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Source: *The Florida Entomologist*, Vol. 76, No. 1 (Mar., 1993), pp. 179-181

Published by: [Florida Entomological Society](#)

Stable URL: <http://www.jstor.org/stable/3496027>

Accessed: 15/01/2014 08:53

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PHORIDS (DIPTERA: PHORIDAE) ASSOCIATED WITH
MATING SWARMS OF *SOLENOPSIS SAEVISSIMA*
(HYMENOPTERA: FORMICIDAE)

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Several species of phorid flies are known to parasitize workers of a number of ant species (Borgmeier 1963, Borgmeier & Prado 1975). At least 17 species of phorids are known to parasitize South American species of the *saevisima* complex of fire ants, *Solenopsis* (Borgmeier 1963, Williams & Whitcomb 1974, Williams et al. 1974, Williams 1980). These parasites belong to the genera *Pseudacteon* and *Apodicticrania*, the latter being endoparasitic in larvae. With the exception of Williams & Banks (1987), all inferences have been taken from disturbed nests, and not under natural conditions. For this reason, phorid behavior is poorly understood and the majority of records are only inferred. Here we present observations of *Pseudacteon* attack on fire ants in Brazil under natural conditions.

From July, 1991 through January, 1992, we observed 24 mating flights of *S. saevisima* (Fr. Smith) in Rio Claro, Botucatu, and Analandia, state of Sao Paulo. All mating swarms occurred between 12:00 and 14:00 standard time. Of the observed swarms, we documented the presence of phorid flies in 8. During our observations, we aspirated phorid flies hovering over mounds and attacking workers on nest mounds. Five species of phorids were collected. Of these *P. tricuspis* Borgmeier was found in 65% of the swarms (39% of all species collected) and constituted 52% of all phorid females.

P. litoralis Borgmeier occurred in 54% of the swarms, constituted 26% of all phorids collected, and 31% of all occurrences of phorids. *P. curvatus* Borgmeier was found at 22% of mating swarms, and constituted 17% of all collected individuals and 15% of all species occurrences. *P. pradei* Borgmeier and *P. obtusus* Borgmeier both occurred at 11% of the swarms, and each constituted 2% of all collected individuals and 8% of all species occurrences. Voucher specimens are deposited in the collection of H.G. Fowler.

During observations, we frequently noted parasitism by phorids on workers, and attempts to parasitize emerging gynes. We were unable to confirm parasitism of gynes, however, although this seems highly possible (Wojcik et al. 1987). Until taking flight, gynes were continuously covered with workers, especially minima workers. Larger workers would often retreat into the nest when phorids were present (Williams & Banks 1987). This was probably in response to preference for larger ants by ovipositing phorid females (Feener 1987). These observations also demonstrate attraction to a naturally occurring event, and not as a response to man-made nest perturbation.

Interestingly, males constituted 68% of all phorids collected from the 8 swarms, with one swarm attracting only males. Males were absent from only one other swarm. In the swarms in which they occurred, males were always more abundant than females. Males were aspirated hovering low over the nest mound, much like ovipositing females, and ants displayed an alarm display, consisting of increased antennal flagellation and an upright position with spread-open mandibles.

Because taxonomy of phorids is based upon the female ovipositor, we were unable to separate males into species. However, the large number of males attracted to the nests prior to swarming suggest that males are probably using the pre-swarm nest as an assembly cue for female encounter. During the pre-swarming activity of *S. saevissima*, workers covering the nest mound are extremely aggressive and active. As swarming is presumably proximally organized by pheromones (Hölldobler & Wilson 1990), it may be that phorids, both males and females, key on pheromonal cues. Females attracted for oviposition may be mated by males also attracted by the same cues (Ridley 1983).

We thank Larry Gilbert of the University of Texas at Austin for this interest and support, and Sanford Porter of the U.S.D.A. for assistance in phorid identification, literature assistance, and his avid interest in the potential of classical biological control of social insects. We also acknowledge the Brazilian National Research Council (CNPq) and the United States Department of Agriculture, Agricultural Research Service for support of our research.

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**PHLOEOSINUS SERRATUS (COLEOPTERA: SCOLYTIDAE)
ATTACKING CUPRESSUS LUSITANICA IN JAMAICA:
A NEW HOST RECORD**

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Phloeosinus serratus (LeConte) is the only member of the genus reported from Jamaica. It was first recorded as an endemic species, *P. neotropicus* Schedl (Bright 1972) but later this name was placed in synonymy under *P. serratus* (Wood 1982). *P. serratus* occurs from Oregon and Washington in northeastern USA to Tlaxcala in Mexico (S.L. Wood, personal communication). Several workers (Bright 1972, Garraway & Freeman 1981, Garraway 1982, C. Subadan unpublished) recorded this beetle from weakened or recently cut trees of *Juniperus barbadensis* L. (Taxodiaceae) in Jamaica. In 1990 I found a small colony of *P. serratus* in recently cut logs of *Cupressus lusitanica* Miller (Cupressaceae), at Whitfield Hall.

Whitfield Hall coffee plantation, on the southern slopes of the Blue Mountains (parish of St. Thomas) is at an elevation of approximately 1400 m. *C. lusitanica* is common at this site but *J. barbadensis* is not. *P. serratus* was recorded attacking *J. barbadensis* at this locality in 1978 and 1980 but attacks on *C. lusitanica* were not observed (Garraway unpublished).

At a previous study site at Clydesdale (parish of St. Andrew) on the western slopes of the Blue Mountains at the same altitude as Whitfield Hall, *C. lusitanica* was at least twenty times more abundant than *J. barbadensis* yet no attacks by *P. serratus* on the former were noted (Garraway 1982). In a laboratory experiment (Garraway 1982) beetles emerging from *J. barbadensis* were exposed to *J. barbadensis* or *C. lusitanica* in separate rearing cages. Galleries were readily initiated in the former but not in the latter.

Traces of *P. serratus* in two *C. lusitanica* bolts 30 cm long and 20 cm in diameter, collected at Whitfield Hall in 1990 were analyzed using the methods of Garraway & Freeman (1981). The mean egg gallery length was 3.5 ± 0.2 cm (\pm SE) and there were 78.5 ± 0.8 eggs per gallery ($N = 47$); the developmental mortality was 90.2% (3944 eggs) and mortality caused by the larval parasitoids *Notospathius* sp. (Braconidae) and *Rhopalicus* sp. (Pteromalidae) was 1.3%. The mean of 78.5 eggs per gallery was significantly greater than that of 52.4 ± 2.7 ($N = 1043$, $P < 0.001$) recorded for the population attacking *J. barbadensis* in the Clydesdale area (Garraway & Freeman 1981). The