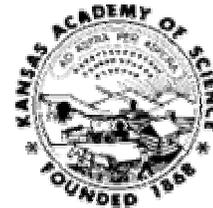


KAS BULLETIN



NEWSLETTER OF THE KANSAS ACADEMY OF SCIENCE

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\$\$\$ KAS Awards Five Grants in 2008 \$\$\$

The Kansas Academy of Science Board of Directors awarded one undergraduate and four graduate student grants this year at a total cost of \$4,495. The grant program is one way in which the KAS furthers the advancement of science within the state. Information about this year's grant recipients and their proposed research is presented below.

Amanda M. Anderson, an undergraduate student at Emporia State University, was awarded \$500 to defray costs of a proposed study entitled: **“Temporal response of the soil microbial community to prescribed fire in the Tallgrass Prairie.”** She will investigate the effects of burning prairies on the composition, species diversity and recovery times of soil microbes. Although some studies of prescribed burning in forests have shown a dramatic decrease in soil microbes and drastic effects on their biodiversity, not much is known concerning these effects in prairie communities. Her research could lead to an improvement in prairie management practices.

Andrea Crowther, A PhD student at the University of Kansas, received \$1,000 to help fund her first major field trip to the Red Sea and Zanzibar to study the **“Taxonomy, phylogeny, and evolution of Indian Ocean sea anemones possessing branched outgrowths and spherical defensive structures.”** She will examine various anatomical features, such as nematocysts, which are defensive structures which evert a tubule containing stinging spines and toxins, and define genera and species limits. Although she will visit major museum collections, field work is one of the most important components of her study. She will be able to observe and photograph live sea anemones in their native habitat and collect tissue samples for later DNA studies.

Alexis S. Reed, a University of Kansas PhD student, received \$995 to further her proposed study entitled: **“Oak survival at the prairie/forest ecotone with climate change: ring-width chronologies and stable isotope evidence of drought responses.”** She will examine how Burr Oaks and Northern Red Oaks have survived during the last fifty years at the edge of their range in mesic and drier locations within the state. Such information will be valuable in predicting forest composition related to future changes in climate.

Sarah Schmidt, a PhD student at the University of Kansas, was awarded \$1,000 to examine the **“Effects of hydrogeomorphology on ecosystem metabolism and algal communities in a sandbar river.”** The fluctuating water levels in the Kansas River produce a number of changing microhabitats, such as the main channel and backwater areas. The algal density and diversity in these habitats in the water column and on the bottom will vary due to the dramatic change in river level. The species composition and each species' input to the metabolism of the entire ecosystem will be explored by taking field samples and readings of standard physical and chemical parameters, such as dissolved oxygen, in these habitats. This research will lead to a better understanding of this dynamic riverine ecosystem, and therefore provide direction for river management.

Bradley S. Williams, a PhD student of the University of Kansas, was awarded \$1,000 for a proposed study entitled: **“Relationships between fish and macroinvertebrate species diversity and hydrogeomorphic zones in Kansas rivers.”** He will be using data mining techniques to determine the effects of hydrogeomorphic habitat patches, also known as “functional process zones,” on fish and macroinvertebrate biodiversity in the Arkansas, Kansas, Smoky Hill and Republican Rivers. Instead of assuming gradual changes in biodiversity in response to a clinal gradient in physical conditions as the channel size increases, he will use an alternative view in which rivers consist of a punctuated series of hierarchically nested habitat patches. This holistic approach should be able to identify large scale factors that influence the biodiversity of rivers, thus leading to better management decisions in the future.

Congratulations and continued success with all of your research projects!

Science in South Korea

Amy Strong, Kansas Junior Academy of Science
Director

Because of my involvement with the Kansas Junior Academy of Science (KJAS), the Board of the American Junior Academy of Sciences (AJAS) and the National Association of Academies of Science (NAAS) selected me to chaperone two AJAS high school delegates from Ohio, Hannah Cox and Lizzie Martin, to South Korea to participate in the 2008 International Science and Engineering Camp (ISEC) and the Korean Science Festival. Both of these events were sponsored by the Korean Science Foundation whose main objective is to raise public awareness of science through programs like ISEC and the annual Festival, a public science television channel and Youth Science Clubs.

