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Specificity of the Trail Pheromones of Four Species of Fire Ants

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SPECIFICITY OF THE TRAIL PHEROMONES OF FOUR SPECIES OF FIRE ANTS, *SOLENOPSIS* SPP.—(*Note*). The species specificity of trail pheromones of fire ants, *Solenopsis* spp., has been studied by Wilson (1962; Anim. Behav. 10: 137-47) and Barlin, Blum, and Brand (1976; J. Insect Physiol. 22: 839-44). Our study, stimulated by taxonomic advances since Wilson's work and conducted concurrently with that of Barlin et al., is presented here to confirm and supplement the latters' observations, and to report some differences in results.

Early studies on the chemistry of trail pheromones convinced us that extracts of whole ants could be used just as readily as Dufour's glands (source of the pheromone). Therefore, extracts were prepared by grinding 1.0 g whole, frozen (–20°) ants with 2g anhydrous Na_2SO_4, prefiltering with purified *n*-hexane, and fractionating by silica gel column chromatography followed by silica gel thin layer chromatography. These partially purified extracts contained several unsaturated hydrocarbons (determined by gas chromatography) and were used without further purification. Bioassays consisted of interchanging blotter papers upon which artificial or natural trails had been made. The test trails were curved and bound by pencil lines. Serial dilutions of the extracts were tested until we could determine the lowest concentration at which ants traced, reinforced, and established a trail wholly within bounds. Each concentration was tested at least twice on each of 3 different colonies of ants (minimum of 6 replications). We also conducted tests using natural trails, but in many cases the responses were erratic. Barlin et al. also used a bioassay based on an interchange of papers with natural or artificial trails, but their criteria for activity were based on the response of the fire ants following the trail. They give no indication of the number of colonies tested or the number of replications.

With 2 exceptions, our data essentially agree with that of Barlin et al. Both studies indicate that the imported species, *S. invicta* and *S. richteri*, readily follow each other's trails and that the native species, *S. geminata* and *S. xyloni*, also readily follow each other's trails. Our *S. geminata* readily followed both natural and artificial trails of *S. invicta*, but not vice versa, whereas Barlin et al. reported that *S. geminata* and *S. invicta* would not follow each other's trails. Wilson's *S. geminata* (obtained in Costa Rica and almost certainly differing from *S. geminata* in the United States—W. F. Buren, personal communication) followed trails of *S. saevissima* (=*S. invicta*), but not as vigorously as did ours. Our *S. richteri* did not follow artificial trails of *S. xyloni* readily or natural trails at all, whereas the *S. richteri* of Barlin et al. followed artificial trails of *S. xyloni* readily, but natural trails not at all. Wilson did not test *S. richteri*.—D. P. Jouvenaz, C. S. Lofgren, D. A. Carlson, and W. A. Banks, Insects Affecting Man and Animals Research Laboratory, USDA, SEA, FR, Gainesville, Fla. 32604.