

WEB PATTERN AND ARCHITECTURE IN SOME SPIDERS (ARANEAE) FROM CENTRAL INDIA

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Abstract—Present paper describes the web architecture and patterns of spiders with respect to their diversity and distribution in the habitats of central India. There are more than 30,000 documented species of spiders in the world (Anonymous 2000). These species can be divided in to two categories: web builders and ground dwellers. The type of web the spider spins depends entirely on the spider's way of life. The pattern and architecture of webs varies family to family. During the present study six types of web patterns viz. Orb web, Irregular web, Sheet webs, Funnel web, Single-line web, Dome shaped horizontal webs were identified and analyzed between July 2011 to July 2013. Spider webs exhibits a variety of forms, but the most common type is the Orb web. The gradations of the web patterns can be written in the following order: Orb web > Irregular web > Sheet web > Funnel web > Single line web > Dome shaped Horizontal webs. The study focused on the spider's web behavior and their survival strategy, which will help in their conservation.

Keywords: Spiders (Araneae), web architecture and web patterns, conservation, Central India.

1. INTRODUCTION

Animals in various taxa build some kinds of nest. Nests are built to protect the owner from predators, moderate harsh environmental conditions, trap food for consumption or attract females to mate. Spiders also make a nest called web.

The parental care is the most interesting event among spiders. The eggs are never laid singly, but are laid in one or more clusters and each cluster is protected by a covering of silk and the egg sac or cocoon. All spiders are carnivorous (Wise 1993), spider mainly feed on large population of insects and also feed on other spiders. The spiders daily construct a new web. The spiders, especially orb weaving spiders, make their webs at night and usually take them down in the morning. They eat the silk, leaving only the base line to rebuild on. Constructing web uses a lot of the spider's energy derived from proteins. Contrasting web needs protein to much out energy requirements. After some time the silk lose its stickiness and become inefficient for capturing prey. Eating their web is a way for the spiders to recoup some of the energy used in spinning, the silk protein thus are recycled.

The study was conducted at few cities of stets viz. Rajasthan, Madyapradesh, Utterpradesh, Haryana. Present survey is an attempt to revise and standardize spider fauna and their web weaving behavior and web patterns and architecture.

2. MATERIAL AND METHODS

2.1 STUDY AREA-

The study area covered 657 km. area of Rajasthan, U.P, M.P, and Haryana state the located ranged semi-arid, sub-tropical humid, and tropical savanna (winter dry) types in additional to woodland, marshy area, pasture, and caves/rock. The temperature varies from 1°C to 48° C, harboring rich genetic diversity.

The study was conducted for periods of two years (July 2011 to July 2013).



2.2 METHODOLOGY-

Proper site were identified in this the site where the spiders and their webs were available. The spiders were identified by using key (Tikader 1980, 1982, and 1987; Sebastian & Petar 2009; Platnick 2011).

1. Site identification - spider build webs in shrubs, trees, along rock walls, storage rooms and corners. Many spiders live in retreat area off the web. Burrowing spiders may be found under rocks, logs in debris or old litter under plants and under sheets of wood or cardboard.

2. Spider webs identification: - the different web patterns were then identified by taking their photographs and comparing them with earlier photographs and reports on the spider's web pattern.

3. Study of Spider activities and designing web patterns: - Different activities of spiders were studied which includes foraging and egg laying, simultaneously different web patterns were also studied by taking their pictures and comparing and analyzing them with the previous work. Photographic records were maintained.

3. RESULTS AND DISCUSSION

Web architecture

Spiders attract special attention on account of their unique weaving capability of constructing webs with geometrical precision. Web weaving habit of spiders is unique. According to their web building ability, generally the spiders are considered as weavers or non-weavers. The weavers make the snares to trap insects for food viz. Pholcidae family, while the non weavers hunt the prey by chasing viz. families' Lycosidae, Gnaphosidae, Salticidae, and Oxyopidae. The spiders wait at the center or at the corner of web for capture the prey. During the study six different web architectures were found in the study area

Irregular web, such as are extended in all directions, and are built by the spiders like *Pholcus*. Webs were mostly found on ceiling the roof and corner of walls. Families like Pholcidae (*Pholcus Artema*), Lycosidae (*Artosa cinerea*), and Oxipidae exhibits irregular web pattern.