We arrived in Seoul on July 20, 2008, and made our way to Ewha Woman's University for the ISEC event. There were 74 students from 11 countries attending the event. There were students in attendance from China, Columbia, Germany, India, Israel, Japan, Korea, New Zealand, the Philippines, Singapore and of course, the United States. We were welcomed by the President of Ewha, Bae Yong Lee and by the President of the Korean Science Foundation, Yoon Chung at the opening ceremony. We were able to get in the spirit of the event with a great high-energy dance routine from the Ewha Cheerleaders. Professors and graduate students from eleven laboratories (see sidebar) worked with camp students on a week-long research project. These students were judged and awarded on their research presentations at the closing ceremonies.



Myself and fellow adult chaperones observed students at work in the labs, attended a teacher seminar session, listened to student research presentations and a science lecture series and visited Seoul Science High School which is a specialized school for students gifted in science. Through these experiences, I found that most countries are struggling with similar concerns regarding increasing the public awareness of science and getting (and keeping) students interested and involved in science to meet future international challenges.

Participating EWHA Woman's University Laboratories

Physics

Lab A: Applied Nuclear Physics Laboratory
(Prof. Insik Hahn)

Lab B: Nano Device Physics Laboratory
(Prof. Jo William)

Chemistry

Lab A: Supramolecular Chemistry Lab
(Prof. Joon Woo Park)

Lab B: Polymeric Biomaterials Lab
(Prof. Byeongmoon Jeong)

Biotechnology

Lab A: Plant Systematics Lab (Prof. Sung-Hee Yeau)

Lab B: Laboratory of Cardiovascular Genomics
(Prof. Goo Taeg Oh)

Mathematics

Lab A: Cryptography Lab (Prof. Hyangsook Lee)

Lab B: Applied Analysis Lab (Prof. Jung-ho Yoon)

Environmental Engineering

Lab A: Atmospheric Environment Lab
(Prof. Yong Pyo Kim)

Lab B: Environmental Ecology lab
(Prof. Sang Don Lee)

Food Science & Technology

Lab A: Flavor Chemistry & Instrumental Analysis Lab
(Prof. Young-Suk Kim)

All visitors to the camp were able to experience many facets of the Korean culture. Immediately upon arrival, we were exposed to the Korean language and quickly learned how to purchase things with the Korean won. We were escorted on a Seoul city tour, visited Changdeokgung Palace built in 1405 and shopped at one of the local market areas called Insadong. That same evening we went to the city center to attend a local theater and were treated to a comic martial arts performance called Jump. Students and teachers learned how to perform a traditional percussion music and dance called Samulnori. We all tried many local Korean foods and took a beautiful night tour of the Han River.

The second part of our trip took us to a city in the south part of the country called Gwangju for the Korean Science Festival. Here we joined teams from China, Japan, Kuwait, Israel, the Exploratorium in San Francisco, and Korean students in hosting hands-on booths. The AJAS team did simple hands-on science demos and two different make-and-take activities. Approximately 15,000 visitors of all ages came to the Festival. We did our sessions in English which proved to be quite popular. We found many ways to communicate and share our science lessons with the local people. In addition to the hands-on sessions, the Festival featured exhibits from all of the leading Korean science organizations and educational facilities.

Report on the 140th Annual Meeting of the Kansas Academy of Science

Richard Schroder, KAS board member

The 140th Annual Meeting of the Kansas Academy of Science and the 9th Annual Paleontology Symposium was held on March 28-29, 2008, at Emporia State University. The meetings were a huge success with 73 abstracts submitted for presentation. Eighty students attended the meeting with 51 presenting papers or posters. In addition to the students, 67 members and non-members attended the meetings.

Activities started on Friday with a guided tour of the Ross Natural History Reservation followed by a banquet in the Colonial Ballroom of the Memorial Union. Following the dinner, Dr. Stanley Bull, of the National Renewable Energy Laboratory, Golden, Colorado, presented a talk entitled: *Renewable Energy: Meeting our Energy Challenge*. This presentation, open to the public, was very enlightening with a major discussion of the pros and cons of wind power.

Saturday's events started at 8 am with the first papers being given in the Kansas Academy of Science and Paleontology Symposium sessions. At 10 am, the post session began with many visual reports on student research presented. In addition to the posters, the Trouvelot Astronomical Prints of the Nineteenth Century, maintained by ESU, were on display. At the noon luncheon, Dr. Stanley Bull presented the keynote address on *Renewable Energy: Potential and Challenges*, another great talk. At 3:15 pm, the awards for student competition were presented. A list of the winners can be found on the KAS website, www.KansasAcademyScience.org.

An announcement was made, during the business meeting, that the 141st Annual Meeting of the KAS will be held at Washburn University in Topeka on March 27-28, 2009. Shaun Schmidt and Sam Leung will head up the local committee.

How Do I Apply for a Research Grant?

