus krishnae* Tikader,1970 | J,K & L –*Uloborus plumipes* Lucas, 1846 different morph | M –*Uloborus plumipes* Lucas, 1846 side view of typical hanging pattern in web | N- *Zosis geniculata* (Olivier, 1789)| O- *Heteropoda venatoria* (Linnaeus, 1767).

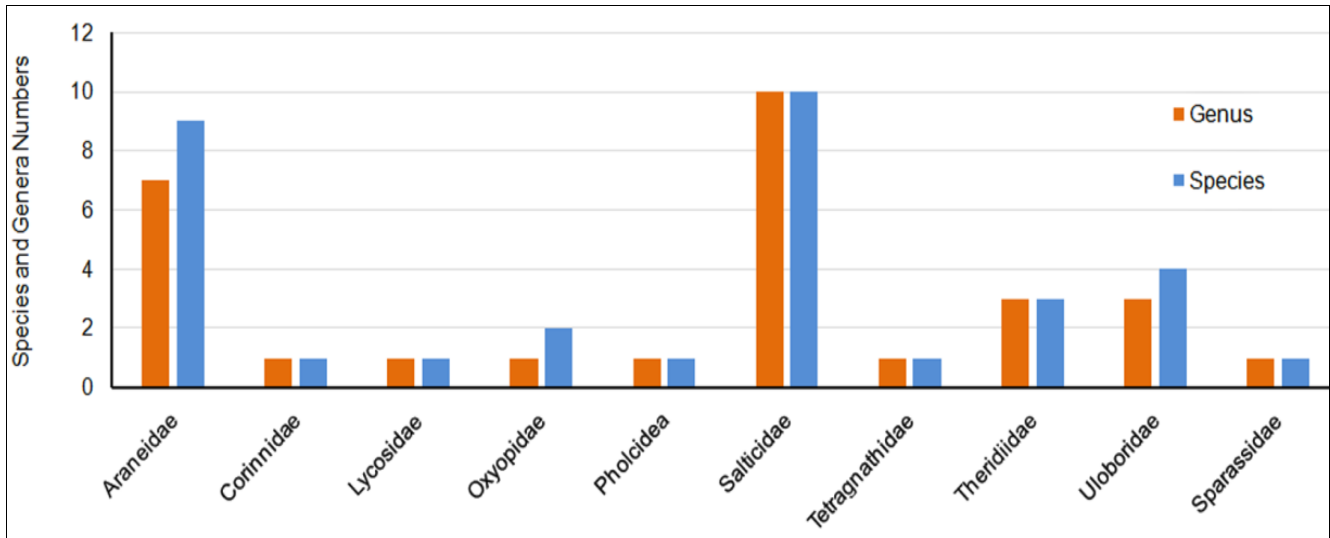


Fig 5: The number of genera and species representing each family of spiders

**Results and Discussion**

The present study on diversity of spiders in CKBS reports 33 different species belonging to 29 genera representing 10 families (Table 1 and fig- 2, 3 and 4) of which *Philoponella prominens* (Bosenberg & Strand, 1906) under family Uloboridae have been documented for the first time from India. Earlier, distribution range of the species was in China, Korea, Taiwan and Japan [10, 17]. Among the 10 families, the Salticidae and Araneadae were most diverse with 30.30% (10 species) and 27.27% (9 species) respectively, of the total number of species recorded. Genera wise the family salticidae was more diverse compared to Araneadae (Fig-

5). The family Uloboridae was represented by 12.12% (4 species) of species distributed under 3 genera. The 3 species of family Theridiidae constituting only 09.09% of diversity were distributed under three different genera. Only one genus, *Hamadruas*, containing 2 species was documented under the family Oxyopidae. Previous study reported presence of *Oxyopes* [18] which, was not found during our survey may be due to seasonal diversity. The least diverse, 03.03%, families were Corinnidae, Lycosidae, Pholcidea, Tetragnathidae and Sparassidae were represented by only one species each (Fig-5).

