

ANECDOTAL FIELD NOTES ON FLORIDA *PHIDIPPUS* (ARANEAE: SALTICIDAE), WITH NOTES ON TERRITORIALITY IN *P. REGIUS*

G. B. Edwards

Florida State Collection of Arthropods, P. O. Box 1269, Gainesville, FL 32602

Most of these observations were made in the course of my dissertation research several years ago. My primary research sites were all in Alachua County, Florida. Some of the more important sites were: the Lochloosa Wildlife Management Area, YMCA Camp McConnell, and Newnan's Lake. The following anecdotes are from observations I made on various ethological aspects of some of the 13 species of *Phidippus* I observed in Florida.

Ambush hunting. This sit-and-wait hunting strategy was observed in use by individuals of *P. apacheanus*, *P. audax*, *P. cardinalis*, *P. clarus*, *P. otiosus*, *P. pulcherrimus*, and *P. regius*. Typically, the spider would sit facing the ground on the main stem (occasionally a large side stem) on tall grass, herbs or small shrubs, a few cm below the top of the plant (often under a flower or leaf petiole). Here the spider would sit motionless (for a few minutes to three hours), unless a movement by another arthropod attracted its attention. Apparently the spider would scan the area below its position; arthropods moving below could be observed and analyzed as potential prey. Once I observed a female *P. audax* waiting near the top of an *Echinochloa* (grass) stem; it spotted a subadult conspecific moving through the vegetation below. The female rapidly stalked down the stem to about two cm above the subadult, which was unaware of the female approaching from above; the female leaped on and killed the subadult.

Ambush hunting by *P. otiosus* is of a slightly different form, since it occurs in a horizontal rather than vertical plane. Individuals of *P. otiosus* were observed, especially at Newnan's Lake, to wait at the ends of branches at the periphery of a tree canopy, presumably waiting for insects to land on the outer edge of the canopy. Often an individual would be on the underside of an upper leaf in a clump of leaves at the end of a branch, where it could survey the leaves

below it without being seen itself. In this respect, *P. otiosus* was like the other *Phidippus* species, which also observed strata below their own position.

Search hunting. The basic search behavior has been well described by Hill (1978) for *Eris militaris* (a close relative of the genus *Phidippus*), and is applicable both to individuals hunting for prey, and to males searching for females. To summarize, a spider moves out side branches and explores both upper and lower surfaces of leaves, frequently stopping to visually scan the surrounding area, and orienting toward any nearby movement. The front legs are often waved around as if testing the air; laboratory observations by Forster (1977) indicate that jumping spiders may be able to pick up nearby airborne vibrations caused by vibrating insect wings.

Agonistic encounters. I observed two equal-sized males of *P. audax* engage in a wrestling match on a *Sacciolepis* (grass) leaf at Newnan's Lake. The males locked chelicerae and pushed and pulled on each other with their legs for 10 minutes. Finally, they fell off the leaf and were separated by the force of the fall, after which fighting was not resumed and they separated. Why males should fight under such conditions is not clear, unless in localized populations, peck orders are set up among males, as was shown experimentally by Richman (1982) for the salticid *Corythalia canosa*. Smaller males usually flee from or only briefly challenge larger males when encounters occur while searching for females, but equal-sized males apparently reach more advanced stages of encounter before determining which is dominant. When a male locates a female, fighting with another male for possession of mating rights to the female is more readily understood. I observed a 40 minute fight between two equal-sized males of *Eris flava*; one of the males had been cohabitating with an immature female which, surprisingly, appeared to be too small to be in the penultimate stage. The cohabiting male eventually drove the other male away in a seesaw battle in which one and then the other appeared to be winning. Snetsinger (1955) observed a small male of *P. clarus* cohabiting with a female to successfully drive away a larger male which approached the nest.

Courtship and cohabitation. On several occasions at Newnan's Lake, I observed *P. audax* males courting hunting

females; however, only one of these males was observed to be successful. On the other hand, I observed two instances of cohabitation for *P. audax*, six instances for *P. regius* (one was with an obviously gravid female, not a penultimate female; on another occasion, two males were cohabiting with the same female, one in the usual adjacent cell made over the female's nest, and another which had made a new nest 2 cm away), and two instances for *P. otiosus*. Hill (1978) reported four instances of cohabitation in *P. otiosus* observed by John A. Anderson, and Snetsinger (1955) reported cohabitation for both *P. clarus* and *P. audax*. Jackson (1977) reported cohabitation for *P. johnsoni*.