Student members of the KAS or students whose major advisor is a member of the KAS may apply for research funds up to the amount of \$1,000 for graduate students or \$500 for undergraduates to support investigation in any scientific field and in any locality.

The application deadline for next year's grants is June 1st, 2009. Grants are awarded by August 1st.

See the KAS website for more details:
www.KansasAcademyScience.org/Research_Grant.html



Ground Squirrels Chew Snakeskins to Mask Their Scent

Henry Fountain, The New York Times, Feb 5, 2008. Illustration by Chris Gash

Here's an odd animal behavior for you: the California ground squirrel chews on the molted skins of one of its main predators, the rattlesnake, and applies the scent to its body by licking itself all over.

This eau de snake has a purpose, says Barbara Clucas, a doctoral student at the University of California, Davis. It acts as camouflage, covering up the squirrel's own scent so a meal-seeking rattlesnake will leave it alone.

Camouflage is nothing new in nature – it's used by animals big and microscopic, and by plants, too. But among vertebrate animals at least, most of the deception is visual. The California ground squirrel's behavior is a rare documented case of olfactory camouflage among vertebrates, Ms. Clucas said.

The squirrels are not the only rodents to chew snake skins, nor the only animals to apply the scent to their bodies. Ms. Clucas said that with the ground squirrels it seemed likely that the behavior was an anti-predator one, because adult males, which are resistant to snake venom, don't do it. Squirrel pups, which are not resistant, do the chewing as do their mothers, which are resistant but look after the pups in the burrows.

Ms. Clucas and two colleagues, Donald H. Owings and Matthew P. Rowe, tested the reactions of hungry rattlesnakes to pieces of filter paper with rattlesnake scent alone, squirrel scent alone, and a combination of the two. The snakes flicked their tongues over the squirrel-only scent, but not over the combined scent or the snake-only scent. The finding, reported in The Proceedings of the Royal Society B: Biological Sciences, suggest that if a rattlesnake is hovering over a squirrel burrow, it can be tricked into thinking that there are no squirrels there.

Ms. Clucas noted that people tend to think of camouflage more in visual terms. "But there are a lot of animal predators where the main sense they use is olfaction," she said. "So this kind of behavior could be more widespread."

Extreme Pressure Changes Near Wind Turbines Injures Bats Lungs

Grady Semmens, Senior Communications Manager of Research, University of Calgary

The mystery of why large numbers of migratory bats are killed by certain turbines of southern Alberta's wind farms every year may have been solved by a comprehensive University of Calgary research project that has yielded answers to the problem.

A bat mortality study supervised by U of C biology professor Robert Barclay that began in 2006 has determined that the vast majority of bats found dead below turbines near Pincher Creek suffered severe injuries to their respiratory systems consistent with a sudden drop in air pressure – called barotraumas – that occurs when the animals get close to turbine blades. The results will be published in the August 26 online edition of *Current Biology*. The study shows that 90% of the bats examined after death showed signs of internal hemorrhaging consistent with barotraumas while only about half of the bats showed any evidence of direct contact with the blades.



Bat Illustration by Neville Cayley

“Because bats can detect objects with echolocation, they seldom collide with man-made structures,” said PhD candidate and project leader Erin Baerwald. “An atmospheric-pressure drop at wind-turbine blades is an undetectable – and potentially unforeseeable – hazard for bats, thus partially explaining the large number of bat fatalities at these specific structures,” Baerwald explains. “Given that bats are more susceptible to barotrauma than birds, and that bat fatalities at wind turbines far outnumber bird fatalities at most sites, wildlife fatalities at wind turbines are now a bat issue, not a bird issue.”

The respiratory systems of bats and birds differ in important ways, in terms of both their structure and their function. Bats' lungs, like those of other mammals, are balloon-like, with two-way airflow ending in thin flexible sacs surrounded by capillaries, the researchers explained. When outside pressure drops, those sacs can over-expand, bursting the capillaries around them. Bird lungs, on the other hand, are more rigid and tube-like, with one-way circular airflow passing over and around capillaries. That rigid system can better withstand sudden drops in air pressure.

Nine species of bats are found in Alberta, three of which migrate through the province each year. The majority of bats killed at wind turbines are the migratory bats that roost in trees, including: hoary bats, eastern red bats, and silver-haired bats. While little is known about their population sizes, the researchers said their deaths could have far-reaching consequences. Bats typically live for many years, in some cases reaching ages of 30 or more. Most also have just one or two pups at a time, and not necessarily every year.

