

Virgin female spiders found willing to give themselves up to being eaten alive by spiderlings

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The community nesting spider, Stegodyphus dumicola. Credit: Wikipedia/CC BY-SA 2.0

(Phys.org)—A team of researchers with Ernst Moritz Arndt University in Germany and Aarhus University in Denmark has found that female virgin velvet spiders (Stegodyphus dumicola) in addition to assisting



close relatives in raising their young, allow themselves to be eaten alive by the spiderlings. In their paper published in the journal *Animal Behavior*, the group describes their study of the spiders and the possible advantages they get from allowing females that never mate to be eaten by young members of the colony.

As the team notes, there are just 20 known kinds of spiders that are social—most go it alone, save for mating. The velvet spiders live in southern Africa and build large webs and nests on shrubs and small trees. Because the spiders do not use glue droplets to hold their webs together, the webs do not need to be renewed, and because of that, they can grow to become quite large. The spiders work together to build and maintain their webs and nests and to raise their young. Prior research has shown that after laying her eggs and tending them until they hatch, the little ones emerge and eat the mother alive by injecting chemicals into her body that dissolve her organs. Anecdotal evidence has suggested that the same fate may befall close female virgin relatives. To find out if this was, indeed, the case, the researchers collected approximately 200 female spiders, some of which were ripe for laying eggs. The researchers color-marked the two groups and then watched as events unfolded over a 10-week period.

The researchers report that in 97 percent of cases, both mated and virgin spiders tended to the eggs and also to the spiderlings that eventually emerged. They observed as the spiderlings proceeded to eat both the mothers and virgin adult females. The researchers suggest the behavior has evolved because of the difficulty in finding alternative food for the spiderlings in the very dry climate in which they live.

But there is still one major question to resolve—in order for the young to eat the adults, the adults must first go through a physical process that makes it possible for the young to eat them—rather like a mammal changing to begin lactation. The researchers would like to know how this



process starts in the virgins.

More information: Anja Junghanns et al. Extreme allomaternal care and unequal task participation by unmated females in a cooperatively breeding spider, *Animal Behaviour* (2017). <u>DOI:</u> 10.1016/j.anbehav.2017.08.006

Abstract

Division of reproductive behaviour and alloparental care are key aspects of many animal societies. In cooperatively breeding species, variation in helping effort and unequal task participation are frequently observed. However, the extent to which the reproductive state of an individual affects the tasks performed during offspring care remains poorly understood. In the social spider Stegodyphus dumicola, approximately 40% of females reproduce, and mothers show extended maternal care including eggsac tending, regurgitation feeding and matriphagy, in which they are consumed by the offspring. We asked whether and to what extent virgin females participate in extreme maternal care and whether they differ from reproducing females in foraging activity. We show that virgin females contributed to all aspects of extended brood care, including regurgitation feeding and matriphagy. This suggests a physiological adaptation in virgin females to cooperative breeding, since in the subsocial Stegodyphus lineatus only mated females provide extended maternal care. Although virgin females and mothers are behaviourally totipotent, we found evidence for task differentiation as virgins engaged less in brood care and more in prey attack than mothers. High relatedness among nestmates and low probability of future reproduction in virgin helpers suggest alignment of reproductive interests between mothers and allomothers. Therefore, extreme allomaternal care by virgin helpers can be considered an adaptation to cooperative breeding in social spiders.



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