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**OBSERVATIONS ON THE NATURAL HISTORY OF A  
NEW ENGLAND POPULATION OF *SPHODROS NIGER*  
(ARANEAE, ATYPIDAE)**

**Robert L. Edwards**

Box 505  
Woods Hole, Massachusetts 02543 USA

and

**Eric H. Edwards**

868 Teaticket Highway  
East Falmouth, Massachusetts 02536 USA

ABSTRACT

The surface portion of the tube webs of *Sphodros niger* Hentz lies hidden at the interface between duff and overlying pine needles in early successional pitch pine-oak woods on Cape Cod, Massachusetts. Males search for females in June. Spiderlings hatch in August and leave the mother the following April. Millipedes appear to be the principal food item. The surface tubes of older juvenile spiders vary from 13 to 15 cm in length and tend down slope. The surface tube has the consistency of thin parchment. The underground portion varies little in length, averaging 13 cm, and is a simple cylinder. The only adult female web found had a surface tube 63 cm in length. This female had at least 73 spiderlings.

INTRODUCTION

Since the revision of *Sphodros* by Gertsch and Platnick (1980), at which time 47 specimens of *Sphodros niger* Hentz were examined, the number of *S. niger* specimens taken by various collectors has significantly increased (Beatty 1986; Morrow 1986). Most of these new specimens are males, taken when they were searching for females, usually during the month of June. One male was picked up by Jonathan Coddington during the American Arachnological Society's field trip to Martha's Vineyard in 1987. In this case the specimen was dead, found in the web of a black widow spider. On the same day Vincent Roth and S. Beshers also collected a male at Walden Pond, Mass. Carol Senske, daughter of the senior author, collected a male on her property in Green Lane, Pennsylvania in early June, 1984. Beginning in 1985 we have consistently picked up live males in the Falmouth, Massachusetts area between the dates of 12 to 25 June. The objective of this paper is to report on the results to date of our study of this elusive spider.

## RESULTS AND DISCUSSION

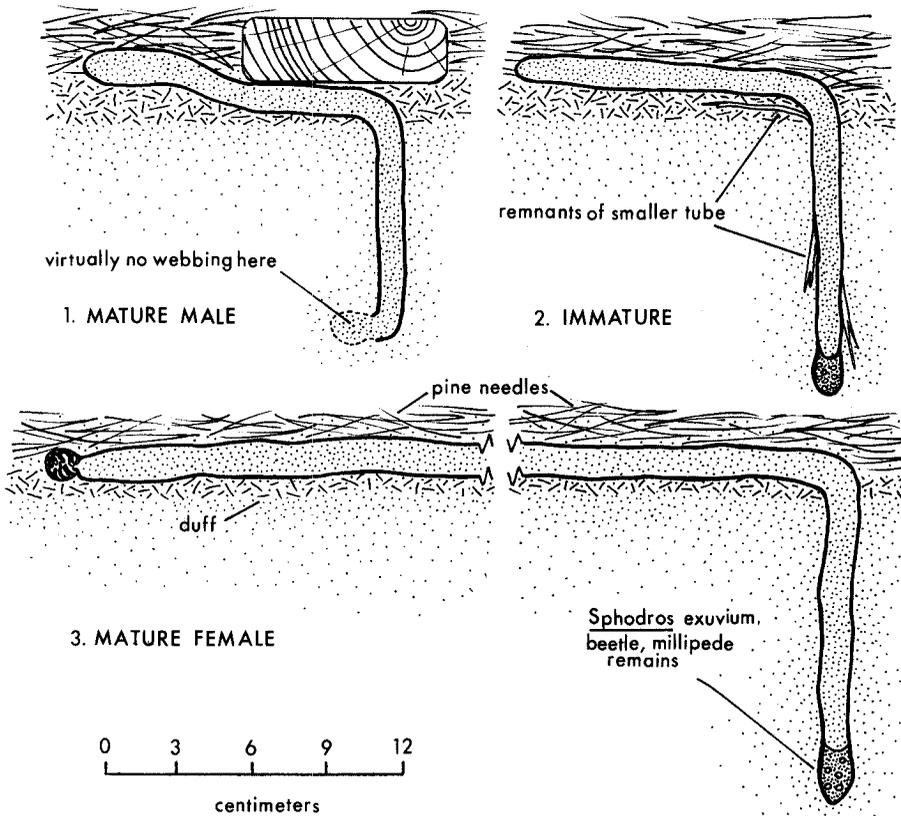
**Habitat and web location.**—We are aware of two concentrations of the species in the southwestern corner of Cape Cod. Both are found in early successional pitch pine (*Pinus rigida*) habitat with scattered white oaks (*Quercus alba*) and junipers (*Juniperus virginiana*). The understory is variable, with only thinly scattered grass under the pines in one area and a considerable amount of low bush blueberry, scrub oaks, reindeer lichen (*Cladonia* sp.) and grass in the other.