“Slow reproductive rates can limit a population's ability to recover from crashes and thereby increase the risk of endangerment or extinction,” said Barclay, noting that migrating animals tend to be more vulnerable in the first place.

All three species of migratory bats killed by wind turbines fly at night, eating thousands of insects – including many crop pests – per day as they go. Therefore, bat losses in one area could have very real effects on ecosystems miles away, along the bats' migration routes.

Baerwald said there is no obvious way to reduce the pressure drop at wind turbines without severely limiting their use. Because bats are more active when wind speeds are low, one strategy may be to increase the wind speed at which turbine blades begin to rotate during the bats' fall migration period.

The study was initiated by TransAlta after the company's wind farm operators noticed bat carcasses below turbines and approached Barclay, an internationally-recognized bat expert, for advice.

“It was important for us to determine as much as we could about this issue,” said Jason Edworthy, Director, Stakeholder Relations for TransAlta. “Ultimately, it's a situation we're working hard to alleviate. Ongoing research with the University is seeing some real results in terms of mitigation of collisions.”

The paper, “Barotrauma is a significant cause of bat fatalities at wind turbines” by Erin F. Baerwald, Genevieve H. D'Amours, Brandon J. Klug and Robert M.R. Barclay will be available online at: www.current-biology.com.

The Kansas Academy of Science: an Editorial

Dan Merriam, past President and past Editor of the Transactions of the KAS

The Academy was organized in 1868 under the name of the Kansas National History Society. Originally, there were seventeen members at the founding meeting at Lincoln College (Washburn) in Topeka. John Fraser, a mathematician from KU, at the first meeting suggested that the scope of the Society "...be enlarged to comprehend the whole field of science within the borders of the state." After a dismal start, by 1873 things began to pick up and the future of the Academy looked brighter. The first issue of the Transactions (V. I, II, and III) was published in 1896.

Since the founding of the Academy, it has met every year with one exception. The meeting is hosted by one of the many Kansas state or private educational institutions. Last year's meeting was held at Emporia State University. The meeting in 2009 will be held at Washburn University in Topeka.

The major sections in the Academy are detailed below. Each discipline organizes its own session(s). Also, there usually is a special symposium and for the past several years the subject has been paleontology. The Academy encompasses **all** of the sciences and each and every meeting is of interest.

Life Sciences	Physical Sciences
Biology Biochemistry Botany Ecology Medicine Physiology Zoology	Astronomy Chemistry Geography Geology Physics
Social Sciences, Engineering, and Technology	
Mathematics, Statistics, and Computer Science	
Science Education	

KAS publishes the *Transactions of the Kansas Academy of Science*, a multidisciplinary, peer-reviewed, scholarly journal for all subjects of biological, cultural, and physical sciences, mathematics and computer science, history and philosophy of science, and science education. We invite authors to submit articles on any topic of science, science education or science history with a particular focus on Kansas and the Great Plains region free of page charges! Check the KAS website for more details.

The Claim: Don't Eat The Mistletoe It Can Be Deadly

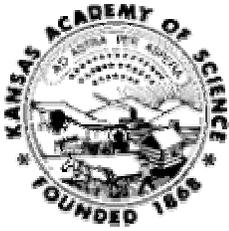
Anahad O'Conner, The New York Times,
December 11, 2007

That Christmas bough of mistletoe has a legendary reputation for romance, but it is also widely considered as lethal as it is festive. At this time of year, poison control centers warn of the dangers of the plant, typically sending out "holiday safety" fliers that advise, among other things, to keep mistletoe out of the reach of children and pets, lest there be fatal consequences. Most experts say that all or parts of the plant can be toxic, though it is the berries that are particularly dangerous.



In reality, studies show that mistletoe is not quite as hazardous as it is made out to be. The plant does in fact contain harmful chemicals like viscotoxins, which can cause gastrointestinal distress, a slowed heartbeat and other reactions. But in studies of hundreds of cases of accidental ingestion over the years, there were no fatalities and only a handful of severe reactions. One study published in 1996 looked at 92 cases of mistletoe ingestion and found that only a small fraction of patients showed any symptoms. Eight of 10 people who consumed five or more berries had no symptoms, and 3 of 11 people who consumed only the leaves had upset stomachs. Other studies have found similar effects, suggesting that while mistletoe can be toxic, its lethal reputation is not quite deserved.

Mistletoe is not deadly, but it can be hazardous, so don't eat it.



KANSAS ACADEMY OF SCIENCE
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*The 141st Annual Meeting of the
Kansas Academy of Science
will be held at
Washburn University
on
March 27 and 28, 2009.*
