

RESEARCH NOTES

EURYOPIS COKI (THERIDIIDAE), A SPIDER THAT PREYS ON *POGONOMYRMEX* ANTS

During studies of western harvester ant populations (Porter and Jorgensen 1980), we frequently observed the spider *Euryopis coki* Levi closely associated with colonies of the ant, *Pogonomyrmex owyheeii* Cole. These observations indicated that *E. coki* was a specialized predator of *P. owyheeii* workers.

In his taxonomic revision of the genus *Euryopis*, Levi (1954) listed several instances of these spiders preying on ants. Gertsch (1979) stated that *Euryopis* spiders "are reputed to feed largely on ants but undoubtedly also prey on other small insects. On one occasion", he watched a female of *Euryopis texana* Banks "prey upon a moving line of small ants, grasping and dispatching them in numbers until the rapacious spider had gathered a small heap of victims." Berland (1933) reported that *Euryopis acuminata* (H. Lucas) of Europe captured *Crematogaster* ants and transported them attached to its spinnerets. Carico (1978) described in detail the feeding habits of *Euryopis funebris* (Hentz) in Virginia. He noted that *E. funebris* first tethered *Camponotus* ants with loops of viscid silk and then killed them with a bite on the leg. The purpose of our paper is to provide an account of the interaction between *E. coki* and the harvester ant, *P. owyheeii*.

E. coki ranges across southern Idaho into northern Utah and western Wyoming (Levi 1954), perhaps also extending into Oregon, Nevada and Colorado. We observed *E. coki* in the Raft River Valley of southern Idaho during June, July and August, 1977-1980. These spiders were commonly found associated with *P. owyheeii* in sagebrush (*Artemisia tridentata*), greasewood (*Sarcobatus vermiculatus*) and shadscale (*Atriplex confertifolia*) plant communities. The frequency of spider observations generally increased as the summer progressed so that by early August, two to three spiders were often present on each ant mound. Occasionally, as many as a dozen spiders were observed at a single mound. Spiders were usually most numerous on mounds with little ant activity, suggesting either that large numbers of foraging ants prevent the spiders from gathering on the mounds or that the spiders may actually cause the mound's reduced activity in much the same way as predation behavior reported for the horned lizard *Phrynosoma cornutum* (Whitford and Bryant 1979).

Individual spiders were most often found hiding among small rocks on the surface of the ant mound where their size and cryptic color pattern made them difficult to see. In the evenings and on other occasions when the ants had temporarily plugged their mound entrance with small stones, *E. coki* was often found lying in wait directly over the shallow depression that remained. Occasionally when an ant mound was constructed near a dead bush, the spider retreated to the lower branches where the bodies of its prey would be left dangling on short silken threads (2-5 mm). Perhaps *E. coki* occasionally employs a "dangling feeding" behavior similar to that reported for *E. funebris* (Carico 1978). More

commonly, dead ants were simply found abandoned around the mound periphery. Prey usually consisted of harvester ants, but on occasion small grasshoppers and other species of ants were found dangling from branches as if they had been taken by the spider. Spiderlings of this species were not observed on the ant mounds, possibly because they smaller arthropod prey, perhaps smaller species of ants as has been reported for *E. funebris* (Carico 1978).

The following account of *E. coki*'s feeding behavior was recorded in early August 1977. "Upon returning a recapture sample of ants to their mound late in the afternoon, several small gray spiders were observed which had been seen earlier in the morning. One of the largest individuals attacked a passing worker by first tacking it to the ground with a short strand of silk and then biting it on the leg. Initially, the ant swung back and forth as if it had been tethered on a leash, but shortly it lapsed into convulsions and ceased motion within two minutes. This disturbance attracted a second and a third worker in succession; both briefly attempted to attack the spider before they were temporarily entangled by silk and driven away. Meanwhile, eight to nine additional spiders of both sexes were observed alternately running on the mound and then lying in wait among the rocks. Over the next 20 minutes nearly every spider managed to kill an ant. After death, the ants were usually carried several decimeters off the mound in a peculiar sling fashion tied to the tip of the spider's abdomen" (Fig. 1). This behavior allowed the spiders to consume their prey without further disturbance from other ants.

Predatory behavior of *E. coki* is quite similar to that observed for *E. funebris* (Carico 1978) except that *E. funebris* is primarily nocturnal and arboreal while *E. coki* is primarily diurnal and ground dwelling. The spiders *Steatoda fulva* (Keyserling) and *Zodarium frenatum* (Simon) are also similar to *E. coki* in that they capture ants from ant nests. *S. fulva* captures *Pogonomyrmex badius* (Latreille) workers in webs which are constructed over the mound entrances during periods of worker inactivity (Hölldobler 1970). *Z.*

