

Study of Parental care in Spider species of Sparrassidae, Ctencidae and Salticidae family in Dakshina Kannada District of Karnataka State

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Abstract: A Behavioral and evolutionary strategy adapted by female spiders in the form of parental care to raise their young ones in few rare species of spiders were studied over a period of one year (August 2015 to August 2016). While going through the field work and study of biodiversity of Dakshina Kannada spiders, the parental care exhibited by the female spiders 1) *Thelcticopis* species of family Sparassidae 2) *Acantheis* species of Cteneidae family and 3) *Brettus cingulatus* species of Salticidae family were observed and studied. The results revealed that, all these species showed the parental investment of efforts to take care of their young ones was very prominent and evident even though the behavioral pattern varied from species to species.

Keywords: *Ctenidae, Dakshina Kannada, Parental Care, Salticidae, Sparrassidae, Spiders.*

1. INTRODUCTION

Parental care is a behavioral and evolutionary strategy adapted by some animals making parental investment into evolutionary fitness of their offsprings. This strategy means that more effort is spent on a relatively small number of offsprings to give each of them high chance of survival to reproduce. Female spiders after mating produce eggs. Many invest substantial amount of energy and effort in ensuring eggs are safe. Main type of nest includes web nest to deposit eggs. Shapes, sizes and patterns of web nests differ from species to species in spiders. The type of nursery care also varies from species to species [1].

Ecological causes of Parental care: Sub sociality is a form of social organization exhibited in a minority of spider species. According to theory parental care is likely to evolve when younger ones face harsh environments, high rates of predation and high competition [2]. The spiderlings are benefitted by obtaining food and protection by female parent. Spiders are always born in groups [3]. Most of the time they interact with each other in performing many functions like nest building, predatory defense, foraging and taking care of younger ones.

2. MATERIALS AND METHODS

Study Area: Dakshina kannada or South Canara district of coastal Karnataka is spread over an expanse of 4,77,149 hectares. Bound by Arabian sea in west, Udupi encircles the district in the east, Coorg in the south east, while Kasargod in Kerala forms the southern boundary. The region is located 12.870 N Latitude and 74.880 E longitude at average

elevation of 22 meters (72 feet) above mean to sea level. Total area is 4559 km² with average humidity of 75% that peaks at July (89 %). South west monsoon winds bring rainfall from June to September and average rainfall is 3975 mm.

Dakshina Kannada comprises Mangaluru, Sullia, Puttur, Bantwal, Belthangady and Kadaba taluks. This district enjoys heavy rainfall, moderate winter and moderate summer. Vegetation is thick compared to other parts of Karnataka; considering the fact that this district encompassing the western ghats and coastal areas of Karnataka possess rich biodiversity and that the existing and potential biological resources need to be reviewed and assessed well. Dakshina Kannada has a very rich flora and fauna which supports high species diversity. There is a need to explore flora and fauna and to conserve it, since there is threat to the natural existence of hotspots of these western ghats areas extended to Dakshina Kannada district.

Study Period:

Spiders were collected and studied between August 2014 to August 2017.

Sampling techniques:

- 1. Visual search :** In D.K district , Walk through the habitat and search visually for Spiders, their webs or retreats (curled leaves, silken cases) walls of houses, building and basement, which are spider haunting grounds, i.e active searching of arboreal, terrestrial, aquatic Spiders .
- 2. Small Spiders and medium Spiders in web** can be caught directly by using plastic boxes carefully.
- 3. Sweeping:** Using a heavy insect net sweep through the soft Vegetation or tall grass with vigor. After a few sweeps, dump the content of the net onto a flat sheet and capture the Spiders.
- 4. Beating:** his method is similar to sweeping. In this case spread the cloth sheet ,or open inverted umbrella (umbrella method) under a bush or the low branches of tree. Grab the branches and give them a vigorous shaking, alternatively strike them with a stick or stiff branch. Spiders will be dislodged from their location and fall on to the sheet and then Spiders are collected in plastic vials.
- 5. Pitfall trapping:** This method is effective for capturing ground-living Spiders. Any smooth sided container buried within the ground surface will work. Inside the pit, place a second cup so that the contents can be removed without disturbing the edge of the pit.