Table 2: Guild structure and habitat distribution of spiders found in CKBS

Guild	Habitat type	Mean height (Ft)	Spider species
Orb-web weaver	Vertical web on tree or shrubs	5 to 6	<i>Argiope pulchella</i> Thorell, 1881
			<i>Eriovixia poonaensis</i> (Tikader&Bal, 1981)
		3 to 4	<i>Argiope</i> sp.
		4 to 5	<i>Bijoaraneus mitificus</i> (Simon, 1886)
		3to 4	<i>Cyclosa mulmeinensis</i> (Thorell, 1887)
		<i>Cyclosa confragra</i> (Thorell, 1893)	
	Horizontal web on tree foliage	4 to 6	<i>Anepsion maritatum</i> (O. Pickard-Cambridge, 1877)
		4 to 6	<i>Uloborus krishnae</i> Tikader,1970
		3 to 6	<i>Uloborus plumipes</i> Lucas, 1846
		4 to 5	<i>Zosis geniculata</i> (Olivier, 1789)
5 to 7		<i>Tylorida ventralis</i> (Thorell, 1877)	
Tent web in bushes	4 to 6	<i>Cyrtophora cicatrosa</i> (Stoliczka, 1869)	
Kleptoparasitic in abandoned tent web of <i>Cyrtophora</i>	4 to 6	<i>Philoponella prominens</i> (Bosenberg& Strand, 1906)	
	Day retreat on tree foliage	3 to 5	<i>Gea</i> sp.
Foliage runner	Sac like retreat in bushes	3 to 4	<i>Castianeira albopicta</i> Gravely, 1931
	Wall	0 to 12	<i>Heteropoda venatoria</i> (Linnaeus, 1767)
Stalkers	Foraging on Shrub or bush foliage	3 to 4	<i>Thiania bhamoensis</i> (Thorell, 1887)
			<i>Telamonia dimidiata</i> (Simon, 1899)
		4 to 5	<i>Myrmarachne melanocephala</i> Macleay, 1839
		2 to 4	<i>Siler semiglaucus</i> (Simon, 1901)
		2 to 3	<i>Asemonea tenuipes</i> (O. Pickard-Cambridge 1869)
		4 to 5	<i>Phintella vittata</i> (C.L. Koch, 1846)
		5 to 6	<i>Brettus cingulatus</i> (Thorell 1895)
	Tree bark and wall	0 to 12	<i>Plexippus paykulli</i> (Audouin, 1826)
		6 to 7	<i>Hasarius adansonii</i> (Audouin,1826)
		4 to 6	<i>Neobrettus</i> sp. Male and Female
Ambush hunter	Foraging on Shrub or bush foliage	5 to 6	<i>Hamadruas sikkimensis</i> (Tikader, 1970)
			<i>Hamadruas</i> sp.
Scattered line	Shrub foliage	5 to 6	<i>Thwaitesia margaritifera</i> O. Pickard-Cambridge, 1881
		3 to 4	<i>Nihonhimea tikaderi</i> (Patel, 1973)

weavers		5 to 6	<i>Chryso viridiventris</i> Yoshida, 1996
	Tree trunk	5 to 6	<i>Crossopriza lyoni</i> (Blackwall, 1867)
Ground runner	Leaf litter	-	<i>Pardosa sumatrana</i> (Thorell, 1890)

