

**Annual Progress Reports due September 13,  
Texas Imported Fire Ant Research and Management Project**

**Title of Project:** : Identification and behavioral testing of fire ant pheromones involved in recognition

**Principal investigator:** S. B. Vinson and Robert Renthall

**Major accomplishments to date** (September 1, through August 31, 2006):

- 1). Cloned and expressed GP-9 B in *E. coli*. GP-9 B is now available in large quantity for extraction of endogenous ligand, using our pheromone binding assay. (Renthall).
- 2). Developed a pheromone binding assay from several antennal proteins. Cloned a fire ant chemosensory protein (CSP) homolog of *L. humile* antennal CSP. Access to two fire ant EST libraries permitted us to uncover a new CSP sequence and six new pheromone binding proteins/odor binding proteins (PBP/OBPs) (Renthall).
- 3). Created *E. coli*-optimized venom protein coding sequence for expression vector (Renthall).
- 4). Expression vectors for CSP and venom protein are ready for protein expression. (Renthall)
- 5). Developed an approach to identify the relevant chemicals released from both male and female fire ants at the initiation of their mating flight. This is called the Solid phase extraction technique that utilizes absorptive plastic materials to extract chemicals from air or water and was initially developed to monitor pollutants. (Rao, Byers and Vinson).
- 6). Using electrophoresis we have detected a unique protein from that antennae segment of female alates. (Vinson).
- 7). Have developed a behavioral assay to see if the antennal gland protein can prevent queen execution of antennal-less queens based on data showing that such queens are executed. (Vinson).

**Goals Achieved:**

- 1-4). Have provided the basic ground work to express several protein to determine their role in the biology of the IFA and some may provide new approaches to the isolation of pheromones.
- 5). Using the absorption approach for the collection and subsequent chemical analysis using the GC and Electroantennogram (in collaboration with John Byers, USDA, Arizona), our results so far indicate that while females release a variety of chemicals at the time of the flight, males do not show strong response to females indicating other uses for these chemicals. On the contrary, the chemicals released

from males do elicit a response in females indicating a possible male mating pheromone.

**Relevance to the Texas Imported Fire Ant Research and Management Project:**

We are attempting to identify and test pheromones involved in worker-queen interactions, nest-mate identification, fire ant mating and sexual larvae development and reproductive stimulation. Any or all of these may provide a new approach to management. These pheromones are essential to the social organization and survival of IFA, and any alteration in the production, detection or timing of the compounds could greatly reduce the IFA infestation.

**Publications submitted/published; presentations/posters presented at national technical meetings/conferences:**

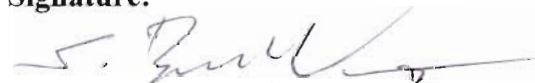
**Manuscript submitted:**

R. Renthall, D. Velasquez, D. Olmos & S. B. Vinson. 2006. Occurrence of Antennal Glands in Ants. To: Insectes Socio. (In revision)

**Presentations**

1. Renthall, R; D. Valasquez, D. Olmos and S. B. Vinson. 2005. Occurrence of antennal glands in ants. **(Poster)**. Ento. Soc. Am. Meeting, Ft. Lauderdale, FL. Nov., 6-9.
  2. Renthall, R. 2006. Chemical Control of Fire Ant Behavior. Annual Red Imported Fire Ant Conference, March 28-30, Mobile AL.
  3. Renthall, R. 2006. Task Selection and Protein Kinase G Expression in Fire Ants. 2006. **(Poster)**. XV Congress IUSI, Washington, DC, July 30- Aug 4.
- Rao, Asha and S. B. Vinson. 2006. Analysis of liquid excretion and its potential role in the fire ant reproduction. 2006. **(Poster)**. XV Congress IUSI, Washington, DC, July 30- Aug 4.

**Signature:**



9-13-06



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**If prepared by someone other than the Principal Investigator, please provide name and contact information:**