4-2004

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Lynnette Struntz
Andrews University

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BY LYNNETTE STRUNTZ

The seabird ecology team from Andrews University stands at its observation point at Protection Island National Wildlife Refuge.

In the last six months, Andrews University has received more than $1.2 million in grant awards to further important research by a number of professors in a variety of fields to support innovative education in the sciences. "It's kind of a new day to get this much support over such a short time period. We are excited, to say the least," said John Stout, dean of research at Andrews.

A large percentage of the funds provided to the faculty members by these new grants will support undergraduate and graduate students involved with them in research, an invaluable learning tool which undergraduates usually are not given the chance to participate in. "Students may have the opportunity to coauthor papers even before they graduate. That's rare for undergraduates," said Patricia Mutch, vice president for academic administration. "And it's a terrific asset when students apply to top graduate and medical schools. We're pleased we can offer this experience to them."

For years, Andrews has placed an emphasis on research. The university supports faculty research and creative scholarship through its Office of Scholarly Research. Each year, through this office, funds are allocated from the university's budget to assist professors with their research and support students working with them. Discoveries and preliminary results made during this research process help catch the eyes of different government and research foundations that award grants.

James Hayward, professor of biology, and Shandelle Henson, associate professor of mathematics, with their team of students and consultants, received a grant for $304,000 from the National Science Foundation to create mathematical models that predict how many sea birds and sea mammals will be in a specific habitat at a specific time. This is particularly important because of recent habitat losses due to human encroachment.

In 2002, several months before they arrived on Protection Island off the coast of Washington, the seabird ecology team at Andrews used a mathematical equation to predict the numbers of gulls resting on this pier every daylight hour for an entire month. Later, actual counts showed the predictions to be remarkably accurate.

Hayward and his colleagues have worked on the behavioral ecology of sea birds since the early 1970s. "Now with the benefit of input from a mathematician," he notes, "our research is at the cutting edge of science. The prospects are exciting."

The team is highly active in publication and speaking engagements. Henson and Hayward speak around the country at professional conferences, sharing the results of their research. Already successful at predicting the movements of animals in one habitat on Protection Island National Wildlife Refuge, Strait of Juan de Fuca, Washington, the sea bird ecology team is now working on models that predict the movements of animals among several habitats on the island.

Robert Zdor, associate professor of biology, received a $65,000 grant from the United States Department of Agriculture to further his research on a type of soil bacteria that has the ability to live around plant roots. Zdor discovered that by applying a certain type of soil bacteria around velvetleaf, a common weed found in cornfields, the plant is harmed and growth is reduced. He is now looking at the genetic basis for cyanide production and is going to test whether or not the cyanide is important in how the bacteria interacts with plants.

"The idea is, if cyanide is important in this interaction, and if we can optimize the cyanide production, then maybe we can optimize the harmful effect of the bacteria on the plant," Zdor explained. He hopes this research will lead to a new method of fighting weeds using a biologically based, as opposed to chemically based, weed control.

Desmond Murray, assistant

professor of chemistry, received a $248,500 grant from the National Science Foundation and a $50,000 grant from the American Chemical Society to study boronic acid substituted flavonoids. This research branched off from a discovery made by an Andrews clinical laboratory science major three years ago who was experimenting with chalcones under Murray's supervision.

Andrews University graduate students, Karl Phillips and Smruti Damania, make bird counts from their makeshift platform on Protection Island.

Chalcones, which belong to a class of plant pigments called flavonoids, have previously been known to have a wide range of biological activity. However, the student found that only one of the twenty chalcones she prepared inhibited growth of the bacterium *Staphylococcus aureus*. Particular strains of this bacterium are becoming increasingly drug-resistant and are leading to hospital-acquired infections that cause complications such as blood and bone infections and infections of the heart and valves that lead to toxic-shock syndrome and death. The chalcone that inhibited this bacterium contained a boronic-acid group.

The following year, a freshman asked Murray for a research project, and he decided she should focus on boronic acid-substituted chalcones. While engaged in this research, they unexpectedly made a purple chalcone.

"This was highly irregular," Murray said, "since both natural and synthetic chalcones are generally yellow to orange in color." They proceeded to make more purple chalcones, as well as other colors.

Murray anticipates that extending the chalcone work to other classes of flavonoids can potentially lead to applications in molecular sensing, antimicrobials and new functional materials.

Candice Hollingsead, associate professor of teacher education, received a grant for $116,000 from the United States Department of Education, part of a larger $899,900 grant divided among five universities as a collaborative project to implement new methods of teaching special-education teachers through virtual-reality, case-based instruction. They will then evaluate its effectiveness in an effort to create a new instructional model. Using CDs with video clips that show 10 actual special-education child cases, teachers can test and strengthen their skills in a realistic environment. The goal of this project is to develop a new special-education teaching theory model that can be used for national emulation.

Desmond Murray, chemistry professor, and student research assistants received a $248,500 grant from the National Science Foundation and a $50,000 grant from the American Chemical Society to continue their purple chalcone research.

Finally, John Stout, dean of research, with his core team of Gordon Atkins, associate professor of biology; Shandelle Henson, associate professor of mathematics; and Duane McBride, behavioral sciences department chair, received a $490,600 grant from the National Science Foundation to study the unusually high percentage of graduates from the Andrews University biology department who are accepted to medical school—nearly double the national average.

Freshman enter the program with average high school GPAs and ACT or SAT scores, but leave the program scoring above the 90th percentile on national exit exams. The team will develop a new undergraduate program in behavioral neuroscience, modeled on the university's biology program. The National Science Foundation believes that the teaching model that develops from this study can be adapted for use in other disciplines or situations and provide a model for national emulation.

"Behavioral neuroscience is an area that's really growing nationally and provides tremendous opportunities," Stout said. "Our interdisciplinary program will open opportunities to successfully enter this field or go on for advanced training programs in psychology, the neurosciences, or medicine. We are excited to offer this great program to our students."

Lynnette Struntz is an Andrews University graduate intern.