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Semiochemicals Released by Electrically-Shocked Red Imported Fire Ants

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The red imported fire ant, *Solenopsis invicta* Buren, has evolved sophisticated chemical communication systems that regulate the activities of the colony. Among these are recruitment pheromones that effectively attract and stimulate workers to follow a trail to food or alternative nesting sites. Alarm pheromones alert, activate and attract workers to intruders or other disturbances. The attraction and accumulation of electrocuted fire ant workers in electrical equipment may be explained by their release of pheromones that draw additional worker ants into the electrical contacts. We investigated the semiochemicals released by electrically-shocked fire ants using an array of behavioral bioassays and gas chromatography. Workers from all size castes were subjected to a standard 120-Volt, alternating-current power source. In all cases shocked workers gaster flagged and curled their gaster in attempts to sting the wire. Other workers were quickly attracted to the wire, where they too were shocked. Gas chromatographic analysis showed that shocked workers released venom alkaloids, probably the result of the worker's attempts at stinging and gaster flagging. The shocked worker ants released bioassay detectable amounts of recruitment pheromones as measured in orientation and olfactometer bioassays. This suggests that fire ants respond to electric stimuli by releasing exocrine gland products, which include defensive and recruitment pheromones. Other semiochemicals are probably being released, but have not been detected via the bioassays available. Thus, the attraction of fire ants to electrical equipment can be explained by pheromone release upon being shocked, rather than an intrinsic attraction of the ants to electrical fields.