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# **FAUNAL DIVERSITY AND RECENT TRENDS** in **ANIMAL TAXONOMY**

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## DIVERSITY OF SPIDERS IN CHULANNUR PEAFOWL SANCTUARY, KERALA

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### ABSTRACT

The distribution and diversity of spiders has been drawn attention of naturalist in different parts of the world since the eighteenth century. Spiders are abundant and ubiquitous, employ a remarkable diversity of predation strategies, occupy a wide array of spatial and niches, are characterized to high within - habitat taxonomic diversity, exhibits taxon guild – specific responses to environmental change, and are relatively easy to sample and identify. The Chulannur Peafowl Sanctuary is located in the Thrissur and Palakkad districts in the state of Kerala. The sampling methods such as ground hand picking, aerial hand picking, and vegetation beating were used to collect specimens. A total of 63 species of spiders belonging to 42 genera coming under 14 families were collected from Chulannur Peafowl Sanctuary. Forest area contained 35 species of spiders belonging to 28 genera under 10 families. The Bamboo area contained 33 species coming under 22 genera under 10 families. Shrubs contained 27 species of spider coming under 19 genera belongings to 10 families. Butterfly garden reported 4 species of spiders coming under 4 genera and single family, Araneidae. The medicinal garden consisted of 13 species of spiders coming under 11 genera under 7 families. Out of the 14 families collected during the study, the family Araneidae was dominant family with 17species belonging to 10 genera. A total of 6 feeding guilds were identified by the analysis of feeding behaviour of collected spiders. Species richness was high in the forest area. Highest species diversity found in Bamboo area and the lowest in butterfly garden.

**Key words:** Spider, diversity, Chulannur Peafowl Sanctuary, guild structure

### INTRODUCTION

Spiders form one of the most ubiquitous groups of predacious organism in the animal world (Riechert & Lockley, 1984). They are the largest order of arachnids and rank seventh in total species diversity among all other orders of organisms. As of November 2017, at least 45,700 spider species coming under 114 families have been recorded by taxonomists (World Spider Catalogue, 2017). Spider webs vary widely in size, shape and the amount of sticky thread used. A herbivorous species, *Bagheera kiplingi*, was described in 2008, but all other known species are predators, mostly preying on insects and on other spiders, although a few species also take birds and lizards.

The distribution and diversity of spiders has been drawn attention of naturalist in different parts of the world since the eighteenth century. Spiders as a group may even provide useful conservation tools as ecological indicators or in rapid biodiversity measurement. Jocque (1981) showed that size in spiders is dependent on the quality of the habitat. Spiders are clearly an integral part of biodiversity, since they play an important role in

ecosystem as exclusive predators on other organisms and maintaining the prey – predator balance. The study intends to carry out sampling at different regions of the sanctuary. As yet, no systematic work has been carried out on the spiders of this sanctuary. This study is relevant owing to the fact that this is the pioneering work on the systematics and diversity of spider fauna in this habitat.

### **MATERIALS AND METHODS**

**Study area:** Chulannur peafowl sanctuary is located between 10°42′, 713″ and 10° 43′ 962″ North latitude and 76 °27′ and 76° 29′ 899″ East longitude in the Thalappilly and Alathur taluqs in Thrissur and Palakkad districts respectively in the state of Kerala. The sanctuary is under the administrative control of Peechi Wildlife Division. The sanctuary predominantly consists of deciduous forests with open patches and rocky areas. The terrain is undulating with small hillocks and valleys with occasional rocky outcrops and rocky patches. The average altitude is about 120 m above mean sea level. The area receives both southwest and northeast monsoons. The average annual rainfall is 2200 mm. Most of the precipitation is received during southwest monsoon from June to September. The temperature ranges between 23°C to 36°C. During summer months the area is relatively dry owing to the hot winds through the Palakkad gap.

**Study time:** The observation of spider was made during the period of 8 months from August, 2016 to March, 2017; which include monsoon and post-monsoon seasons. Spiders were collected once in a month in the morning (7.00 am) up to (11.00 am). As spiders exploit a wide variety of niches, sampling was done in order to collect representative samples from different habitat. An all-out search method was used for collecting the spiders. Each site was examined thoroughly for the possible spiders.

