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The life history and social organization of spider- *Stegodyphus sarasinorum.*

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Abstract
Stegodyphus sarasinorum is a socially cooperative spider species exhibiting communal living, limited individual dispersal and an unusual reproductive strategy centered around matriphagy. This study investigates the dispersal patterns, colony structure and reproductive behaviors of S. sarasinorum. Field observations documented the construction of large, communal, sheet-like webs on trees and shrubs—hallmarks of the species' group-living behavior. Despite their solitary tendencies outside the breeding season, females transition to intense maternal care following a single reproductive event. Each female lays approximately 350–500 eggs, which she guards within an egg sac. After hatching, the spiderlings remain in the natal web and are initially nourished with regurgitated food. This maternal investment culminates in the ultimate act of self-sacrifice: the mother offers her body as a final nutritional resource, consumed by her offspring through a process that leaves behind only her exoskeleton.

Key words: *Stegodyphus sarasinorum, life history, social organization, maternal investment.*

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I. INTRODUCTION:

In *S. sarasinorum* Karsch, the adult stage is attained after twelve instars, with the secondary sexual characters becoming evident in the twelfth instar. This species is univoltine, producing only one generation per year. Typically, a fertilized female produces and cares for a single egg sac during her lifetime. The bionomics and behavior of this social spider encompass various aspects of its life cycle, including nest architecture, web repair, activity rhythms, feeding behavior, population density across developmental stages, sex ratio, sexual behavior, maternal care, dispersal, and colony foundation. Maternal behavior is particularly notable. During the second instar, the mother feeds her young through regurgitation and also provides them with captured prey. Ultimately, she becomes a living food source, allowing the spiderlings to feed on her body fluids until she dies. Dispersal and colony foundation occur via emigration. New colonies are typically formed by groups of spiderlings dispersing over silken threads between the fourth and ninth instars, or by individual females establishing new sites. [2]

S. sarasinorum disperses at a markedly lower rate than most spider species, reflecting its reliance on communal living. Two primary dispersal strategies are observed: **Group Dispersal**: Involves the formation of nearby satellite colonies by small subsets of individuals from the natal colony. This strategy is more prevalent in colonies with abundant food resources, suggesting that resource availability drives collective dispersal and colony expansion. **Solitary Dispersal**: Occurs when a single mated female departs to establish a new colony. Solitary dispersers face elevated predation risks and do not demonstrate increased reproductive fitness, making this strategy less favorable. Intermediate-sized females are the most likely candidates for founding new colonies, while larger females typically remain in their natal nests. Furthermore, immature spiders have occasionally been observed dispersing via ballooning, though the ecological significance of this behavior remains uncertain. [4]
Approximately 13–15 days post-oviposition, spiderlings emerge by rupturing the cocoon wall and settle on the mother's body. Initially pink and round, the juveniles remain non-feeding until undergoing 2–3 molts. Unlike most spiders, *S. sarasinorum* does not provide prey to the offspring; instead, maternal investment is delivered via regurgitated nutritive fluids, derived from the liquefaction of the female's internal organs. This process culminates in matriphagy, wherein the juveniles consume their mother entirely once she can no longer provide regurgitated sustenance. The mother's exoskeleton is typically removed from the web within a few hours. Following this, juveniles begin feeding on trapped insects and eventually disperse to establish new webs. [3]

The velvet spiders**,** or social spiders (family *Eresidae*), represent a small group of approximately 100 species distributed across 10 genera. While they are primarily found in the Old World, a few species have also been documented in Brazil. Members of this family are entelegyne (females possess a genital plate), eight-eyed araneomorph spiders that typically construct disorganized or messy webs. With the exception of the genus *Wajane*, they are cribellate, producing woolly silk. Some species, particularly within the genus *Stegodyphus*, display

behavior that approaches eusociality, including cooperative brood care. This parental investment is believed to be a critical factor in the evolution of social behavior in these spiders. [7].