John Anderson (Edwards 1980) also observed a mating between a *P. otiosus* male and a *P. regius* female. I observed a *P. clarus* male courting a *P. audax* female at Burnt Pond from a distance of 40-50 cm. Initially, each spider was on a separate herb, but the male, upon spotting the female, went down the stem of the plant it was on, across a grass blade, up the stem of the plant the female was on, and out on a side stem of that plant where the female was perched (total distance traversed was about 86 cm). The female watched the entire approach of the male. The male began courting when about 12 cm from the female, but the female backed away on the stem; the male moved forward to about 12 cm distance and again displayed, then advanced forward to where he could almost touch the female; the female backed away again; the male followed, but the female turned and jumped off the plant, ending the encounter. The male looked around in several directions, but not finding the female, turned and went back down the plant. Gardner (1965) reported males of other *Phidippus* species courting females of different species, but Snetsinger (1955) reported that individuals of *P. audax* and *P. clarus* gave each other scarcely more than passing notice when encounters occurred in the field. The above encounter occurred in mid-August, when females of *P. audax* would normally be nesting in more temperate climates, but adults of *P. audax* occur throughout most of the year in peninsular Florida, creating additional opportunities for interspecific encounters.

Nesting. Almost all eggsacs of *P. otiosus* and *P. regius* were taken under either pine or oak bark. One *P. regius* female made a nest on the outside of the trunk of a young pine sapling, and another was found with an eggsac inside a hollow pole. Sometimes several *P. otiosus* females would make nests under the bark of a lightning-struck pine. A few *P. otiosus* were found nesting under frond petiole remnants on trunks of cabbage palms. One *P. otiosus* female made an eggsac on the top of a cabbage palm frond, as did a *P. audax* female. Other *P. audax* females were found nesting in rolled *Rubus* leaves, and one female had a nest in the top of a cattail seed head. This latter case

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was extraordinary, as the *P. audax* female's eggsac (which contained first instars nearly ready to emerge when observed) was right next to a *P. clarus* female's nest (which had eggs; probably this female's second eggsac). The two eggsacs were nearly touching, and I cannot believe that these females were not aware of each other's presence; neither can I explain why the close proximity of the other's eggsac was tolerated. Other females of *P. clarus* usually made their eggsacs in the tops of *Eupatorium*, *Solidago* and *Boehmeria*.

Few records of eggsacs of other species were noted in the field. A *P. apacheanus* female was found with an eggsac under oak bark. Two eggsacs of *P. putnami* containing postembryos and first instars were found on rosemary and in the curled tip of a saw palmetto frond, respectively, but the female had already left the eggsac in each case. A *P. workmani* female was found with an eggsac deep in the folds of a newly emerging saw palmetto frond. Two females of *P. cardinalis* were collected under hickory bark by D. B. Richman and J. Reiskind (Edwards 1980); one female later produced an eggsac in the laboratory. Jon Reiskind (personal communication) also collected a female *P. pulcherrimus* with an eggsac in rolled sweet gum leaf. Kaston (1948) reported a *P. whitmani* female nesting in a rolled leaf on the ground.

Based on field records of eggsacs and first appearance of 1st instars, eastern U.S. species of *Phidippus* appear to lay eggs in the following range of months: *P. apacheanus* (December to May), *P. audax* (primarily May to August; probably year round in peninsular Florida), *P. cardinalis* (February to May), *P. clarus* (August to November), *P. insignarius* (August to September) [does not occur in Florida], *P. mystaceus* (October to May), *P. otiosus* (January to June), *P. pius* (August), *P. princeps* (May to July), *P. pulcherrimus* (April to July), *P. putnami* (August to October), *P. regius* (mostly October to June in north Florida, probably March to September in south Florida), *P. whitmani* (May to August), and *P. workmani* (August to September).

Shelter. Individuals of *P. audax*, *P. clarus*, *P. otiosus*, *P. pulcherrimus*, *P. regius*, and *P. workmani* were observed to have built thin walled silken retreats in which to spend the night. Spiders could be easily seen through the silk of these nests, which were built in rolled leaves or the tops of grasses and herbs, frequently in seed heads or flower umbels. I occasionally observed adults of *P. audax*, *P. otiosus*, and *P. regius* spend the night in shelters without spinning silken retreats, e. g., in hollow spaces under bark. I also observed the very thickly-woven molting nests of immatures of the above species, and observed individuals of *P. audax* and *P. pulcherrimus* on *Tradescantia* to make short hunting sorties of a few cm from their molting nests after molting, and then returning to the nest with prey. Tessler (1979) found *P.*

audax to repeatedly use the same nests on Queen Anne's lace, and Jackson (1979) reported marked individuals of *P. johnsoni* in the field to make excursions as far as 1.2 m and return to the nest.

