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Pheromone may induce Brood Tending in the Fire Ant, *Solenopsis saevissima*

OUR observations of laboratory colonies of the fire ant, *Solenopsis saevissima* (F. Smith), suggest that care of the immature forms by the workers might be influenced by secretions from the immature forms. Recognition of the immature forms and their care by workers might thus be associated with these secretions. Watkins and Cole¹ noted that worker army ants, *Neivamyrmex opacithorax* Emery, were attracted to secretions of their larvae and pupae. This letter presents the results of studies we have made on the response of worker fire ants to extracts of their brood.

In the first test, the entire brood from one colony of fire ants was collected, and an extract was prepared from samples of all types of immature forms by homogenizing the pooled forms in cold hexane. The clear extract was then poured over corn cob grits (ground corn cobs, twelve to thirty mesh) which were mixed until the hexane evaporated. The treated and untreated grits were placed on the foraging platform that serves our clear plastic nests. The ants immediately began picking up the treated grits and carrying them to the nest, so in a relatively short time (about 1 h) they had removed all the treated grits and left all the untreated grits. The same response was obtained when clay granules or pieces of paper were treated. Our most important finding, however, was that the ants placed the treated material with their brood within their nest. Later, when we repeated the trials four times with grits, three times with clay granules and three times with pieces of paper, the treated materials were always harvested, but 6 to 24 h later the ants had removed them from the nest to the refuse pile. Ants did not pick up grits treated with hexane alone.

After the preliminary tests, we determined the reactions of the ants to extracts from the various types of immature forms, worker larvae, worker pupae, sex larvae, or sex pupae and to dilutions of these extracts. In this test, 2 g of each form was collected from field colonies and homogenized by hand in a tissue grinder in 2 ml. of hexane. Then the extracts were poured over about two hundred corn cob grits each and evaporated as before. Also, dilutions of 1 : 1, 1 : 10 and/or 1 : 100 of each extract were prepared by appropriate dilution and evaporated on similar numbers of corn cob grits.

The worker ants harvested grits treated with extracts of worker or sex larvae, but they did not harvest any grits treated with extract of worker or sex pupae. When the extract of sex larvae was diluted, workers harvested all grits treated with dilutions of 1 : 1 and 1 : 10 and harvested some grits treated with a dilution of 1 : 100; however, when the extract of worker larvae was diluted, the har-

vesting of the 1 : 1 dilution was only partial, and no harvesting of grits treated with greater dilutions occurred. Similar results were obtained with ant colonies in soil nests; however, we did not attempt to locate the place where the ants deposited the treated grits in these nests.

In all our studies, the worker ants found and carried the treated grits to their nest, groomed the treated grits, rubbed them with their antennae and palpi, and generally appeared to care for them as they did their brood. In one test, workers carried brood from the nest and placed it with the treated grits on the foraging platform. Moreover, when a colony was disturbed by a sharp tapping that caused an alarm reaction, the worker ants picked up the treated grits and ran about with them in the same manner as they normally do with brood. Workers from subcolonies that had no queen or brood also collected treated grits and returned them to their nest.

Because our method of extraction removed lipids from the brood and because worker ants are greatly attracted to fats and oils, the attraction of the grits that we had noted might be a food response. We therefore tested the response of worker ants in three nests to grits treated with vegetable oil. In two of these colonies, the ants removed the oil from the grits but did not carry the grits into the nests. In the third colony, some grits were carried into the nest, but they were placed apart and separate from the brood. It thus seems that the reaction of the ants to the extract of immature forms was not a food response.

The action of the worker ants of *S. saevissima* in locating, transporting and caring for inanimate objects treated with extracts of brood and placing these treated objects with their brood demonstrated that a pheromone (or pheromones) is associated with recognition and brood tending. The attractant was present in both worker and sex larvae, but not in pupae. This lack of a pheromone(s) in pupae in these preliminary tests does not necessarily preclude its occurrence, however, because we may not have extracted a sufficiently large sample. The removal of the inanimate objects to the refuse piles within 24 h after the introduction into the brood or nests seems to indicate that the pheromone(s) had dissipated.

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¹ Watkins, J. F., and Cole, T. W., *Texas J. Sci.*, **18**, 254 (1966).