A thorough search of the area for the tube webs followed the first capture of a male in a pitfall trap in 1984. The search was unsuccessful. Further searches were carried out following the observations reported by Beatty, *op. cit.* The open, grassy areas in the woods were without webs. Almost by accident, a recently vacated web was found in the woods, near where a male had been found (Fig. 1). Efforts were redoubled following this find in and around the barer areas within the woods, in circumstances where the spiders might have portions of their webs under rocks, logs, tree roots, and other objects, again without success. Ultimately we discovered that the preferred situation was one where there was a thick cover of pine needles over duff, in generally bare areas and with the duff thick enough to remain fairly moist through much of the summer. The above-ground capture tubes lie underneath the needles and are therefore completely hidden from view. The soil in this area is a coarse, sandy soil that retains little moisture. To say that this spider is cryptic is an understatement.

Without exception the webs are on the slopes of gently rounded gullies, one to three meters in elevation above the bottom. Webs were considerable distances apart, averaging about 5 m from one another. No concentration such as that described by Beatty (*op. cit.*) was observed. The majority found were those of larger immature spiders (over 12 mm long). Only one unoccupied tube of a much smaller individual was found, although the remnants of smaller tubes were twice found attached to larger occupied tubes (Fig. 2).

**Web architecture.**—The webs of these immatures were more or less consistent in their structure and length. In ten of the twelve tubes found so far, the surface portion of the tube paralleled the duff-pine needle interface, averaged 13 cm in length and invariably ran down slope. A relatively sharp, right angle turn led down into the soil for a comparable distance, averaging about 13 cm. The other two webs were found in thickets of low bush blueberries where there were no pine needles but rather a year-round accumulation of leaves with leaf mold underneath. The layout of the webs was otherwise just like those found in the pine needles.

There is no obvious widening of the spider's retreat at the bottom. Usually at the very bottom a centimeter or more of compacted material had accumulated, including *Sphodros* exuvia and a quantity of separated scutes of millipedes. The surface portion of the tube (Fig. 4) has attached material comparable to that found in the duff, while the subterranean section has a thin coating of soil. The attached material is exactly what is external to the tube and may have become attached as the web was constructed, not necessarily as a consequence of any deliberate activity on the part of the spider. In our experience thus far with captive *S. niger*, if the surface portion of the tube is left exposed, the spider makes no attempt to disguise it and will eventually abandon it if left uncovered.



Figures 1-3.—Diagrams of the placement of *Sphodros niger* tube webs and burrows. 1, horizontal portion partially under rotting board; 2, typical web of older juveniles; 3, gap indicates 32 cm of web not shown.

The internal diameter of the horizontal tubes varies from 10 to 12 mm. This is a roomy diameter considering the size of the spider. The inner surface of the horizontal tube is a very light grey in color, smooth and parchment-like in consistency and very strong. If carefully uncovered the tube retains its integrity. The underground portion is soft and flexible, and fairly easily pulled apart. In two cases, the horizontal portion separated from the vertical portion while the pine needle cover was being pulled aside. The horizontal portion of the tube web of an adult female with young, found in August 1988, was unexpectedly long (63 cm; Fig. 3). The vertical portion was exactly like all the others. The end of the horizontal portion of the tube had been collapsed or drawn up by the spider and was compacted into a fairly solid wad.

**Behavior of captives.**—At the time of this writing (January, 1989) we are keeping several specimens in captivity. It is impossible to make direct observations without disturbing them, since their natural cover has been recreated; consequently we have made only limited behavioral observations. Captive *S. niger* are quick to make new subsurface tubes, but do not reconstruct the surface portion readily. If the subsurface portion of the original tube is placed in a prefabricated hole with the horizontal portion attached and covered with pine needles, the spider will use the entire tube. Those without horizontal tubes

