

PBAN/Pyrokinin Peptides in Central Nervous System from Fire Ant *Solenopsis invicta*

Choi MY, Vander Meer RK, and Raina AK

Center of Medical, Agricultural and Veterinary Entomology, ARS-USDA, Gainesville, FL (MC, RKV), ARS-USDA, SRRC, New Orleans, LA (AKR)

Corresponding author: mychoi@ars.usda.gov

Peptides from the pheromone biosynthesis activating neuropeptide (PBAN)/Pyrokinin family are expected to be found from all insect groups and some other arthropods. These neuropeptides are characterized by a conserved pentapeptide, EXPRLamide, at the C terminus. This amino acid sequence is required for physiological activity. The PBAN/Pyrokinin peptides have been found to 1) stimulate pheromone production (PBAN), 2) act as an embryonic diapause hormone (DH), 3) induce melanization and reddish coloration hormone (MRCH), 4) stimulate muscle contraction (myotropins or pyrokinins), 5) accelerate puparium formation, and 6) regulate pupal development and diapause. PBAN is synthesized in the subesophageal ganglion (SG) and released into the hemolymph where it stimulates sex pheromone production in many moths. However, virtually nothing is known about how pheromone production and release is regulated in social insects, which depend on sophisticated pheromonal communication to maintain colony cohesiveness and sociality. In the present study, we confirmed the presence of PBAN peptides and identified PBAN cDNA for the first time in an ant species, *Solenopsis invicta*. Brain subesophageal extracts of male and female fire ant sexuals significantly stimulated sex pheromone production in a lepidopteran. Three groups of PBAN producing cell clusters were found in the SG that correspond to the mandibular, maxillary and labial neurons, as in Lepidoptera. PBAN-like immunoreactive neurons in the VNC were found in thoracic (two pairs) and abdominal ganglia (three pairs). Fire ant PBAN cDNA, encoding 176 amino acids, including *S. invicta* PBAN (Soi-PBAN) and three additional neuropeptides, was identified. The structure and preprohormone positions of the fire ant PBAN gene are more similar to lepidopteran PBANs than the PBAN/Pyrokinins found in other insect groups. Thus, the PBAN peptides in fire ants could function in pheromone production and/or regulation as they do in Lepidoptera.

1. **Choi, M.Y., Vander Meer, R.K., Raina, A.K.** 2008. PBAN/Pyrokinin peptides in Central Nervous System from Fire Ant, *Solenopsis invicta* (Abstract). International Society of Chemical Ecology. Paper No. 78.