The collected spiders were kept under observation and its Parental care and Behaviour were studied.

3. RESULTS AND DISCUSSION

1} Sparassidae family – *Thelcticopis* genus. Karsch 1884

The Huntsman spiders or the Giant crab spiders or the sparassidae Bertkau, 1872, constitute a large family of usually cryptic, medium to large sized ambush hunters known to exploit a wide variety of ecological niches globally, ranging from tropical rain forests to xeric sand dunes [4]. Partaking the occasional mammalian vertebrate prey, in the form of microchiropteran bats [5]. The family is represented in India by 12 genera and 98 species, 9 of which have hitherto comprised the genus *Thelcticopis* [6], defined by the following traits: prosoma longer than broad, longitudinally convex, posterior row of eyes procured, lateral eyes sessile, Anterior medians larger than anterior laterals, legs short, relatively less laterigrade, leg 1 longer than or equal to leg 2; Anterior Tibiae with 5 to 7 pairs of ventral spines; spinets supported in a membranous stalk, strengthened by a hairy, chitinous ring [7].

A number of Sparassidae families occur in warm temperate and tropical belts of the world. The genus *Thelcticopis* consists of spiders with nocturnal, large sized light eyed spiders, 2 clawed laterigrade legs with a soft trilobate membrane at the apex of metatarsal allowing hyper mobility of tarsi and cheliceral margin with teeth. A total of 85 species of 11 genera reported from India so far [8],[9]. This genus is distinguished by the abdomen narrowing behind and ending in terminal spinnerets which are borne on a tubular stalk separated at the base by a membranous ring . Abdomen is huge, really round sacs. The female constructs flat, oval egg sac on the underside of the 2 leaves or single leaf of Anacardiaceae family trees like, *Anacardium occidentale* (cashew nuts) Lamiaceae family tree leaves like *Tectona grandis* (Teak common

name) the leaf surface of which are rough. The spider species of genus *Thelcticopis* possess egg sac with white or off white colour paperly silky, tough fibrous tissue like material which is slightly hard. The female mother lay a ground sheet of silk underside of the single leaf or sometimes 2 leaves combined and deposits eggs over it, and complete the egg which would be spherical in shape. The female spider hide in retreat and incubates eggs inside for 3 to 4 weeks. When the eggs are fully grown tears opens the egg sac and comes out along with spiderlings. The female guards the eggs and also juveniles when they hatch (**Fig.1**).

When disturbed or sensing danger mother jumps on grounds and act still and camouflage to escape from danger. The juveniles after around 3 weeks by ballooning process will disperse in the environment.



Figure- 1 : Image showing a female spider belonging to family Sparassidae , genus *Thelcticopis* with ruptured egg sac and spiderlings released.

2} Family Ctenidae :*Acantheis* species:

Acantheis is a genus of spiders in the Ctenidae family. It was first described in 1891 by Thorell. As of 2017 it contains 9 species [10]. We have only one species of spider from India - *Acantheis indicus* Gravely, 1931. Members of this family are two clawed spiders with a distinctive eye arrangement .8 eyes arranged in 3 rows with the pair of small anterior lethal eyes and large posterior lateral eyes. Ctenoids often have a median stripe running down the back.

Ctenoids are wandering spiders, which do not build web and wanders along the ground actively hunting its prey. These are nocturnal wanderers. They are primarily litter dwelling and many are diurnal. These have tendency to attack human beings if provoked and they are extremely with toxic venom and wander into human habitations. Egg sacs are deposited on the substrate sometimes carried with the Chelicerae [8].

