



## RESEARCH PROGRESS REPORT SUMMARY

**Grant 01780:** Defining the Mechanism by Which Ticks Locate Dogs in Order to Better Prevent Disease Transmission

**Principal Investigator:** Dr. Emma Natalie Ivy Weeks, PhD

**Research Institution:** University of Florida

**Grant Amount:** \$104,867.31

**Start Date:** 3/1/2013                      **End Date:** 2/28/2018

**Progress Report:** End-Year 4

**Report Due:** 2/28/2017                      **Report Received:** 1/13/2017

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### **Original Project Description:**

The brown dog tick (BDT) is common across the U.S. and is the most widely distributed tick in the world. BDT's carry and transmit the pathogens that cause debilitating diseases such as canine ehrlichiosis and babesiosis. Prevention of these diseases is accomplished through tick control. BDT's can complete their entire life cycle indoors, making management difficult. Records of infestations are increasing and unpublished data indicates that a high level of pesticide resistance is present in domestic populations. Consequently once introduced, these ticks are particularly hard to eradicate and as one female tick may lay 5,000 eggs, the problem soon gets out-of-hand. Pesticide resistance leads to aggressive treatment regimes, which in turn, lead to increased exposure of humans and pets to chemical residues. Alternatives to pesticides are needed. Studies have shown that BDT's are attracted to dog odor, a blend of volatile chemicals used by ticks to find a blood meal. In this study, Dr. Weeks will identify the chemicals BDT's use to locate a dog. This will enable manipulation of tick behavior thereby facilitating management and reducing the need for extensive use of pesticides. Improved tick control without the need for increased environmental pesticide applications will improve the quality of life for dogs and their owners.



### **Grant Objectives:**

To identify chemicals from within dog odor that are tick attractants and that could be used as part of a surveillance trap in kennels or homes, or in attract-and-kill devices.

### **Publications:**

None at this time.

### **Report to Grant Sponsor from Investigator:**

The brown dog tick (BDT) is common across the US and the most widely distributed tick in the world. BDT's are capable vectors of pathogens that cause canine ehrlichiosis and babesiosis as well as other disease agents. Prevention of these diseases is accomplished through tick control. BDT's can complete their entire life cycle indoors, making management difficult. Records of infestations are increasing and unpublished data indicates that a high level of acaricide resistance is present in domestic populations.

Consequently once introduced, these ticks are particularly hard to eradicate and as one female tick may lay 5,000 eggs, the problem soon gets out-of-hand. Acaricide resistance leads to aggressive treatment regimes, which in turn, leads to increased exposure of humans and pets to acaricide residues. Alternatives to pesticide applications are needed. Studies have shown that BDT's are attracted to dog odor, a blend of volatile chemicals used by ticks to find a blood meal. Identification of the chemicals BDT's use to locate a dog (semiochemicals) would enable manipulation of tick behavior thereby facilitating management and reducing the need for extensive use of acaricides. Improved tick control without the need for increased acaricide applications will improve the quality of life for dogs and their owners or handlers. Work will be accomplished through four successive objectives to 1) collect dog odor, 2) identify chemicals that ticks can detect, 3) test chemicals for tick attraction and ultimately 4) evaluate efficacy of an attractant-based tick trap.

For the first objective, the collection of dog odor, all animals have been identified and the samples have been collected and analyzed by chromatographic techniques. Furthermore the chemicals have been identified tentatively by mass spectrometry. For the second objectives the electrophysiological techniques have been established and ten ticks have been tested against each dog breed sample plus a mixed sample of all dog breeds (Total 60 ticks). For the third objectives the behavioral assay has been established. Attraction has been demonstrated to whole dog hair samples and positive controls. Further studies will continue to test the response of ticks using behavioral and electrophysiological means to determine the biologically-active chemicals in dog odor. These chemicals will then be tested in the behavioral bioassay and in traps.