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IN VITRO POST-DISPERSAL BURROW SHARING AMONG SPIDERLING *GEOLYCOSA TURRICOLA* (ARANEAE, LYCOSIDAE)

An essential component in the evolution of sociality in spiders is the extension of broodmate tolerance and the delay, or reduction (e.g., *Agelena consociata* Denis; Roeloffs & Riechert 1988) of dispersal of the young (Shear 1970). Subsocial strategies (maternal social or extended tolerance among broodmates) may be viewed as intermediate between the solitary life style of most species and the complex behavior of the social species in that social cohesion is temporary (though in some species it is prolonged, e.g., *Nemisia caementaria*, Buchli 1969). The nature of the dispersal strategy in these temporarily social groups is of interest. In particular, the question whether the mechanisms that end the subsocial phase also trigger the onset of dispersal is important since post-dispersal tolerance among broodmates or spiderlings and their mother would raise the possibility that the advantages of subsociality reach beyond the proximate benefits of food procurement or protection at the nest site to processes of later development such as nest site location and mate finding. To date, there have been few studies of the dispersal strategy of subsocial spiders (a notable exception is Krafft et al. 1985) and, thus, little is known about the functional ecology of this process. Here I report observations from a study of the burrowing spider *Geolycosa turricola* (Treat) that suggest that dispersal and the termination of tolerant behavior may be independent events in this species.

The biology and ecology of *G. turricola* has been previously reported in detail (Miller & Miller 1987, 1991). Briefly, females produce egg cases in their burrows in early spring and remain there during the early development of the young (Miller & Miller 1985). Some spiderlings may remain with their siblings in the maternal burrow well past the time when dispersal and burrow construction is possible. During this time tolerant spiderlings share large prey items and exhibit no cannibalism or agonistic behaviors toward broodmates (Miller 1989).

As part of a study of the mechanism that triggers dispersal from these subsocial groups (Miller, in prep.), I observed the dispersal activities of five broods (each with their mother; brood size $\bar{X}$ = 82, SD = 15.3), each placed in paper burrows positioned in the center of 1.5 m diameter plastic swimming pools. Adult *Geolycosa* readily accept paper burrows and routinely build turrets on them. A sand substrate devoid of vegetation surrounded each burrow; the sand was moistened each morning and afternoon with a plant mister. The arenas were observed twice each day for a period of four months (March–June). Spiderlings that dispersed from all the maternal burrows (n = 78) easily constructed burrows in the sand. Small crickets were provided for food.

On six occasions (twice in one arena; once each in the four other arenas) a spiderling dispersed, constructed a burrow and, within a day, was joined in that burrow by another spiderling. On two occasions, (two different arenas) three spiderlings shared a single small burrow. The shared burrows were located a considerable distance from the maternal burrow (point of dispersal) ($\bar{X}$ = 22.3 cm, SD = 6.2, n = 8) but were significantly closer to the maternal burrow than burrows containing single spiderlings ($\bar{X}$ = 43.1 cm, SD = 10.2, n = 78, all arenas combined; t = 5.64, P < 0.001). The average diameter of the shared burrows was not significantly different from that of burrows containing only a single spider.

Upon their discovery, each shared burrow was enclosed with a small screen cage (6 cm in diameter) so that burrow desertion by one or both of the spiderlings could be observed (small crickets were provided for food). The period of burrow sharing ranged from 3 to 12 days. In five of the six burrows shared by two spiderlings, one of the spiderling deserted and constructed another burrow within the wire cage. In the other case one of the spiderlings disappeared and was presumed to have been eaten. In the case of the two burrows shared by three spiderlings, two of the spiderlings deserted the burrow and each constructed burrows of their own within the cage.

It is unclear how burrows were located by dispersing spiderlings. Groups of spiderling *G. turricola* held in Petri dishes deposit a considerable amount of silk (Miller 1989) and there is some evidence that silk is deposited by dispersing spiderlings (Miller unpubl.). Such silk trails could be followed by dispersing broodmates. The short time between the establishment of a burrow by a spiderling, and the joining of the spiderling by another individual (less than a day in each case) suggests such a process. Such a process might be facilitated if spiderlings disperse in groups or swarms such as in some social spiders (Lubin & Robinson 1985). However, the presence of such behavior would presumably result in nonrandom vectors of dispersal from the maternal burrow. Field and laboratory studies of the pattern of burrow establishment of this species (Miller & Miller 1991) do not show such directionality.

The burrow sharing observed here probably does not reflect a paucity of suitable burrow sites within the experimental chambers. Although Miller (1984) showed that spiderling *G. turricola* prefer burrow sites that contain some vegetation, different from the barren conditions of this experiment, the number of shared burrows represented only 10% of the total number of spiders that were observed to build burrows in the apparatus indicating that the majority of spiderlings found suitable burrow sites.

Burrow sharing could represent an avenue for delaying the cost of burrow construction. Spiderling *G. turricola* and *G. rafaelana* are known to disperse in late summer and then delay burrow construction until the spring (Miller & Miller 1991, Conley 1985, respectively). Miller & Miller (1991) showed that the size of the first burrow, which is highly correlated to the size of the spiderling, is an important indicator of overwinter survivorship in *G. turricola*. However, burrow sharing has never been observed in the field. Moreover, it is unclear what advantage burrow sharing after dispersal has over subsocial tolerance in the maternal burrow.

Dispersal from subsocial groups is generally viewed as simply the endpoint of the tolerant phase, albeit somewhat delayed in comparison to non-social species. In this view, dispersal serves as the dependent variable measuring the response of a brood to the events that alter social behavior. The observations reported here suggest that the factors that work to initiate dispersal from subsocial broods may be independent of those that imply the termination of mutual tolerance.

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