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Ujjwala Shivaji Deshmukh
Assistant Professor, Department
of Zoology, Govt. Vidarbha
Institute of Science &
Humanities, Amravati,
Maharashtra, India

Suicidal maternal care in spider *Stegodyphus sarasinorum*, (family Eresidae)

Ujjwala Shivaji Deshmukh

Abstract

Spiders belonging to genus *Stegodyphus*, family Eresidae are commonly known as 'social spiders' or 'family spiders'. Survey was carried out to study the maternal suicidal behavior of *Stegodyphus sarasinorum* in their natural habitat. All webs analyzed were long-established, large, sheet like and perfect nest construction of *Stegodyphus sarasinorum* on trees and bushes. These spiders are usually solitary, few days after mating female lays 350-500 eggs in egg sac and guard the egg sac. Hatching takes place after 4-5 weeks the female opens the egg sac and spiderlings come out of egg sac and remain in same web, spiderlings firstly feeds on regurgitated material and finally female provides them with her body as food (matriphagy). The spiderlings climb on the female's body and consume her, extracting her body fluids and leaving only the exoskeleton

Keywords: Eresidae, *Stegodyphus sarasinorum*, regurgitation, matriphagy

1. Introduction

The social spiders or velvet spiders (family Eresidae) are a small group (about 100 species in 10 genera) of almost total Old World spiders (exception: a few species are known from Brazil). The characteristics of this family of spiders are that they are entelegyne (have a genital plate in the female), eight-eyed araneomorph spiders that build unkempt webs. With the exception of *Wajane*, they are cribellate (use wooly silk). Some species are nearly eusocial, they cooperate in brood rearing. Parental care seems to be one of the main steps in the origin of sociality in *Stegodyphus*.

The spiders of the family Eresidae are represented poorly in Indian fauna. The genus *Stegodyphus* was established by Simon 1873, with the type species *S. lineatus*. Latneille. Pocock (1900) described five species of *Stegodyphus*. Tikader (1962) ^[13] illustrated Pococks *Stegodyphus pacificus*, *Stegodyphus socialis* for easy identification. Gajbe (2007) ^[4] rediscrined and reillustrated *Stegodyphus sarasinorum* Karsch including male.

The genus *Stegodyphus* belongs to the family Eresidae, all Erasides are terrestrial except arboreal *stegodyphus* and its members are characterized by their short, stout bodies, which are usually covered with fine hairs. The spiders of this genus occur on bushes, branches of trees; they spin large sheet like or sac like web. In the social Eresidae spider *Stegodyphus mimosarum*, most individuals under natural conditions live in colonies containing up to several hundred individuals. In *Stegodyphus sarasinorum* Karsch the adult stage is attained after twelve instars. The secondary sexual characters become manifest in the twelfth instars. There is only one generation per year. Normally only one cocoon is made and taken care of by a fertilized female during her life-time.

Spiders are usually solitary, exhibiting aggressive behaviour towards other animals, but cooperative living patterns have been also observed in a few species from several families. Providing parental care is costly for the parent because it limits investment in future reproduction, but it is generally beneficial for the individual young whose survival, growth and reproductive value can be increased (Clutton-Brock 1991, Fox and Czesak 2000) ^[1, 3]. Investment in young via post-hatching maternal care is relatively uncommon among invertebrates (Clutton-Brock 1991) ^[1], but is evident in several spider families. Maternal care in spiders includes provisioning the young with prey or with trophic eggs (Evans *et al.* 1995) ^[2], regurgitating digested material (Kullmann and Zimmermann 1975) ^[6] and matriphagy i.e. consumption of the mother by her young (Seibt and Wickler 1987) ^[11].

Semelparous species are especially suitable to investigate maternal allocation patterns because the trade between current and future reproduction is removed when females invest all their

Correspondence

Ujjwala Shivaji Deshmukh
Assistant Professor, Department
of Zoology, Govt. Vidarbha
Institute of Science &
Humanities, Amravati,
Maharashtra, India

resources into a single reproduction event (Tallamy and Brown 1999) [12]. Matrophagy is an extreme form of semelparous maternal care in the semelparous spider *Stegodyphus lineatus* (Eresidae). Females of the spider *Stegodyphus lineatus* (Eresidae) produce a single small brood with small eggs and provide the young with regurgitated fluid and later, with their body contents via matrophagy. (Salomon *et al* 2005.) [7]

According to Schneider (1997) [9] infanticide by males in species with high maternal investment may be the most extreme example of a reproductive conflict of interests between males and females. The subsocial spider *Stegodyphus lineatus* is semelparous and the offspring eat their mother.