Sheet web (sometimes called triangular web) is flat with main lines running down the center. When small flying insect lands on the web, the spider shakes it, causing the insect to struggle and get caught in the strands. Principal part of the web of a more or less closely woven sheet extended in a single plane and consisting of threads extending in all direction in that plane. These webs were found on two adjacent walls. Linyphiidae and Agelenidae families' exhibits sheet type of web formation.

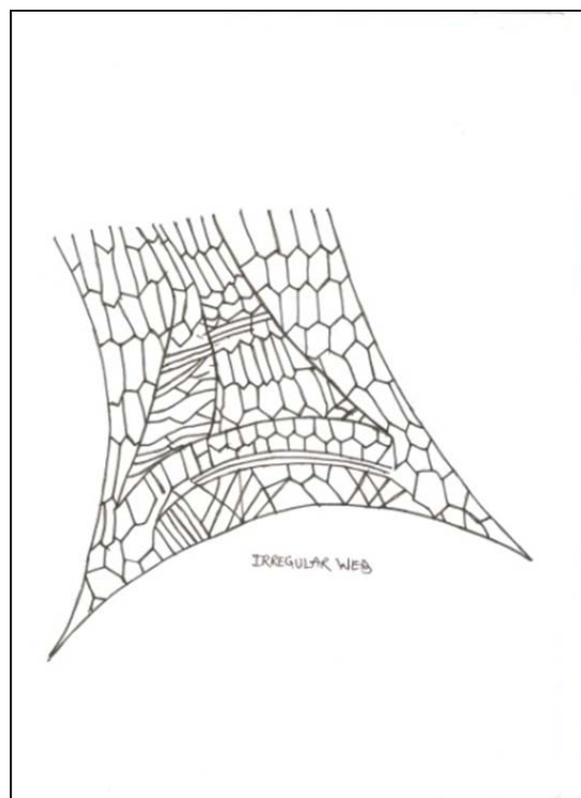
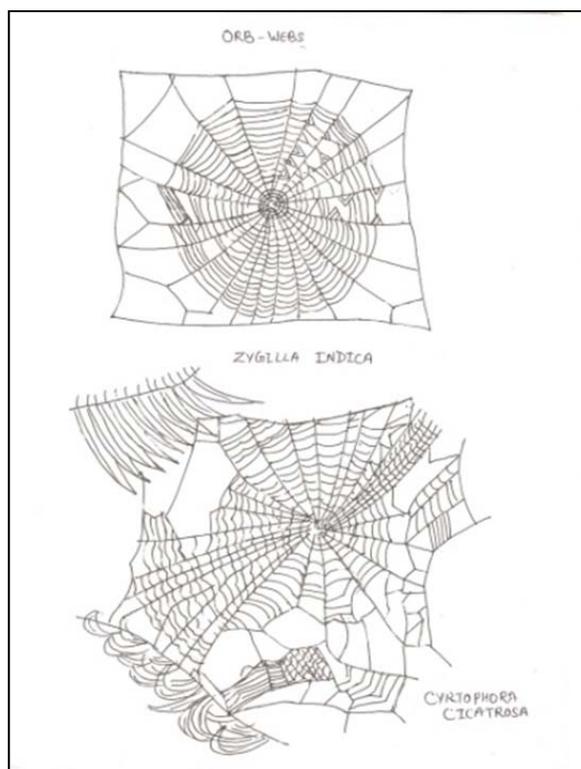
Funnel web were found in the grass. The spider hides at the small end and rushes out and grabs the insects as they come down the funnel. The principal part of a funnel web is sheet like structure; the webs of this type differ from sheet webs. They were even near water cooler sources: families like Hexathelidae, Agelenidae and Lycosidae exhibits funnel web pattern.

Orb web is shaped like a circle. The spokes are built first, and then the spiral connecting strands are added. Insects fly into the barely visible orb. Orb-web is the center portion, the part lying within the supporting frame work, consists of a series of radiating lines. Families like Araneidae, Tetragnathidae, and Uloboridae exhibits this pattern.