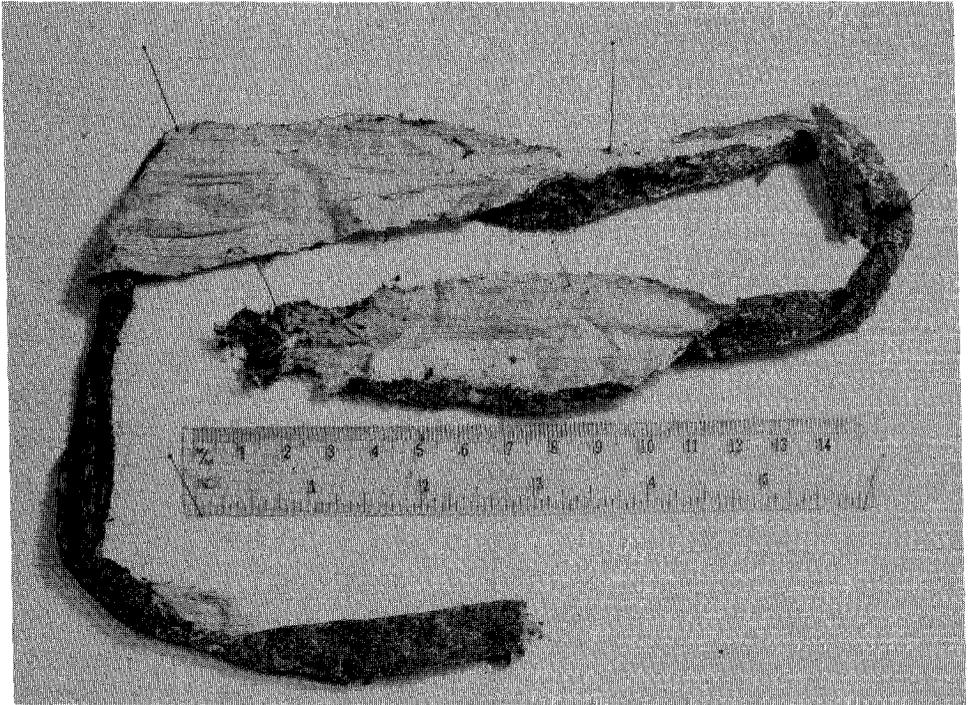


Figure 4.—The surface portion of the web of a mature female *Sphodros niger*, minus a 7-cm piece and the underground section (13.5 cm). See text for details.

usually do a great deal of excavating, and piles of dirt soon appear at the surface around the upper ends of their tubes. This behavior is reminiscent of an observation of Beatty's (op. cit.), in which he observed piles of dirt in and at the end of a tube. At first this activity was puzzling, but eventually we concluded that it usually preceded the construction of a new surface tube originating some distance from the original point of entrance of the old tube into the ground. The spider digs a new exit from below—it does not leave what web it has to start an entirely new tube from the surface.

Webs were not found where the duff and leaf cover were thick enough to encourage mice and shrews (esp. *Blarina brevicauda* and *Sorex cinereus*) to forage and dig burrows. This could be as much a consequence of predation by mammals as choice.

**Food and feeding.**—These spiders seem to be little disturbed when removed from their habitat if they are left in their tube. One spider almost immediately seized and ate a small caterpillar that wandered across its tube while the web was laid out in the bottom of a plastic pail, barely an hour after it had been removed from its natural surroundings. Another juvenile spider, shortly after being placed in its new home, opened its tube to toss out its shed exuvium.

Judging from the debris found in the bottoms of their tunnels, *S. niger* appears to favor millipedes for food. A few beetle elytra were found as well. It is unlikely that flies, caterpillars or other aerial and surface arthropods would have ready access to the tube. The most abundant insects of any size in the duff-needle interface are various species of carabid beetles, themselves predators. One carabid genus *Pterostichus* sp., quickly caught and devoured a captive *Sphodros* that had

left its web. Another *Pterostichus* was found in an unoccupied web. There are a few spiders, notably *Steatoda americana* (Emerton), *Agelenopsis kastoni* Chamberlin & Ivie, and some lycosids in shallow retreats that occasionally are found in small numbers at the duff-needle interface. Centipedes and sowbugs occur here in fair number while millipedes are usually abundant. Earthworms are infrequently observed in this situation but cannot be ruled out as potential prey.

**Spiderlings.**—The one female found with young on 14 August 1988, had 73 spiderlings in the horizontal portion of the web and an unknown number below that in the vertical section. The spiderlings were transferred to the vertical portion along with the adult and placed in an aquarium for observation and study. The newly hatched spiderlings are unpigmented except for the eyes, well stocked with yolk, and possess relatively underdeveloped limbs and spinnerets. In terms of general body size and shape, the newly hatched spiderlings are slightly larger than those that leave in the spring. In the wild the young leave the mother in April, at which time they are moderately pigmented light brown in color, have become more slender, look like miniature adults and measure from 2.5 to 2.6 mm. We have yet to observe any ballooning activity on the part of the young—the few captured in the wild were taken in a pitfall trap.

**Behavior of males.**—In any particular year males move about for approximately a seven day period, but exactly when this activity occurs, is not predictable. In 1984, 1985, and 1986, movement was during the second to third week in June, and in 1987, the fourth. No observations were made in 1988. So far we have detected no obvious climatic events, such as rainstorms, which trigger this activity. On several occasions we followed males during their mating “walkabout” for considerable periods of time. They move rapidly for short distances, usually only several feet, before they take cover and remain quiet for varying periods of time. They tend to move down slope, but the movements otherwise do not seem to be directed. They were most frequently seen in the early afternoon. Attempts to follow males were unsuccessful and frustrating. They were easily lost in vegetation and debris, or occasionally remained stationary for very long periods of time (hours).

**Comparisons with other species of *Sphodros*.**—There are similarities and differences between the webs and behavior of *S. niger* and those of *abboti* and *rufipes* as noted by Coyle and Shear (1981). The males of *abboti* behave much as *niger* when in search of mates. They are diurnal and seem to rely in part on a contact pheromone which helps to explain our observations of the behavior of *niger* males. In addition *niger* males both move like and have the appearance of pompilid wasps or larger, dark gnaphosids. Our single surface web of an adult female *niger*, 63 cm in length, was about twice as long as the maximum length of the aerial webs of adult female *abboti* and *rufipes* (35 cm). The number of young, 73 plus for our single female *niger* is comparable to the average of 79.7 for six broods of *abboti*. The surface portion of the *niger* web is substantially tougher than the underground portion; the reverse is true of the other two species.

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