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## SCIENTIFIC NOTE

**THE BEHAVIOR OF THE BEETLE INQUILINE,  
*CREMASTOCHEILUS SAUCIUS*, AND ITS HOST ANT,  
*POGONOMYRMEX OCCIDENTALIS*, DURING ENTRANCE  
INTO THE ANTS' NEST<sup>1</sup>**Shaharra J. Usnick<sup>2</sup>

Alpert (1994) noted the behavior of several *Cremastocheilus* species (Coleoptera: Scarabaeidae) while they were entering the nest of their host ants. However, Alpert did not mention specific behaviors of *Cremastocheilus saucius* LeConte and their ant host, *Pogonomyrmex occidentalis*, while the beetle entered the ants' nest. This note discusses the behavior of this *Cremastocheilus* beetle inquiline. In addition, I discuss the behavior of their host ants while the beetles attempted to enter the ants' nests.

The genus *Cremastocheilus* (Coleoptera: Scarabaeidae) contains 5 subgenera and 12 species groups (Alpert 1994) and is restricted to North America. The beetles' preferred habitats are inside the nests of ants. These relationships are generally not mutually beneficial because the beetle adults eat ant brood to survive.

Ants of both formicine (primarily *Formica*, *Myrmecocystus*, *Lasius*, and *Camponotus* species) and myrmicine (primarily *Pogonomyrmex*, *Messor*, and *Aphaenogaster* species) subfamilies are the preferred hosts of *Cremastocheilus* species (Alpert 1994). These ant genera have common traits that make them good hosts, including vegetable material mixed with the soil inside the nest, populous colonies with enough ant brood to support several adult beetles, and abundant nests in open areas (Alpert 1994).

The host ants frequently attack *Cremastocheilus* adults, both inside and outside the nests (Alpert 1994). These attacks are especially fierce by *Pogonomyrmex* species. When attacked, all *Cremastocheilus* play dead. Letisimulation is when the beetles remain motionless for long periods of time. Some *Cremastocheilus* use letisimulation to their advantage by allowing the host ants to carry them into the nests.

In the Southwest, the beetles' activity and dispersal are triggered by summer rains. After mating on the ant mound, the adult beetles lay the eggs inside the nests' vegetative matter and then the adults die. The larvae survive inside the ant nests by feeding on stored vegetative debris and the adults. The newly eclosed adults survive inside the nest over the winter by eating ant brood.

The following observations on *C. saucius* were made on June 6, 1998, at the USDA Agricultural Research Service (ARS) Central Plains Experimental Range (CPER), which is located approximately 60km northeast of Fort Collins, Colorado. I was researching *Pogonomyrmex occidentalis* Cresson (Hymenoptera: Formicidae) foragers when I noticed the beetle inquilines, which I later identified as *Cremastocheilus saucius* (MacKay 1983), near the nest entrance. Following is a description of the beetle inquilines behavior as they entered the nest of *P. occidentalis*.

The first beetle flew onto the nest near the edge of the dome. The beetle then ran and entered the nest. The ants did not react to the beetle until it had entered the nest entrance, then the ants attacked the beetle and tried to extract the beetle from the nest by pulling on its' legs. The ants were unsuccessful in removing the beetle. In the following forty-five minute period, six more beetles landed on the mound and attempted to enter the nest. Only two of these six beetles were successful in entering the nest. Two pairs of beetles copulated on the edge of the mound before

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they attempted to enter. All the beetles, including the successful ones, were viciously assaulted by up to eight ants at a time. The ants attacked the unsuccessful beetles until they retreated to the edge of the mound where the ants continued the defense of their nest. The ants primarily attacked the beetles' legs and attempted to drag the beetles away from the nests. The two beetles that eventually successfully entered the nest, did so despite continued attacks by the ants.

After watching these beetles, I examined additional ant nests in this location. I found six additional nests that had beetles near them. The beetles were either being actively attacked by the ants or were injured on the edge of the ant mounds. Interestingly, although this site has a large number of ant nests of various sizes and ages, I found beetles only on the older more established nests. I found no beetles on ant nests that were one or two years old.

In addition, during late October of 1998, for an unrelated study, I dug up several *P. occidentalis* nests using a backhoe. In the extracted dirt piles, I found two adult beetles. Lavigne (1969), at various times of the year, also found these beetles surviving inside the *P. occidentalis* nests. I placed voucher specimens of the beetles in the University of Colorado Museum.

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Howard received his BS in biological sciences from Boston University and his MS in entomology from the University of Delaware. Following a career as an executive with the Boy Scouts of America, he has devoted himself to research in the Cicindelidae (Coleoptera) and to teaching and studying in the New Jersey Pine Barrens, on which he has become an authority. He recently donated his 26,000-specimen cicindelid collection to the Carnegie Museum. He has published over a dozen papers on the Cicindelidae. He has authored two books, *A Field Guide to the Pine Barrens of New Jersey* and *A Pine Barrens Odyssey*, and has a third volume in press on *The Wild Flowers of the Pine Barrens*.

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