Single line snare webs a single line, attached at both ends to branches that stretch about four feet across open spaces in the forest. Families like Theridiidae; Uloboridae shows single-line snare type of web pattern formation. Some garden spider viz. *Cyrtophora cicatrosa* weaves a **horizontal dome shaped web**.

Out of nine families observed, Pholcidae, Lycosidae, and Oxyopidae irregular web weaver, Linyphiidae and Salticidae as sheet web weaver, Hexathelidae as funnel web weaver, Araneidae and Uloboridae as orb weaver, Theridiidae as single

line weaver, Uloboridae also as horizontal dome shape weaver. It is also observed Lycosidae and Salticidae as ground runner and Oxyopidae as a foliage runner.



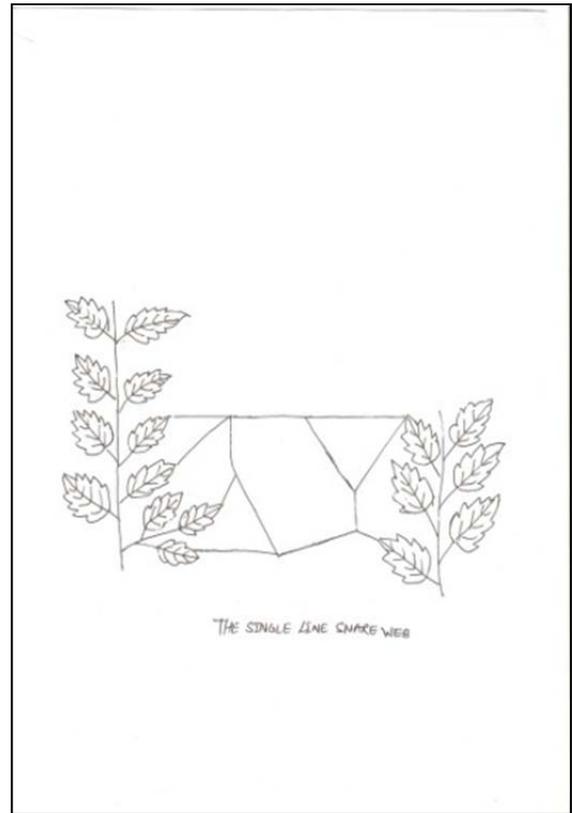
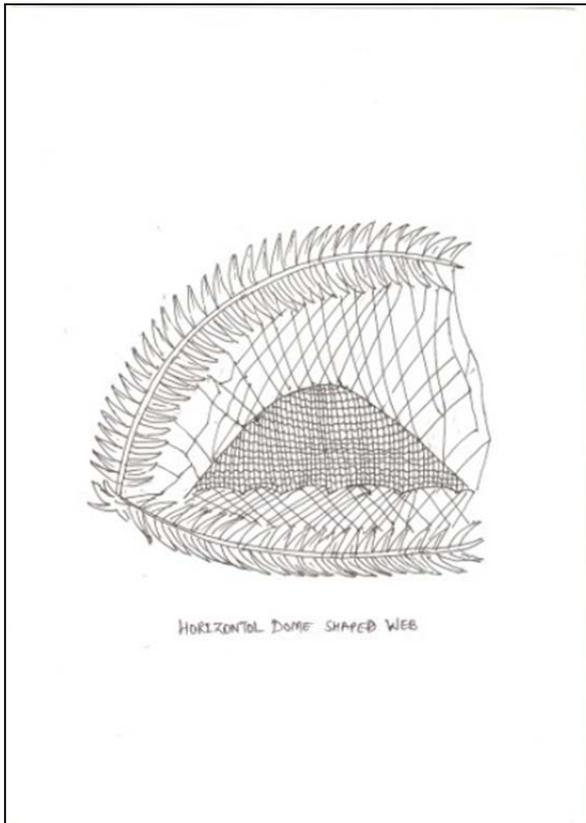
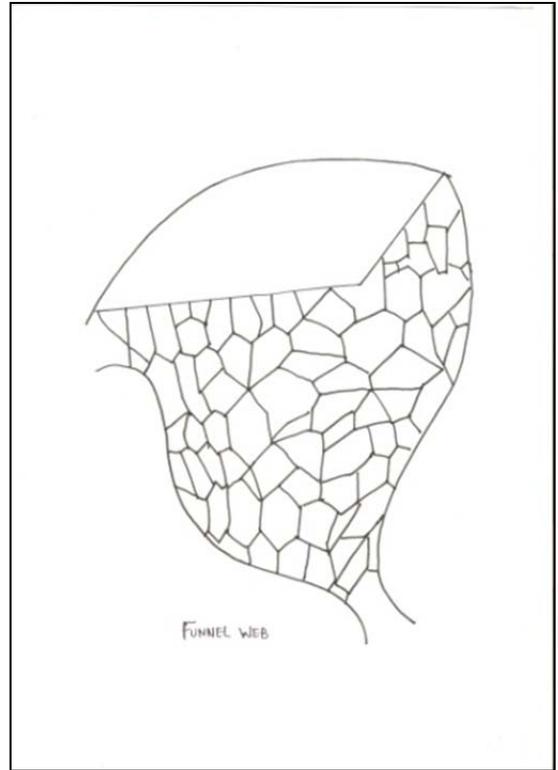
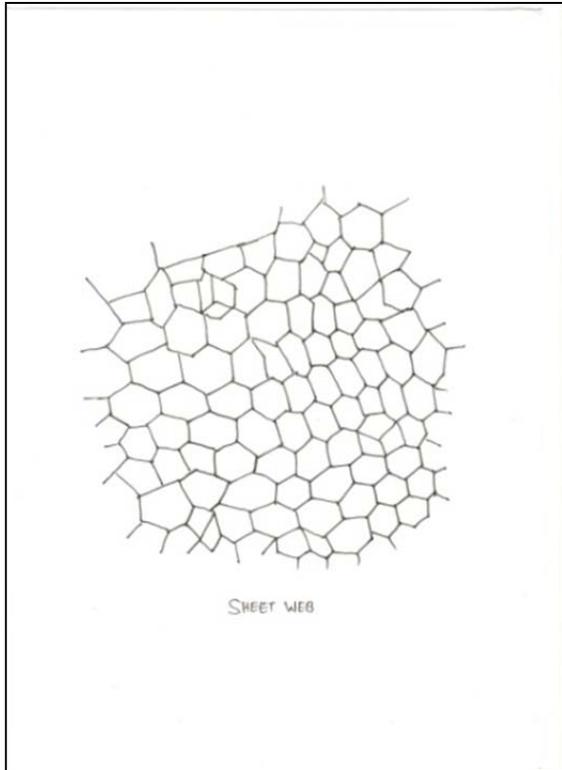


