

m-1686

**Fire Ant Foraging Behavior:  
A Multiplicity of Strategies and Mechanisms**

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Fire ants utilize a variety of orientation mechanisms, most of which increase their foraging efficiency. Wilson (1962) studied the organization of mass foraging in fire ants and found a complex system centered around the use of trail pheromones. Over the last 20 years other fire ant orientation mechanisms have been investigated and trail pheromone work has been expanded. These are outlined below.

**LIGHT ORIENTATION**

It has been demonstrated that light plays a dominating role in initial trail formation in fire ants. Foraging workers randomly search for food; but once they find it they go directly back to the nest. Our studies showed that in the absence of a light source or if the light source was rotated, initial trail formation to a new food source was significantly reduced. Once a pheromone trail was established rotation of the light had no effect on the trailing workers. Fire ants use visual cues to track and orientate back to the nest after their first discovery of a food source. The most dominant visual cue is a light source, such as the sun, moon, or a street light (see Vander Meer, 1986; Vander Meer, unpublished).

**TRAIL PHEROMONE ORIENTATION**

See Vander Meer, R.K., Trail Pheromone section of "The fire ant sting apparatus: A case of harmonious parsimony" in this volume.

**MISCELLANEOUS**

In the absence of trail pheromone cues fire ants learn the route to a food source through a maze, by their ability to retain a combination of the distal-visual and kinesthetic cues required to return to the food source. Workers acting as sanitary engineers preferentially carry refuse downhill. S. invicta workers respond to their own nest soil in preference to soil from other conspecific colonies or non-nested soil. This may be extended to recognition of their foraging tunnels or total foraging area, thereby increasing their ability to find their way back to the correct nest. See Vander Meer (1986) for references.

**REFERENCES**

Vander Meer R.K., 1986. — The trail pheromone complex of Solenopsis invicta and Solenopsis richteri. In: Fire Ants and Leaf-Cutting Ants: Biology and Management. (C.S. Lofgren and R.K. Vander Meer, eds.), Westview Press, Boulder, CO, pp. 201-210.  
Wilson E.O., 1962. — Chemical communication among workers of the fire ant Solenopsis saevissima (Fr. Smith). 1. The organization of mass-foraging. 2. An information analysis of the odour trail. 3. The experimental induction of social responses. Anim. Behav., 10, 134-164.

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