**Sampling:** The sampling was done once in a month. A total of 32 quadrates were studied each season per site by collecting from 4 quadrates. Specimens collected were transported to the laboratory. Comparatively large specimens were photographed in the field itself before collection with the help of special digital camera and lens (Canon EOS 5D digital SLR and Canon 180 mm macro lens). Specimens were preserved in 70% alcohol with proper labeling of locality, date, and other notes of importance for further studies. Preserved specimens were examined under a stereo zoom microscope (Leica-MS5) in the laboratory for taxonomic identification. Spiders were identified up to species level with the help of available literature (Sebastian & Peter, 2009). Field record was maintained throughout the study period. The field collection data also used to calculate the species richness, species diversity and relative abundance of dominant spiders present in different location and season.

**Guild structure studies:** Ecological characteristics relating to foraging manner, nature of web, prey species, microhabitat use and daily activity pattern at family level were subjected to guild classification. Output of the analysis was organized into graphical form. Designation of spider guild was based on ecological characteristics known for the family (Young & Edwards, 1990).

### RESULT

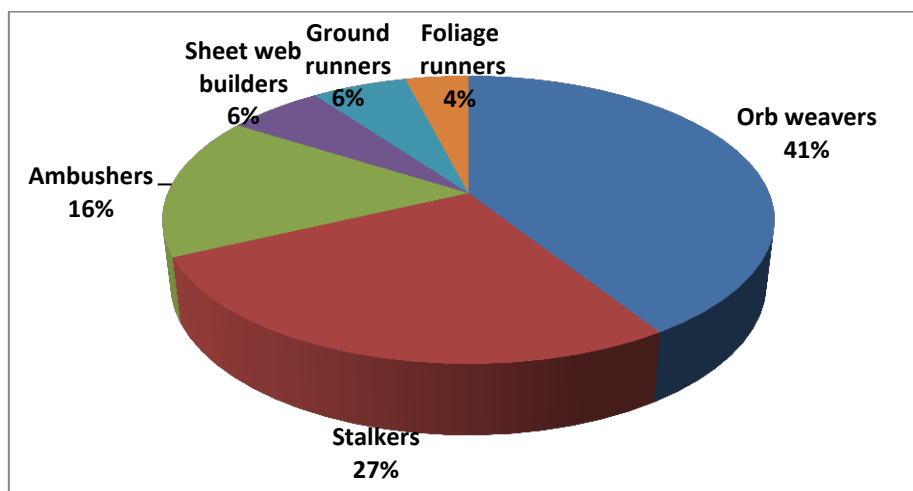
A total of 63 species of spiders belonging to 42 genera of 14 families were collected during the study period (Table 1). Out of the 14 families collected during the study, the family Araneidae was dominant family with 17 species belonging to 10 genera. Family Salticidae was the second dominant family with 11 species belonging to 11 genera. The family Tetragnathidae is the third dominant family with 7 species belonging to 4 genera. Oxyopidae and Thomisidae are the next dominant families which reported 6 species each and 1 and 3 genera respectively. Other families such as Lycosidae reported 4 species, Sparassidae reported 3 species. Nephilidae and Pholcidae with 2 species each. Families such as Lycosidae has 2 genera, Sparassidae 3 genera, Nephilidae 2 genera and Pholcidae with 1 genus. Clubionidae, Eresidae, Hersiliidae, Miturgidae and Theridiidae with 1 species each.

**Table 1. Spider families, genera, species and guild recorded from Chulannur Peafowl Sanctuary**

Sl.No.	FAMILY	GENERA	SPECIES	GUILD
1	ARANEIDAE Simon, 1895	10	17	Orb weavers
2	CLUBIONIDAE Wagner, 1887	1	1	Foliage runners
3	ERESIDAE CL Koch 1851	1	1	Sheet web builders
4	HERSILIIDAE Thorell, 1870	1	1	Ambushers
5	LYCOSIDAE Sundevall, 1833	2	4	Ground runners
6	MITURGIDAE Simon, 1885	1	1	Foliage runners
7	NEPHILIDAE Simon, 1894	2	2	Orb weavers
8	OXYOPIDAE Thorell, 1870	1	6	Stalkers
9	PHOLCIDAE C. L. Koch, 1851	1	2	Sheet web builders
10	SALTICIDAE Blackwall, 1841	11	11	Stalkers
11	SPARASSIDAE Bertkau, 1872	3	3	Ambushers
12	TETRAGNATHIDAE Menge, 1866	4	7	Orb weavers
13	THERIDIIDAE Sundevall, 1833	1	1	Sheet web builders
14	THOMISIDAE Sundevall, 1833	3	6	Ambushers

Spiders collected during the study were divided in to 6 ecological guilds based on the foraging mode of the spiders (Figure 1). Out of 63 species of spiders collected from Chulannur peafowl sanctuary, majority of species (41%) belong to “Orb weavers” category. The second dominant guild constituted the “Stalkers” (27%). Other guilds are Ambushers (16%), Sheet web builders (6%), Ground runners (6%) and foliage runners (4%).

