WEB ECOLOGY OF COMMON ARANEIDS OF SATPUDA LANDSCAPE, INDIA

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Abstract
In India, Spiders from only 11 families are known till date and they are **Araneidae** Clerck, 1757; **Deinopidae** C. L. Koch, 1850; **Linyphiidae** Blackwall, 1859; **Mimetidae** Simon, 1881; **Mysmenidae** Petrunkevitch, 1928; **Nephilidae** Simon, 1894; **Pimoidae** Wunderlich, 1986; **Tetragnathidae** Menge, 1866; **Theridiidae** Sundevall, 1833; **Theridiosomatidae** Simon, 1881 and **Uloboridae** Thorell, 1869. 7 Orb-web Builder families namely Araneidae, Deinopidae, Linyphiidae, Nephilidae, Tetragnathidae, Theridiidae and Uloboridae out of the 11 orb-web builder during 2013-2015 from Satpuda Landscape were collected. Webs can be an identifying character of a particular family and even the genera of a particular family can be identified by the web. Here, a brief Web comparison of the collected genera from the Araneidae is done to have an idea about the web including parameters like **Web Orientation & Measurement/ Web Description/ Related Activities**.

Keywords: Satpuda, Araneidae, Orb-Weavers, Ecology, Web.

Introduction

'Orb-web' is a peculiar web usually fulfilling almost all the requirements for which a web is being built i.e. prey capturing and retaining it, quite strong with significant elasticity, resistant to moderate climatic tampering and so on. Family Araneidae is one of the orb-web builder family currently having 177 genera and 3059 species (WSC, V-22.0). It was described by Clerck in 1757.Web pattern of different genera which were collected during the field work were studied in details aspect for documentation purpose.

Materials and Methods

Spiders from the 7 families were observed day and night for their web pattern. Web images were taken by Sony Cyber- shot DSCH-50. Web images with and without specimen wherever possible were taken and measurement of web segments were done with the help of scale and vernier caliper.

Observations and Results

Satpuda Landscape was surveyed day and night for studying the web patterns of different genera from Family Araneidae Clerck, 1757. Here, a tabulated documentation of 7 genera with their respective webs is done.

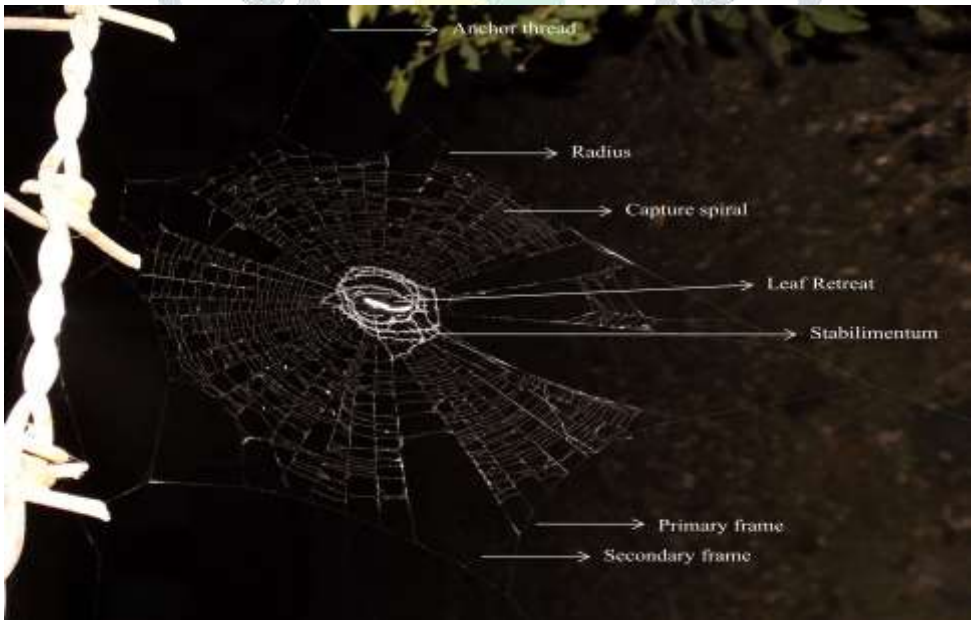

Fig. 1: General parts of a web (Web of *Cyclosa* sp.)

