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# PRE-COURTSHIP COHABITATION OF MATURE MALE AND PENULTIMATE FEMALE *GEOLYCOSA TURRICOLA* (ARANEAE, LYCOSIDAE)

Pre-courtship cohabitation of mature male(s) and immature female spiders is well known in some groups. The webs of subadult female araneids of several genera (e.g., *Nephila, Argiope*) may contain many "suitor" males (Robinson and Robinson 1980, Christenson and Goist 1979) and the immature females of some wandering spiders (e.g., Salticidae, Clubionidae) tolerate mature males (Pollard and Jackson 1982, Jackson 1977). However, no such phenomenon is known for the family Lycosidae. Here we report on pre-courtship cohabitation of subadult female and mature male *Geolycosa turricola* (Treat) and comment on the significance of this observation.

As part of a study of the male courtship behavior of *G. turricola,* we made evening observations of a number of burrows in a population near Starkville, Mississippi. Courtship activities of *Geolycosa* are known to occur near dusk (Wallace 1942). On the evening of 13 August 1984 we observed six burrows that contained mature male spiders, each positioned face down at the burrow entrance with the abdomen clearly visible from the surface. Each male was captured, and the burrow was excavated. A penultimate female was found in each burrow. The male-female pairs were held in the laboratory (females in artificially constructed burrows, males separately in wire cages) until the female molted to maturity between 5 and 6 days later (successfully in each case). Each pair was mated successfully.

Cohabitation in spiders may serve to habituate females to the presence of the male, thereby dampening her predatory instincts (Robinson 1982), or provide males with the advantage of proximity, thereby increasing the chances of a successful courtship (Christenson and Goist 1979). However, these advantages are available to the male only if the female is stationary. Thus the cohabitation phenomenon is thought to be associated primarily with web-building spiders or wandering spiders that construct "nests" for reproduction (Robinson 1982). Although the Lycosidae are generally considered vagabond spiders, the *Geolycosa* have adopted a sedentary life style as obligate burrowers. Immature males and females and mature females leave their burrows only for prey capture [e.g., we found that the average prey capture distance of *Geolycosa hubbeli* (Wallace) in Florida was less than 10 cm.]. Mature males abandon their burrows in search of females. The advantages of cohabitation for male *Geolycosa* are probably analagous to those of other spiders that exhibit the phenomenon.

Pre-courtship cohabitation has not been reported in the North American web-building lycosids (*Sosippus* spp.). Brady (pers. comm.) notes that, on the several occasions when he has observed mature males in the webs of females, the latter have also been mature.

The mechanism by which male *Geolycosa* locate immature females is unknown. Draglines deposited by receptive female wolf spiders are thought to aid the searching male by effectively increasing the area of detection around the female (Tietjen 1977). Contact sex pheromones in the silk and tactile stimulation provided to the male by the dragline are both apparently important in this

process (Dondale and Hegdekar 1973, Tietjen 1977). Our observations (laboratory and field) indicate that draglines probably are not as important in mate-finding in *Geolycosa.* Only males wander any great distance from the burrow, and although females deposit silk outside of the burrow, it is confined to a small area containing the material that forms the turret. This is not to say, however, that chemical cues associated with silk are not important in close range mate-finding or other courtship behavior among *Geolycosa.* We have observed mature male *G. turricola* perform preliminary courtship displays to the turrets (no burrow or female) of a conspecific mature female.

We have not investigated the role of aerial sex-attractants or substrate and airborne sounds in mate finding in *Geolycosa.* Airborne pheromones are known to be important in some lycosids (e.g. *Schizocosa saltatrix* (Hentz) and *S. ocreata* (Hentz), Tietjen and Rovner 1982). One is tempted to hypothesize that the turret could serve as a broadcasting location for airborne pheromones. With regard to sound production, we have observed a variety of palpal movements during courtship, some of which may result in vibrations of the substrate (Miller and Miller in prep.). Whether the immature female actively advertises her impending readiness by producing vibrations of some sort is, however, unknown. Whether the male produces a different signal prior to cohabitation than he does prior to copulation also must be determined.

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## LITERATURE CITED

Christenson, T. E. and K. C. Goist. 1979. Costs and benefits of male-male competition in the orb weaving spider, *Nephila clavipes.* Behav. Ecol. Sciobiol., 5:87-92.

Dondale, C. D. and B. M Hegdekar. 1973. The contact sex pheromone of *Pardosa lapidicina* Emerton. Canadian J. Zool., 51:400-401.

Jackson, R. R. 1977. Courtship versatility in the jumping spider, *Phidippus johnsoni* (Araneae: Salticidae). Anim. Behav., 25:953-957.

Pollard, S. D. and R. R. Jackson. 1982. The biology of *Clubiona cambridgei* (Araneae, Clubionidae): Intraspecific interactions. New Zealand J. Ecol., 5:44-50.

Robinson, M. H. 1982. Courtship and mating behavior in spiders. Annu. Rev. Entomol., 27:1-20.

Robinson, M. H. and B. Robinson. 1980 Comparative studies of the courtship and mating behavior of tropical araneid spiders. Pac. Insects Monogr. No. 36. Bishop Museum, Honolulu.

Tietjen, W. J. 1977. Dragline-following by male lycosid spiders. Psyche, 84:165-178.

Tietjen, W. J. and J. S. Rovner. 1982. Chemical communication in lycosids and other species. Pp. 249-279, *in* Spider Communication: Mechanisms and Ecological Significance (P. N. Witt and J. S. Rovner, eds.). Princeton University Press, Princeton.

Wallace, H. K. 1942. A revision of the burrowing of spiders of the genus *Geolycosa* (Araneae, Lycosidae). Amer. Midl. Nat., 27(1):1-61.

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