NORTHEAST REGIONAL CONSERVATION NEED GRANT QUARTERLY REPORT

Grant Number: **2010-01**
Grant Title: **"*Laboratory and Field Testing of Treatments for White Nose Syndrome: Immediate Funding Need for the Northeast Region*"**
Grant Receipt**: Bucknell University**
Grant Contact Name: **DeeAnn M. Reeder, Department of Biology**

This project is in support of RCN topic#12 "Identify and Address Factors Contributing to the Regional Decline of Populations of SGCN". Hibernating bats in the NE USA have experienced sudden and dramatic declines over the past three winters due to an emerging infectious disease dubbed "White Nose Syndrome" (WNS). As of January, 2012, new estimates of the number of bats that have died thus far range from 5.7 to 7.7 million, and the causative agent is now known to be the cold-loving fungus *Geomyces destructans* (Gd). This proposal aims to address these declines by developing and implementing methodologies to combat WNS, which was specifically referenced in the call for proposals. Specific goals include: (1) testing potential treatments for efficacy against cultured Gd (the fungal pathogen associated with WNS) under laboratory conditions, (2) testing potential treatments for safety in healthy bats, and (3) testing potential treatments for efficacy against Gd in hibernating bats. Studies of the anti-Gd activity of terbinafine, voriconazole, and other anti-fungal compounds are ongoing, but were definitive enough for drug testing of terbinafine and voriconazole to begin in November, 2011. Trials conducted under strictly controlled conditions in a captive setting, in which microclimate is tightly controlled and in which each bat's behavior can be tracked have just been completed. We have begun detailed analysis of necropsy results, survivorship, and drug tissue levels as well as characterization of immunological responses in these bats. While results are pending, we believe that the side effect profile of voriconazole is too negative to continue any further testing with this drug (it led to significant mortality). We have also begun to consider our plans for the hibernation season of 2012-2013 and have determined that we will conduct field-testing of slow-release terbinafine implants (with simultaneous testing of the same implants with bats from the same cave in captivity).

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Report #- **2nd quarter (April 1, 2012 to June 30, 2012)**

Were planned goals/objectives achieved last quarter? **For the quarter, yes.**

Regional Conservation Need Addressed:

Priority RCN Topic number 12 " Identify and Address Factors Contributing to the Regional Decline of Populations of SGCN". Hibernating bats in the NE USA have experienced sudden and dramatic declines over the past three winters due to an emerging infectious disease dubbed "White Nose Syndrome" (WNS). As of January, 2012, new estimates of the number of bats that have died thus far range from 5.7 to 7.7 million, and the causative agent is now known to be the cold-loving fungus *Geomyces destructans* (Gd). **This proposal seeks to address these declines by developing and implementing methodologies to combat WNS, which was specifically referenced in the call for proposals.**

Progress Achieved: (For each Goal/Objective, list Planned and Actual Accomplishments)

The overall goal of this project is to develop and test potential treatments for WNS and, if possible, to optimize field treatment protocols. Tasks include:

1. **Testing potential treatments for efficacy against cultured Gd (the fungal pathogen associated with WNS) under laboratory conditions.**
2. **Testing potential treatments for safety in healthy bats.**
3. **Testing potential treatments for efficacy against Gd in hibernating bats. Trials will primarily be conducted under strictly controlled conditions in a captive setting, in which microclimate is tightly controlled and in which each bat's behavior can be tracked. Limited, highly selective field trials will also be conducted.**

Planned and Actual Accomplishments:

1. **Formulations of terbinafine and other anti-fungal compounds are being tested for activity against Gd in the Ghannoum and Barton laboratories**
2. **Safety testing of treatments in healthy bats is being assessed from control animals in our experiments.**
3. **UV photos (for detection of active infection) revealed that our study bats did develop lesions characteristic of WNS. We have begun detailed analysis of necropsy results, survivorship, and drug tissue levels, and have started to discuss research plans for the winter of 2012-2013 (during which field trials will occur). It is clear that the drug voriconazole causes significant mortality in hibernating bats, and continued studies of this drug will not occur. However, the drug terbinafine did not appear to cause such mortality and slow-release implants of terbinafine look relatively promising.**
4. **Development of assays that will be used to assess overall health in control and treated bats is ongoing, and a number of assays now appear to provide useful information about immune status in bats, including: a phagocytosis assay that measures the ability to recognize and destroy foreign pathogens via macrophage white blood cells, a bactericidal assay that measures the ability to recognize and destroy foreign pathogens via the innate complement system, and an assay of total antibody levels.**

Difficulties Encountered:

No major difficulties are reported this quarter.

Activities Anticipated Next Quarter:

During the next quarter we continue our detailed analysis of necropsy results, survivorship, and drug tissue levels AND analyze changes in white blood cell composition between the bats in different treatment groups. Plans for the hibernation season of 2012-2013 will continue.

Costs:

Are you within the approved budget plan? **Yes – although we are underspent to date in most budget categories.**

Are you within approved budget categories? **yes**

Signature:

Date: 9/23/2012