Territoriality. I marked 13 females of *P. regius* on 12 cabbage palms in a study of territoriality at Camp McConnell. Palms ranged from 1.6-3.1 m in height, and were either isolated (#3, 6, 7, 9, 10), associated with other palms (#2, 8, 12), associated with shrubs (#4, 5), or associated with other types of trees (#1, 11). The palms approximately ringed the ca. 60 m x 30 m experimental area, beginning with palm #1 on the west side and moving counterclockwise to palm #10 on the northwest corner. Female *P. regius* were usually found in nests on the youngest fully-developed fronds, in the center of the palm. On Oct. 13, 1976, I marked females (F) 1-5 and correspondingly marked the palms they were on. On Oct. 20, I rechecked these five palms: F-1 had been replaced by another female, which I marked and designated as F-1'; F-2 was missing; both F-3 and F-5 were on palm #3; and F-4 was missing. On this same date I marked females 6-10 and their corresponding palms, and I noted a cohabiting pair (male and penultimate female) in a palm near palm #1. On Oct. 27, F-1' was still on palm #1, F-5 was on palm #4, and F-10 was on palm #8; all other females were missing and all other palms were unoccupied. On Nov. 3, F-1' was on palm #1, and all other palms were unoccupied; I did find a new female on a palm which I had observed to have four unoccupied retreats on an earlier date. I marked both female and palm as #11. Palm #11 was in the southeast corner. On Nov. 10, F-1' was still on palm #1, but all other palms were unoccupied; the same was observed on Jan. 14, 1977. On Jan. 28, F-1' was missing also.

The cohabiting pair (although unmarked by me, by visual inspection they appeared to be the same two individuals) remained together through Nov. 10, a minimum of 21 days, but on Dec. 9, only the female was present (designated female and palm #12; this palm was located near palm #1 on the west side), presumably the same female which had finally matured and mated (I made this assumption because the penultimate female of the cohabiting pair was smaller than normal, and the adult female on the same palm on Dec. 9 was also small and of similar color). This female

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still was present on the same palm on Jan. 14; total time on the same palm, including the penultimate stage, was at least 92 days, and in the adult stage at least 36 days.

The following conclusions can be made: 1) most females were transient, staying on a palm less than a week, 2) a few females stayed in the vicinity of one or a few palms for over a week; F-3 was on palm #3 for two consecutive weeks, F-10 was on palm #10 and the nearby palm #8 on consecutive weeks, and F-5 was on the closely spaced palms #3, 5, and 4 on three consecutive weeks, 3) a female may remain on a palm for a prolonged period of time; in this study, F-1' was on the same palm on all but the first and last observation days, and was on the palm a minimum of 56 days. Palm #1 was about 2.1 m in height and was clumped with a pine tree about 4.3 m high; the proximity of the two plants may have provided a sufficient combination of shelter and foraging area for the spider to remain. A female with this combination of resources may actively exclude other individuals, and in effect establish a territory, using the palm as home base for excursions into the surrounding vegetation.

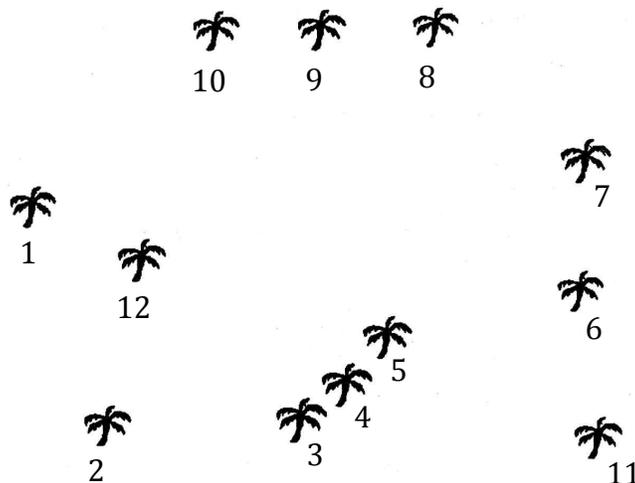


Fig. 1. Diagram of study area at Camp McConnell, showing approximate location of marked palms.

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