Table 1: year wise study of web pattern in families of spiders

FAMILY	IRREGULAR WEB		SHEET WEB		FUNNAL WEB		ORB WEB		SINGLE-LINE WEB		HORIZONTAL DOMB SHAPED WEB	
	2011-2012	2012-2013	2011-2012	2012-2013	2011-2012	2012-2013	2011-2012	2012-2013	2011-2012	2012-2013	2011-2012	2012-2013
PHOLCIDAE	**	**	-	-	-	-	-	-	-	-	-	-
LYCOCIDAE	*G	*G	-	-	-	-	-	-	-	-	-	-
OXYOPIDAE	*F	*F	-	-	-	-	-	-	-	-	-	-
LINYPHIDAE	-	-	**	**	-	-	-	-	-	-	-	-
SALTICIDAE	-	-	*G	*G	-	-	-	-	-	-	-	-
HEXATHELIDAE	-	-	-	-	**	**	-	-	-	-	-	-
ARANEIDAE	-	-	-	-	-	-	**	**	-	-	**	**
THERIDIIDAE	-	-	-	-	-	-	-	-	**	**	-	-
ULOBORIDAE	-	-	-	-	-	-	**	**	**	**	-	-

Note: - ** - shows abundance of web. *F - shows foliage runner habit. *G - shows ground runner habit.

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