The *Acantheis indicus* found in Nehrunagar ,Puttur of D.K district ,Karnataka state was a female Spider, having 24 mm of body length and the leg length measuring 8 cms. The colour is faded brownish with surface variegated with dark brown, blackish brown central band on anterior half of abdomen. The vulva is somewhat rounded plate with an elevated tongue slightly grooved in the midline. The female was found along with egg sac inside cup of waste coconut shell. The egg sac was soft - combined with soft mud palates and coconut shell fibre mixed, brownish in colour (**Fig.2**)



Figure- 2: Image showing a female spider belonging to family Ctenidae , genus Acantheis with the egg sac

The female along with the egg sac as such was monitored. The whole coconut shell was placed in a glass round aquarium and Photographed. Water was placed in a small bowl and also cotton soaked in water was kept inside the jar and then mouth of the glass aquarium was closed with mesh to access fresh aeration. The female spider was found to carry the egg sac with chelicera and placed the egg sac attached to the mesh at the mouth of the aquarium which was the indication that the egg sac needed very good aeration. The female spider brought drops of water from the plate and was found to be moistening the egg sac which indicated the sac also needed moisture for the comfort of eggs inside by maintaining the temperature and aeration. The female spider used to guard the egg sac either by sitting upon the egg sac or besides it. The juveniles after approximately 35 days were trying to disperse through ballooning and making stripes of lines through silky web line from nest towards bottom of the aquarium bottom.

3) Family Salticidae Blackwall ,1841: *Brettus cingulatus*

These are commonly called jumping spiders. The genus *Brettus* Thorell ,1895 has included seven (now 6) species of small to medium sized ,web invading araneophagic Spartaeine jumping spiders [11],[12]. All except one,*B.Madagascarensis* Peckham and Peckham 1903,are found in south and south east Asia. The type species for *Brettus*, *B.Cingulatus* Thorell 1895, is known from a single male specimen (the holo type) collected at “Tharrawaddy” (Thayarwady, Myanmar). The female *B. Cingulatus* has not been previously described. Two species of *Brettus*, *B. Albolimbatus* Simon ,1900 and *B.Anchorum* Wanless,1979 were originally reported from India[13]. A white band is present along lateral edge of cephalothorax.

Female was dull light brown and orange in colour with thick hairy fringe on the lower edge of first tibia .Tarsal and metatarsal segments of the legs were thin and slender. Abdomen roughly spherical ,covered with flat dull brown setae having metallic lustre. Dorsal surface had slightly elongated median yellow patch and a large conspicuous orangish spot on either sides.On any leaves of shrubs,tendrils, coconut leaves or small trees with a little rough surfaced underside of leaves they formed thin sheet of web nests. The eggs are laid very neatly, intact and the cluster contains approximately 25 to 40 eggs (**Fig.3a**)



Figure- 3a: Image showing a female *Brettus cingulatus* ,belonging to family Salticidae with intact eggs.

The thin sheath of silky web threads cover the cluster of eggs and dots of white patches on the whole of the above surface of the nest is noticeable. The female *Brettus cingulatus* guards the nest by sitting above the retreat and it is seen to feel the edges of the boundary line of eggs ,so as to keep them intact. It keeps moving around the edges feeling the whole boundary with metatarsal. The eggs are spherical [14], white in colour .The female gaurds the nests for 20 days and spiderlings emerge. The spiderlings will be in same pattern of eggs before and if spiderlings at boundary line moves apart ,the female spider again drives it into the group by the metatarsal (**Fig.3b**).



Figure- 3b: Image showing a female *Brettus cingulatus* ,belonging to family Salticidae with spiderlings.

This was noticed and videographed. It takes care and looks after the spiderlings for 14 days untill all spiderlings disappear by ballooning, through thread like structure and it is noticed that the female will wait till the dispersal of the last spiderling to the environment.

4. CONCLUSION

This study showed that the main cause and necessity for a spider species to opt parental care towards eggs and young ones, form a predatory defense and build specific type of nest was an instinctive character of individual spider species to overcome ecological causes like, harsh environment, predation, competition and survival of species.

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