ARANEIDAE Clerck, 1757			
Genera	**Web Orientation & Measurement**	**Web Description**	**Related Activities**
Araneus	**Vertical:** Measurements of three webs of *Araneus* were taken for comparision: web 1, 2 & 3 respectively Total area of web (16cm/ 22 cm/24cm); Height from ground (2 feet/ 1.5 feet/ 2feet); Dist. (above) From the hub (9cm/13cm/9.5cm); Dist. (below) From the hub (9cm/11cm/9cm); No. of radials (27/28/28); Dist. b/w adjacent radials near centre (2mm/3mm/3mm); Dist. b/w adjacent radials near pheriphery (1.4cm/1.8cm/2cm); No. of spirals (24/31/30); Dist. b/w adjacent spirals (5mm/6mm/6mm); No. of attachment threads (8/7); Dist. of retreat from web (13cm/21cm/22cm)	Web of *Araneus* sp., less pronounced at the upper half. The upper half of the web is comparatively broader while lower half is more in area and a bit narrowed as compared to the upper half region of the web. Spider sitting at hub of the web, which is at a distance from the spirals and also the spirals of the web are spaced. Some of the spirals are discontinued and a small missing block is formed in the web, instead of the usual complete spiral pattern of the orb-web.	
Argiope	**Vertical:** Measurements of two webs of *Argiope* were taken for comparision: web 1 & 2 respectively Total area of web (18cm/ 24 cm); Height from ground (2 feet/ 1.5 feet); Dist. (above) From the hub (9cm/13cm); Dist. (below) From the hub (9cm/11cm); No. of radials (27/28); Dist. b/w adjacent radials near centre (2mm/3mm); Dist. b/w adjacent radials near pheriphery (1.4cm/1.8cm); No. of spirals (24/31); Dist. b/w adjacent spirals (5mm/6mm); No. of attachment threads (8/7); Area of stabilimentum (1.5cm/2.5cm); Dist. Of retreat from web (13cm/21cm)	Popularly known as "signature spider". This spider shows unique decoration of stabilimentum, which are called as signature. *Argiope* changes its stabilimentum shape from zig-zag to round shape. The species which was collected changes its stabilimentum design after 2-3 days. The height of the web from the ground is not much i.e. it usually built its web near to the ground, ranging app. from 1 foot to 3.5 feet in height.	

Cyclosa	**Vertical**: 3 webs of *Cyclosa* were measured; web1, 2 & 3 respectively: Total area of web (12cm/ 17cm/14cm); Height from ground (5feet/ 3.5 feet/1.8feet); Dist. (above) From the hub (6cm/9.5cm/7cm); Dist. (below) From the hub (6cm/8.5cm/7cm); No. of radials (34/46/43); Dist. b/w adjacent radials near centre (1mm/1.5mm/1.5mm); Dist. b/w adjacent radials near pheriphery (6mm/7mm/7mm); No. of spirals (32/41/32); Dist. b/w adjacent spirals (1.5mm/1.8mm/1.5mm); No. of attachment threads (5/6/5); Area of stabilimentum (2.2cm/11.5cm/6cm).	This spider builds a web which allows it to a remarkable degree of camouflage since its web is occupied by the leftovers of the prey and other debris. The stabilimentum is often occupied by these materials only and the female deposits its egg sacs, which passes vertically from the hub. The spider usually sits in the midst of these structures, fooling their predators. *Cyclosa* can be noticed sitting in its web during the whole day, but the web usually found vacant in night. *Cyclosa insulana* builds both linear and circular stabilimenta. The shape, size and design of stabilimenta varied depending upon the website location and environmental conditions. For example, in exposed or quite windy sites, *Cyclosa* builds smaller webs with greater number of circular stabilimenta while in normal conditions, it builds linear stabilimenta and also the web is large. I have noticed 4 webs of *Cyclosa insulana* which are present in forests of Melghat region at a bit of exposed site, which shows the presence of circular stabilimenta with size variations in the web.	**Egg Sacs:** **Shape:** round to oval **Size:** 4-5mm **Count:** 1 **Silk colour:** golden yellow **No. of eggs (total):** app. 60 **Site of egg sac laying:** laid within the web along with debris hanging with stabilimenta and also on under and upperside of leaf. **Parental Care:** Egg sac is guarded by the female till hatching. 
Cyrtophora	**Horizontal**: Web of *Cyrtophora* quite complex and therefore, the detailed measurements were not able to be taken , only the distinctly available measurements were taken of the 2 webs of *Cyrtophora:* web 1 & 2 respectively Total area of web (32cm/24cm); Height from the ground (3.6feet/1.8feet);	Commonly called as Tent-web spiders. *Cyrtophora* shows a degree of high technical aspect while building a web, which is quite complex and is rather not a complete orb web instead it is a horizontal web forming a cone in the middle, with many support lines holding it. The web is not sticky in nature, spirals and radials are constructed from the same silk. Unless in orb webs, all cells in the web are rectangular. Web height 2 to 5 feet.	**Egg Sacs:** Shape: oval to elliptical Size: 4-5mm Count: 2-7 **Silk colour:** off white with greenish tinch. **No. of eggs (total):** app. 150 **Site of egg sac laying:** laid at the center of the web, hangs with silk. **Parental Care:** Egg sac is guarded by the female till hatching and also accessory tents are built within the existing web, for accommodation of the hatchlings.

