

Legacy of Learning

Research Project on Bats Is Handed Down from One Cadet to Another

BY DANIEL STINNETT '07

Hardy Hendren '15 and Lt. Col. Paul Moosman demonstrate how bats are photographed using a color card to ensure color measurements are calibrated. – VMI Photo by Kelly Nye.



When it comes to legacies and traditions at VMI, bat research may not be the first to come to mind. Nevertheless, research projects sometimes span the years, with one cadet picking up where another's research left off and plenty still to do for the next cadet researcher.

During Honor's Week in March, Cadet Hardy Hendren '15 was one of 21 cadets presenting their honors theses. His was the culmination of research on the red bat that began in 2013 during the Summer Undergraduate Research Institute. Hendren digitally analyzed the color of approximately 300 bats using photographs taken of specimens at the Smithsonian by Pam Chen '13 for her research project. Both cadets carried out their work under the guidance of Lt. Col. Paul Moosman '98, associate professor of biology.

"Hardy was looking at this one species of bat, and how its color varies geographically. . . . We've got this species of bat that is secretive in its behavior, and so we really don't know a lot about what they're doing," explained Moosman. "So, by looking at how their color changes and the patterns we might see there, we're trying to use that to tell us other things about their biology that might be important."

The project started for Hendren when he talked with Moosman about potential topics for an honors thesis. After discussing the possibility of expanding upon Chen's research, Hendren spent his time during SURI '13 digitally analyzing her photographs.

"[Chen] developed a digital photography technique that allowed her to photograph the bat specimens in a light-controlled environment using a mounted digital camera that took photos of specimens directly beneath it," explained Hendren. "She then used ImageJ, an image-processing program developed by the National Institutes of Health, to measure pixel brightness of red, green, and blue – RGB – over a scale of 0 to 255. . . . The mean brightness values and standard deviation for each color were recorded, and this became the data I used in my research."

In addition to determining a color value for each bat, Hendren developed a map of color patterns based on the location at which each specimen was captured. The map helped Hendren search for correlations between environmental variables, such as climate or

elevation, and the color of the bat. SURI did not allow enough time for Hendren to complete this research, so he continued work on the project during the academic year.

"The most difficult aspect of the project was that it was very difficult to maintain momentum. Since I am a cadet and not a full-time scientist, there are multiple, independent demands on my time that constantly compete with each other," Hendren said. "In short, the challenge of a thesis is the same challenge all cadets face in everything they do – there is too much to do and not enough time to do it."

Though finding time to work on the project at VMI may have been challenging, the results have piqued the interest of biologists beyond post. In March, Moosman traveled to St. Louis to the North American Joint Bat Working Group Meeting to present Hendren's research. Hendren was unable to attend as he is an NCAA wrestler and the meeting conflicted with the conference wrestling tournament.

"The bat biologists were pretty excited about what he had done," said Moosman. "People have always paid attention to [this bat] because it's uniquely colored, but I don't think anyone's looked into why its colored the way it is. . . . He found some interesting patterns in his research, . . . pointing to some things that are going on behaviorally."

One interesting finding was that the bats captured in Louisiana and Mississippi were distinctly colored when compared to the other red bats in North America. This could be because the red bats in this region are not migratory like other red bats. Another possibility is that those found in that area are a subspecies or entirely different species. These topics open up many directions for the next cadet to take up Hendren's research.

"I certainly hope a future cadet continues with this project," Hendren said. "Since so much work has already been put into it, I imagine they would find very valuable results. I am certainly grateful to have had an opportunity like this during my cadetship."

"This is the most academically challenging thing I have ever done, and there is inherent satisfaction . . . [in] seeing a project I have been working on for about two years through to the end."