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PATTERNS OF BEHAVIOR IN SOLITARY AND COMMUNAL SPIDERS. Peter N. Witt, N. C. Mental Health Research, Raleigh, N. C. 27611.

When speed and amount of food uptake, web-building activity throughout the day, movement characteristics, and production of offspring in the laboratory and outdoors are compared between the solitary orb web builders like Araneus diadematus Cl. (A. d.) and colonial spiders Mallos gregalis Simon (M. g.) from Mexico, different forms of behavior emerge. While young A. diadematus females (mean weight 55 mg) readily consumed radioactively labeled glucose (injected into a live fly), close to 100% in 120 min, a group of M. gregalis of the same average body weight took more than 1,000 min to ingest the same amount. The latter animals followed a pattern of approaching and leaving the prey repeatedly in 24 hrs. Increasing activity of hungry individuals together with movement to fly-catching surface of the three dimensional web apparently helps M. gregalis to distribute food evenly throughout a 20 member colony. Time-lapse movies and animal counts on different web parts provide data supporting such observations. The relatively greater fly-holding capacity of the Mallos web, measured by Jackson (Beh. Ecol. Sociobiol., 1978), makes it possible for the slower spiders to eventually eat as much of the trapped prey as A. diadematus without attack and wrapping. Slow movements across the web with frequent meetings in M. gregalis seem to have exploratory as well as communication function. In contrast, A. diadematus moves in the laboratory only for web renewal or when prey has hit. No evidence for recycling of silk could be found in M. gregalis using radioactive labeling techniques, while Peakall (J. exp. Zool., 1971) has shown that A. diadematus digests and incorporates 98% of old silk into daily renewed webs. Under controlled, steady laboratory conditions M. gregalis raise offspring all year round; in the changing climate of Mexico, Burgess (dissertation, 1978) found a seasonal rhythm in appearance of spiderlings. A. diadematus maintain circadian and annual rhythms even in a constant environment. — It is hypothesized that in spiders a relatively flexible, environment-dependent behavior is associated with communal living, while predominantly innate patterns of rigid behavior characterize the solitary life style. (Supported by NSF grant No. BNS-75-09915-02A).