**Figure 1. Guild structures of spiders collected from Chulannur Peafowl Sanctuary**



### DISCUSSION

The present study is the first comprehensive documentation of the spider fauna in Chulannur Peafowl Sanctuary. Hawksworth & Kalin Arryo (1995) proved that diversity generally increases when a great variety of habitat types are present. Highly varied habitats provide a greater array of microhabitats, microclimatic features, alternative food sources, retreat sites and web attachment sites, all of which encourage the colonization and establishment of spiders. In 1991, Uetz reported that structurally a more complex shrub can support a more diverse spider community.

The different habitat such as, Forest area, Shrubs, Bamboo area, Butterfly garden and Medicinal garden were studied. These provide variation in species composition. The first dominant habitat is the Bamboo area, it contains more number of Araneidae family and the second dominant habitat is the Forest area, it represent the increased species of Tetragnathidae family. The Shrubs, contains more number of Salticidae family. The Butterfly garden and Medicinal garden provide more species of Araneidae family. And also high species occurrence was observed in the November - January season. Araneidae is the largest family of spiders that construct orb-webs. Dominance of this family in the study area is directly consequential to the vegetational architecture. Vegetational architecture plays a major role in the species composition found within a habitat (Rypstra et al., 1999), and vegetation which is structurally more complex can sustain a higher abundance and diversity of spiders (Andrew & Hughes, 2004).

Studies have demonstrated that a correlation exists between the structural complexity of habitat and species diversity (Andow 1991). Uetz (1991) suggests that structurally more complex plants can support a more diverse spider community. Downie et al. (1999) and New (1999) have demonstrated that the spiders are extremely sensitive to small changes in the habitat structure; including habitat complexity and microclimate characteristics. Thus the physical structure of the environments has an important influence on the habitat preferences of spider species especially

web-building species (Hurd & Fagan, 1992). Vegetation structure seems to influence the spider composition on family level because similar families cluster within a similar habitat type. In Terai Conservation Area, Hore & Uniyal (2010) found that habitat heterogeneity is mediated largely by structural diversity of the vegetation rather than microclimate variation.

Many threats to spider diversity have been documented. The primary threat is habitat loss and degradation due to deforestation, agriculture, grazing and urbanization. The major obstacle for spider conservation is an absence of public support, arguably due to fear and ignorance. Conservation of spider will thus necessitate a greater understanding by the general public, scientists, land managers and conservationists about the importance of conserving these fascinating creatures (Sebastian & Peter, 2009). Describing the spider diversity in groups allows greater insights in to how habitat differences may be reflected in life history strategies (Lee & Kim, 2003). Guilds are ecological grouping of organisms which exploit a single or similar resource in a similar manner (Root, 1967). Recently spiders have been sub divided into increasingly finer guild system (Uetz, 1991). Therefore, documenting spider diversity patterns can provide important information on the biodiversity of this tropical forest ecosystem. Spiders as a group may even provide useful conservation tools as ecological indicators in rapid biodiversity measurement; there is an urgent need to provide taxonomic resources for groups from tropical ecosystems in the view of current global biodiversity crisis.

### **CONCLUSION**

A total of 63 species of spiders belonging to 42 genera of 14 families were collected during the study. Out of the 14 families collected during the study, the family Araneidae was dominant family with 17 species belonging to 10 genera. The study reveals a more or less varied and diverse species composition in relation to various habitats, bringing into focus the influence of changing vegetation type on spider fauna and also baseline information over the ecology, importance and the threats faced by the spider species. The project intends to create a primary data on the spiders of this region paving way for further research into the topic. The data produced in the form of a checklist shall be of great help to anyone who is keen on exploring the diversity of spiders of this region. There is lack of information on ecology and taxonomy of Indian spiders. However spiders can be used as indicator species (Kapoor, 2008; Noss, 1990). Certain factors like distribution and relationship of them to the various habitats and its responses to the different disturbance makes difficult, using them as indicator species. The study shows information related to the species distribution and diversity, richness and evenness in a particular habitat.

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