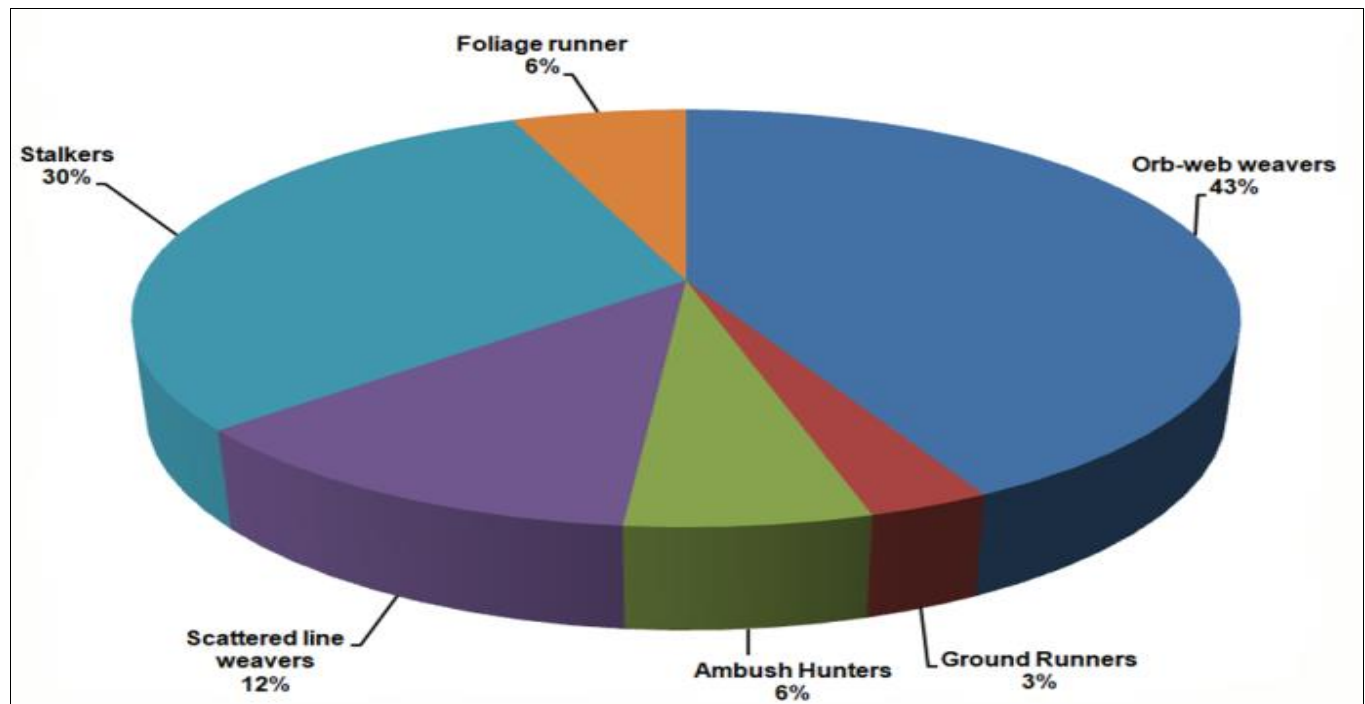


Fig 6: Guild structure of spiders found in CKBS

The documented spiders were categorized into six functional groups based on the guild structure classification of [15, 16]. Orb-web weavers were the most dominant guild, comprising 14 species, followed by Stalkers with 10 species, scattered line weavers with 4 species, Ambush hunters with 2 species, Foliage runner with 2 species and Ground runners with 1 species (Table 2 and Fig - 6). Table 2 further indicates that these spiders were recorded from 12 distinct habitat types. Among Orb web weavers, 50% were found building vertical webs on trees within 7ft above the ground, while 28.6% constructed horizontal webs on trees or shrubs. Only the species *Cyrtophora cicatrosa* (Stoliczka, 1869) observed within tent web in bushes (7.14%) and in some of their abandoned webs *Philoponella prominens* (Bosenberg & Strand, 1906) was recorded as kleptoparasite (7.14%). *Gea* sp. was found in day retreat formed with white sheet of web underside the tree leaves (7.14%). Most stalkers, about 70%, were located foraging on shrub and bush foliage, while *Plexippus paykulli* and *Hasarius adansoni* were observed on tree barks and building walls as well. Both male and females of *Neobrettus* sp., constituting 10% of stalker species diversity, were found exclusively on live banana leaf. Scattered line weavers preferred shrub foliage and tree trunk within six feet above the ground, with 75% and 25% respectively. Ambush hunters were found foraging on bush and shrub foliage with only one genus *Hamadruas*. Foliage runner, *Castianeira albopicta* was found in sac like retreat in bushes from where it was foraging up to about 2 ft with fast haphazard running through nodes, internodes and leaves of the twig and come back time and again to prey on small insects. The other foliage runner, *Heteropoda venatoria*, was observed to wait for prey either on tree trunk or walls. *Pardosa sumatrana*,

the only ground runner species, was foraging with fast intermittent running on the leaf litter under shadow areas.

**Conclusion**

The present communication reports about presence of 33 spider species under 29 genera and 10 families exploiting different microhabitats in CKBS surrounded by a rapidly developing urbanized landscape. The orb-web weavers being the dominant guild may help in assessment of air pollution in the area in future. The ground area of the sanctuary is covered with thick leaf litter suggesting a suitable habitat for ground runners, however, we have found only one such species. Therefore, the area needs further exploration in future across seasons for litter dwelling spider diversity. Overall the study is indicating a healthy ecosystem with spider faunal diversity differing from non-forested areas and agro ecosystems.

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**Conflict of interest**

The authors declare that they have no known competing interest in the work reported in this publication.

**Author Contribution**

SS, MRM and AKA collected data and photographically documented the specimen in the field work. MRM also carried out identification of the specimen, data analysis and drafting of manuscript. SM finally identified the specimen Corrected the manuscript and provided necessary guidance.

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