			
Neoscona	**Vertical**: Total area of web (2.6feet/ 1.8feet/1.4feet); Height from ground (2feet/ 3feet/2.8feet); Dist. (above) From the hub (28cm/24cm/17cm); Dist. (below) From the hub (38cm/28cm/25cm); No. of radials (27/25/22); Dist. b/w adjacent radials near centre (7mm/6mm/6mm); Dist. b/w adjacent radials near pheriphery (5cm/3cm/3.5cm); No. of spirals (32/34/28); Dist. b/w adjacent spirals (1.1cm/0.8cm/1cm); No. of attachment threads (7/4/6); Area of stabilimentum (1feet /3feet).	*Neoscona*, which are commonly cited in the webs, on shrubs, fences, poles, fields etc. builds a nearly vertical web ranging from 20- 70 cm in diameter. Hub of *Neoscona* sp. is not that prominent, showing few cross threads. The spider usually remains in retreat, within a curled leaf or beneath tree trunks, during the daytime. The height of the web from the ground is variable ranging from 2 feet to 7 feet.	**Egg Sacs:** **Shape:** round **Size**: 5-6mm **Count:** 1 **Silk colour:** yellowish white **No. of eggs (total):** - **Site of egg sac laying: -** **Parental Care:** Egg sac guarded by the female. 
Poltys	**Vertical**: Total area of web (20cm/2feet/1.2feet); Height from ground (2.2feet/ 3.6 feet/2.8feet); Dist. (above) From the hub (10cm/30cm/18cm); Dist. (below) From the hub (10cm/30cm/18cm); No. of radials (22/34/44); Dist. b/w adjacent radials near	These spiders are nocturnally active, building finely meshed orb webs at night and reingesting them around dawn. *Poltys* builds a very fine web, equally spaced spirals and neatly radiating radial threads. Usually the centre of the web i.e. the hub shows spaced cubical blocks of thread; while these blocks are absent in the webs of *P. columnaris* species.	**Egg Sacs:** **Shape:** oval to elliptical **Size:** 4.4-6mm **Silk colour:** yellowish with some brown threads **No. of eggs (total):** app.40 **Site of egg sac laying:** laid adhered to any surface, especially twigs with the help of silk. **Parental Care:** *Poltys* spider appears to show least parental care, as it is not seen guarding its egg sac.

	centre (3mm/5mm/3mm); Dist. b/w adjacent radials near pheriphery (1.5cm/2.6cm/1.6cm); No. of spirals (60/190/140); Dist. b/w adjacent spirals (1mm/1mm/1mm); No. of attachment threads (8/6/10); Area of stabilimentum (1.2feet/3.6feet).		
Zygiella	**Vertical**: 2 webs were compared, web 1 & 2 respectively; Total area of web (1.2feet/1.4feet); Height from ground (1.5feet/ 5 feet); Dist. (above) From the hub (17cm/20cm); Dist. (below) From the hub (19cm/22cm); No. of radials (18/22); Dist. b/w adjacent radials near centre (5mm/6mm); Dist. b/w adjacent radials near pheriphery (3cm/3.4cm); No. of spirals (12/16); Dist. b/w adjacent spirals (5mm/6mm); No. of attachment threads (5/9); Area of stabilimentum (2feet/1.5feet).	*Zygiella*, nocturnal in habit, hunts in the night and its web has a unique characteristic of having a missing sector in the upperhalf of the web. The missing sector usually shows a signal thread which connects the hub to the retreat through this missing sector. The spider rests in its retreat during the daylight hours and is informed for the presence of any prey through that signal thread, which is connected to the hub.	

CONCLUSION

The orb-weavers include more or less 12,000 species and make up about 26% of spider diversity. Web constitute an essential part in understanding the ecological as well as behavioural aspect of the spiders and by studying the detailed web characters; structures and related activities, one can easily understand and can identify and characterise the spider by seeing the web.

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