Stegodyphus lineatus is an annual and semelparous species, which builds its nests and webs on trees and bushes in a desert environment (mainly along seasonally dry watercourses). Mating in this species occurs in the spring, and after two weeks the female produces a single egg sac, which contains about 90 eggs (Schneider 1995) [8]. Approximately 30 days after egg laying, the female opens the egg sac and releases the hatched spiderlings. During a period of around two weeks after hatching the female does not catch prey, but feeds the young with regurgitated material, and finally provides them with her body as food (matrophagy). The occurrence of matrophagy is inflexible and is likely to be a conservative trait in this genus (Schneider 2002) [10]. The spiderlings stay in the maternal nest for two weeks or more after matrophagy and then disperse gradually.

Stegodyphus sarasinorum are abundantly observed on bushes, trees and fencing in the campus of Government Vidarbha Institute of Science and Humanities, Amravati (M.S.) India. The unkempt typical web of this spider makes their identification easy, an attempt was made to observe the behaviour of spider with respect to maternal care, matrophagy, in the natural habitat.

2. Materials and Methods

Government Vidarbha Institute of Science and Humanities, Amravati (M.S.) India, is renowned educational institute in Maharashtra, (India) having a history of nearly 100 years, occupying more than 168 acres area. The campus is flourished with rich biodiversity.

Stegodyphus sarasinorum known as “social spiders” abundantly found in the campus of Government Vidarbha Institute of Science and Humanities, Amravati (M.S.) India. Work was carried out in the natural habitat of campus, to study social behaviour of *Stegodyphus sarasinorum*. Webs of *Stegodyphus sarasinorum* were observed with female inside. 25 webs were selected and observed after every 4 days while after observing egg sacs, webs were observed daily till hatching and after hatching up to emigration of spiderlings.

3. Results and Discussion

Silken nests of *Stegodyphus sarasinorum* with tubular passages inside and with single female in web attached to nearby twigs, were observed in the campus of Government Vidarbha Institute of Science and Humanities, Amravati (M.S.) India. After conformation of females residing in the web, 25 webs were selected and observed after every 4 days while after conforming egg sac in web, webs were observed daily till hatching and after hatching up to migration of spiderlings.

There is only one generation per year or single reproductive cycle of spider. Normally only one cocoon is made and taken care of by a fertilized female during her life-time. All the webs analyzed and selected, were constructed by immature female spiders on shrubs as Silken nests, attached to nearby twigs, with trapped insects. The size of web increases with the growth of spider, the web become more irregular and larger in size (up to 30 cm long and 10 cm in width), after 3-4 heavy rains. The webs were carefully opened; several observations in the field confirm the existence of female spiders in the web, in some webs more than one female have been recorded along with male. Mating in this species occurs in the winter, after mating exoskeletons of males were found in 17 webs out of 25 selected webs; most probably females have killed the males. Normally only one cocoon is made by the fertilized female. Approximately after two weeks of mating the female produces a single circular egg sac or cocoon which contains about 350-550 eggs. Webs enclosing egg sacs were very compactly constructed and the female do not catch pray. Female repairs the web, when it has been opened for observations. The brood size was positively correlated with body mass, larger the females larger the broods. Eggs were small, round, golden yellow in colour and compactly attached to one another. Female was always found guarding the egg sac. Nearly 4-5 weeks after egg laying, the female opens the egg sac and spiderlings come out of egg sac in same maternal web. During a period of around two- three weeks after hatching the female feeds the young with regurgitated material, and finally provides them with her body as food (matrophagy). It has been observed that the female does not provide prey to the young and the young do not catch prey before matrophagy. The spiderlings climb on the female's body during matrophagy and consume fluid from her body and in almost all webs exoskeleton of females (mother) was observed after 3-4 hours of matrophagy. The spiderlings stay in the maternal nest after matrophagy for few weeks, starts feeding on trapped insects in web and finally emigrates, leaving the parental web, to construct the new web. (Photo A to L)

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