Feb 8th, 11:45 AM - 12:45 PM

RUMS: Research for Undergraduates in Math and Science

David Gauthier
Old Dominion University

11:45 AM – 12:45 PM (Learning Commons # 1310)

RUMS: Research for Undergraduates in Math and Science
Chair: Dr. David Gauthier
Department of Biological Sciences

Effects of Temperature on Experimental Mycobacteriosis in Striped Bass (Merone saxatilis)

By ELIZABETH SMITH, with Wolfgang Vogelbein and MariCarmen Korngiebel-Rosique (Mentor: Dr. David Gauthier)

The bacterial disease mycobacteriosis is highly prevalent in striped bass of Chesapeake Bay. Mycobacterium shottsii and Mycobacterium pseudoshottsii appear to be the major agents associated with disease in this system. With increased eutrophication, the deeper waters of Chesapeake Bay have become increasingly hypoxic and it is speculated that striped bass are subject to a "thermal oxygen squeeze"; hypoxia in the deeper waters pushes the fish into shallower, warmer waters, potentially leading to increased susceptibility to infection. In this study, we examined the effect of temperature on infection with M. shottsii and M. pseudoshottsii in striped bass.

Birds as Vectors of Rickettsia parkeri

By JESSICA VINCENT, with Chelsea Wright and Erin Heller (Mentors: Drs. David Gauther, Eric Walters, Holly Gaff)

In 2004, the bacterial pathogen Rickettsia parkeri was identified as the causative agent of Tidewater spotted fever in humans. Amblyomma maculatum, the Gulf Coast ticks, are carriers and spread in a rapid, punctuated pattern which is atypical of terrestrial animal vectors. This implicates birds as likely dispersal agents. To determine whether birds play a role in the spread of A. maculatum, we are attempting to detect Rickettsia parkeri in wild avian blood samples. We use a Rickettsia spp. specific TaqMan assay, and test positive samples for species-level identification. Currently, out of the 200+ samples tested, none have been positive.

The Effect of Harmonic Vibrations on the Disruption of a Bacterial Biofilm

By AMARILIS DYER, with Jarrod Cath (Mentors: Drs. Onur Bilgen, Dayle Daines)

Bacterial biofilms are composed of cell populations that adhere to a surface using a self-produced matrix of extracellular polymeric substances. Our goal was to identify the characteristics of harmonic excitation, namely the frequency, which would be most effective to de-laminate biofilms from an abiotic surface. First we determined which bacterium formed the maximum biofilm over 24 hours, then subjected these to various frequencies of harmonic excitation in 96-well plates and quantitated the effect of each frequency on biofilm disruption. We conclude that 1931 Hertz was the optimal frequency to de-laminate E. cloacae biofilms under the conditions of our assay.

Interactions between Small Mammals and Ticks in the Hampton Roads Area

By AMY JOHNSON, with Robyn Nadolny and Jana Eggleston (Mentor: Dr. Holly Gaff)

Ticks are the most significant disease-causing arthropods in the United States. In the Hampton Roads area, there are fourteen species of ticks, many of which are confirmed disease vectors or have the potential to transmit pathogens to humans. Ticks have a unique life history with each species having a preferred host or hosts for each of their three life stages: larval, nymphal and adult. Tick species that do not bite humans have the capability to amplify these pathogens in wildlife, which can in turn spill over to increased risk to humans. Although some immature ticks are also collected via flagging, the typical methodology for collection, immature ticks can more readily be collected off of wild birds and small mammals. Small mammals are the preferred host of the immature stages of many tick species. To collect data on small mammal populations, movement, and tick load, we have been live trapping for small mammals. Modified Fitch traps are baited with seed in the evening and checked at sunrise the following morning. Results of the frequency of ticks found on each small mammal species will be presented. Additionally, seasonal variation in these frequencies will be presented. Small mammal trapping has been shown to be an effective source of information on host preference for the immature stages of ticks.

Using Pheromones to Enhance Field Tick Collection Techniques

By JOSEPH BROWN, with Pamela Kelman (Mentor: Dr. Holly Gaff)

The established method of tick flagging was tested against a new method, consisting of a newly designed flag with four different treatments. The different treatments included an unscented flag, a flag scented with hog urine, a flag dispersing carbon dioxide, and a flag both scented with hog urine and dispersing carbon dioxide. The new flag design was tested against the traditional flag, and the different treatments were also compared to each other. The species collected include Amblyomma americanum, Dermicentor variabilis, Amblyomma maculatum, and lxodes scapularis. When compared, the new flagging method was shown to collect the most ticks overall, but there was some variation between the different sites in which flag had more. Further research is needed in order to further confirm the results.