During a period of approximately two to three weeks after hatching, the female feeds her young with regurgitated material. Eventually, she provides them with her own body as food in a process known as matriphagy. Observations indicate that the female does not provide prey to the young, and the spiderlings do not catch prey themselves prior to matriphagy. During this process, the spiderlings climb onto the female's body and consume fluid from her. In nearly all observed webs, the exoskeleton of the female was found 3–4 hours after matriphagy. [6]

Sociality in spiders is rare, with only a few taxa exhibiting prolonged cooperative behaviors. Among them, *Stegodyphus sarasinorum* (Family: Eresidae) is a well-studied species that displays extensive group living, cooperative prey capture and parental care. Unlike solitary spiders, *S. sarasinorum* exhibits a colony-based lifestyle that is intricately linked with its ecological strategies, reproductive output, and survival. This paper examines key aspects of the species' dispersal, colony dynamics, reproductive behavior and maternal investment. *Stegodyphus sarasinorum* is largely dependent on communal living, and they disperse at a lower rate compared to most spiders. There are two main dispersal strategies that occur which are group dispersal to form nearby satellite colonies or solitary dispersal when a mated female leaves her natal colony and starts her own new independent colony. Colonies with more abundant food source were found to be more likely to disperse into satellite colonies, whereas less feed colonies tend to remain with their natal colonies. Solitary dispersers also face more of a predation risk and their fitness too does not improve when they leave their original colonies. One strategy used by group dispersers is capturing webs to improve feeding opportunities and increase space, however the webs can be disturbed by wind, rain, or other nearby animals. [1]

Beleyur investigated the spatiotemporal dynamics of web architecture in the social spider *Stegodyphus sarasinorum*, tracking web development across different group sizes through controlled experiments and image analysis. Geometrical parameters such as coordination number and pore size remained consistent across group sizes. However, silk density was highest near the retreat (nest) and decreased with radial distance in all groups. The silk conservation hypothesis tested on the basis of total silk investment increases with group size and per capita silk investment decreases with group size, observation illustrated that although larger colonies produced more silk overall, per capita silk investment did not decrease with increasing group size. These results suggest that silk use is not economized in larger groups, prompting further investigation into how ecological factors and individual body condition influence silk investment, with implications for web architecture and colony fitness. [5].

Colony size significantly affects individual morphology and social behavior. Larger colonies generally contain individuals with lower mean body mass, while smaller groups tend to have higher cooperation levels and reduced intraspecific competition due to greater interdependence. *S. sarasinorum* lacks distinct castes or hierarchical structures, and all individuals partake in communal tasks such as web maintenance and prey capture. The cooperative nature of the species is further demonstrated when individuals removed from their nests aggregate spontaneously, highlighting strong social cohesion. Colony integration is flexible; migrating individuals from nearby colonies are often accepted into new colonies, facilitating gene flow and demographic stability within a metapopulation framework. [5]

Breeding occurs during the spring season, typically between December and February. Males initiate courtship through active pursuit of females, sometimes navigating narrow passageways within the web. Females may evade unwelcome males but rarely respond aggressively, in contrast to many other spider species. Successful mating lasts approximately 3–4 minutes and involves the male rubbing his pedipalps against the female's genital opening. Females of *S. sarasinorum* are semelparous, investing all reproductive resources into a single breeding season. Gravid females become conspicuously larger and less mobile, abstaining from prey capture and web-building activities. Other colony members provision these females by dragging prey into the central nest. Gravid females are responsible for constructing 2–4 brood chambers and initiating satellite nests. Egg sacs are typically lenticular, constructed from dense silk, and contain between 350 and 550 eggs. These 6 mm, white-colored cocoons are attached to the inner walls of the nest. (Wikipedia).

II. MATERIALS AND METHODS:

The study was conducted on the campus of Government Vidarbha Institute of Science and Humanities, Amravati (Maharashtra), India, a renowned educational institute with a legacy of over 100 years. The campus spans approximately 168 acres and is characterized by rich biodiversity, including a wide variety of fauna and flora.

The focal species for this study was *Stegodyphus sarasinorum*, commonly known as social spiders, which are abundantly found in their natural habitat across the campus. Field observations were carried out in situ within the campus environment to investigate the social organization of these spiders. A total of 21 silken nests containing adult females were selected for detailed observation. These nests were monitored every 4 days to assess nests

activity and structure. Once egg sacs were detected within the nest, observations were conducted daily to track the progression from egg-laying to hatching. Post-hatching, the nests continued to be monitored daily until the emigration of spiderlings was complete.

This methodological approach allowed for continuous behavioral tracking and documentation of the social organization and developmental stages within natural conditions.