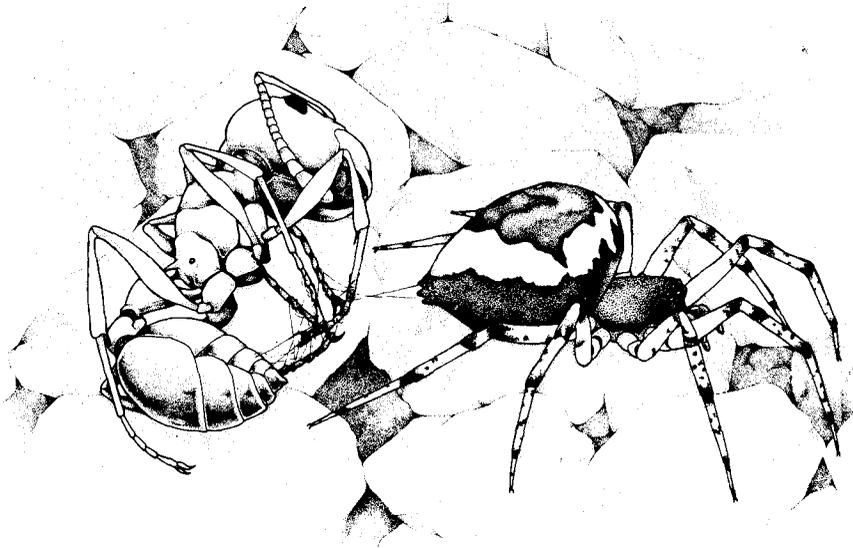


Fig. 1.—*Euryopsis coki* female transporting a worker of the harvester ant *Pogonomyrmex owyheeii* (drawing by Jean A. Stanger).

frenatum captures *Cataglyphis bicolor* (F.) workers at night by lying in wait near the nest entrance and attacking the guard ants (Harkness 1977).

In early August 1980, we collected approximately 50 spiders for laboratory observation of feeding behavior. The mean dry weight of 40 ants fed to these spiders was 2.1 ± 0.4 mg (\pm SD), while the mean dry weight of 60 ants not fed to the spiders was 2.4 ± 0.3 mg. Apparently, the spiders removed about 13% (0.3 mg) of the ants' biomass during feeding. The mean live weight of 12 spiders before feeding was 3.5 ± 1.5 mg. After feeding, the spiders' weight had increased an average of 1.1 ± 0.9 mg or 30%. Twelve egg sacs were deposited during the course of these observations with multiple layings by several females. Eight egg sacs were allowed to hatch and they averaged 19.8 ± 4.7 spiderlings. The spiderlings emerged about 19 days after the egg sacs were deposited.

E. coki appears to be a fairly important predator of *P. owyheeii* in southern Idaho, especially in late July and early August. While our observations suggest that these spiders specialize on harvester ants, it is possible that other major food sources exist. Since several closely related *Euryopsis* species inhabit southwestern United States (Levi 1954), it would be interesting to know what relationship these spiders have with ants in their regions.

Thanks are extended to J. E. Carico and C. D. Jorgensen for their helpful suggestions. W. J. Gertsch and H. W. Levi identified the spiders and read the manuscript. Voucher specimens have been deposited in the Museum of Comparative Zoology (MCZ) at Harvard University. This project (Report no. DOE/ID/01674-7) was sponsored by EG&G Idaho, Inc. and partially funded by DOE contract no DE-AS07-77ID01674 to Brigham Young University. Additional funding was provided by Brigham Young University Department of Zoology and the D Eldon Beck Award.

LITERATURE CITED

- Berland, L. 1933. Contribution a l'étude de la biologie des arachnides. Arch. Zool. Expér., 76(1):1-23.
- Carico, J. E. 1978. Predatory behavior in *Euryopsis funebris* (Hentz) (Araneae: Theridiidae) and the evolutionary significance of web reduction. Symp. Zool. Soc. Lond., 42:51-58.
- Gertsch, W. J. 1979. American Spiders. 2nd ed. Van Nostrand Reinhold, New York, 274 pp.
- Harkness, R. D. 1977. Further observations on the relation between an ant *Cataglyphis bicolor* (F.) (Hym., Formicidae) and a spider, *Zodarium frenatum* (Simon) (Araneae, Zodariidae). Entomol. Mon. Mag., 112:111-121.
- Hölldobler, B. 1970. *Steatoda fulva* (Theridiidae), a spider that feeds on harvester ants. Psyche, 77:202-208.
- Levi, H. W. 1954. Spiders of the genus *Euryopsis* from North and Central America (Araneae, Theridiidae). Amer. Mus. Novitates, No. 1666, 48 pp.
- Porter, S. D. and C. D. Jorgensen. 1980. Recapture studies of the harvester ant, *Pogonomyrmex owyheeii* Cole, using a fluorescent marking technique. Ecol. Entomol., 5:263-269.
- Whitford, W. G. and M. Bryant. 1979. Behavior of a predator and its prey: The horned lizard (*Phrynosoma cornutum*) and harvester ants (*Pogonomyrmex* spp.). Ecology, 60:686-694.

Sanford D. Porter and **David A. Eastmond**, Department of Zoology, Brigham Young University, Provo, Utah 84602 (Present address of senior author: Department of Biological Science, Florida State University, Tallahassee, Florida 32306).