III. RESULT AND DISCUSSION:

Silken nests of *Stegodyphus sarasinorum* were observed on shrubs in the campus of Government Vidarbha Institute of Science and Humanities, Amravati (M.S.), India. These silken nests were constructed with tubular passages and attached to nearby twigs. All observed nests were built by immature female spiders, particularly after 3–4 heavy rains, during monsoon and increased in size and irregularity as the spider matured. Mature nests reached up to 30 cm in length and 10 cm in width observed during early winter. Trapped insects were commonly found in the web, indicating the predatory nature of the species.

After confirming the presence of female spiders within the nests, 21 silken nests were selected for study. These nests were monitored every four days. Once an egg sac was observed in a nest, it was monitored daily until hatching, and subsequently until spiderlings dispersal.

Typically, a single female occupied each silken nest; however, in some cases, multiple females and males were recorded. Mating occurred during winter. Post-mating, male exoskeletons were found entangled within web in 16 out of the 21 nests, suggesting that males are frequently killed by females after copulation.

Each fertilized female produced only one cocoon during her lifetime. Approximately two weeks post-mating; mostly middle of January, the female constructed a single, circular egg sac containing about 350–550 eggs. The egg sacs were compactly built and eggs were small, round, golden-yellow and tightly packed. A positive correlation was observed between female body mass and brood size, larger females produced larger broods.

The female spider consistently guarded the egg sac. Nests enclosing egg sacs were reinforced and compact. During this period, the female ceased prey capture and focused entirely on brood care. If the web was disturbed during observation, the female was observed repairing it.

About 4–5 weeks post-oviposition, the female opened the egg sac, releasing the spiderlings into the maternal nest. For 2–3 weeks following hatching, the mother fed her offspring via regurgitated fluid. This was followed by matriphagy, wherein the spiderlings consumed the maternal body fluid. During this phase, spiderlings climbed onto the female and consumed her bodily fluids. Exoskeletons of the maternal female were observed in nearly all webs 3–4 hours after matriphagy mostly during February to early march.

Following matriphagy, spiderlings remained in the maternal nest for a few more weeks, during which they began feeding on insects trapped in the web. Eventually, the juveniles dispersed from the maternal nest and began constructing their own webs.

IV. CONCLUSION:

The life history and social organization of *Stegodyphus sarasinorum* reflect a complex interplay between cooperative behavior, resource sharing and reproductive sacrifice. The evolution of group dispersal, communal living and extreme maternal care, including semelparity and matriphagy, underlines the unique adaptive strategies of this species. Further studies are needed to explore the genetic and ecological mechanisms underpinning their sociality, particularly in the context of dispersal and colony integration.

REFERENCES:

[1] Bharat Parthasarathy, Hema Somanathan, Corrigendum: Body condition and food shapes group dispersal but not solitary dispersal in a social spider, *Behavioral Ecology*, Volume 29, Issue 3, Page 780, May/June 2018.

[2] C. C. Jacson and K. J. Joseph, Life-history, bionomics and behaviour of the social spider Stegodyphus sarasinorum Karsch, Insects Sociaux, Vol 20, page 189-203, June 1974.

[3] M. Salomon, E.D. Aflalo, M. Coll, Y. Lubin; Dramatic histological changes preceding suicidal maternal care in the subsocial spider *Stegodyphus sarasinorum* (Araneae: Eresidae), The Journal of Arachnology, Volume 43 Issue 1 April 2015.

[4] Marianne B. Willey and Robert R. Jackson, Predatory behavior of a social spider, *Stegodyphus sarasinorum* (Araneae: Eresidae): why attack first? Canadian Journal of Zoology.; 2220-2223. November 1993

[5] Thejasvi Beleyur, Tejas Gorur Murthy, Saurabh Singh, Divya Uma, Hema Somanathan: Web architecture, dynamics and silk investment in the social spider Stegodyphus sarasinorum; Animal Behaviour 179(3):139-146, September 2021

[6] Ujjwala Shivaji Deshmukh. "Suicidal maternal care in spider *Stegodyphus sarasinorum*, (family Eresidae)". International Journal of Fauna and Biological Studies. *doi:10.13140/RG.2.2.12427.67368*. 2017

[7] *"Stegodyphus sarasinorum Karsch, 1892". World Spider Catalog. Retrieved 21 April 2016.*