

KAS BULLETIN



NEWSLETTER OF THE KANSAS ACADEMY OF SCIENCE

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148th Annual Meeting of the Kansas Academy of Science and 92nd Annual Meeting of the Kansas Entomological Society in April 1-2, 2016

The 148th annual meeting was held in conjunction with the Kansas Entomological Society's 92nd annual meeting at McPherson College on April 1-2, 2016. We gathered in Melhorn Hall on Friday afternoon to caravan out to the Maxwell Wildlife Refuge for a field trip. A tour of the refuge, led by volunteers, brought us very close to a small herd of several dozen bison that were lured to the vicinity with food. Among the females and juveniles were two huge male bison, each approaching 2,000 pounds. Viewing these impressive animals in their native surroundings was a thrilling experience. We then moved up the trail and saw a herd of elk, which were off in the distance, and then returned to the refuge headquarters, and then back to the college to greet colleagues. The banquet dinner later that evening was superbly balanced and enjoyed by all. After dinner, Dr. Devin Schrader, assistant director of the Center for Meteorite Studies at Arizona State University, gave us a historic perspective as well as an in-depth look at scientific investigations of meteors.

The next morning, three concurrent sessions of oral presentations began after coffee and a continental breakfast. In addition to the Paleontology Symposium, there were papers on organismal biology, ecology, cell biology, genetics, chemistry, health and medicine, and soil biology. Besides the oral presentations, there were 36 posters covering the same topics.

We learned about the success of periodical cicadas at KU's fragmentation study site, the mating habits of a large wolf spider (*Rabidosa punctulata*), the composition and photosynthetic production of biological soil crusts in different prairie types, and how to identify different species of fireflies in Kansas. Randy Miller and his students gave us a glimpse of the wonderful world of water bears – the tardigrades. I am jumping ahead into pure speculation, but with their unique physiology, water bears are the most likely multicellular animal to be found on Mars or other planets in the solar system. Of course, we may probably find bacteria or other single-celled creatures first.

Following the morning session, we adjourned to the dining room once again for a wonderful lunch and a high-speed journey into understanding the population dynamics of the quasi-social cobweb spider, *Anelosimus studiosus*, in relation to the aggressive and passive behavioral traits of individuals sharing the web. Dr. Jonathan Pruitt, of the University of California- Santa Barbara, by his studies of social spiders, may have uncovered a fundamental aspect of diverse groups of animals – their personalities – and how they affect group survival. For a variety of reasons, webs containing a mixture of aggressive and passive spiders seem to have a greater chance of survival than webs with only aggressive or passive individuals alone.

KAS Newsletter Goes Electronic

Starting with the next issue, KAS Bulletins will be sent electronically instead of by snail mail. However, paper copies can still be sent to those who notify the KAS secretary, Sam Leung.

If you wish to continue receiving the newsletter in the mail, send Mr. Leung an email or letter if you do not have email:

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This Microbe Makes a Meal of Plastic

Science News Magazine Apr. 16, 2016
By Sarah Schwartz

A newly discovered microbe chows down on polluting plastic.

For humans, polyethylene terephthalate, also known as PET, is a stiff, strong plastic fiber that's the main ingredient in polyester clothing and disposable bottles. But for the bacterium *Ideonella sakaiensis*, PET is dinner.



Researchers in Japan discovered the bacterium living in samples of soil, wastewater and recycling plant sludge, all contaminated with PET particles. PET is very stable, and few known microbes can break it down. But *I. sakaiensis* can use PET as its main food

source, the scientists report in the March 11 *Science*. Tests revealed that the bacterium latches onto PET particles and releases a protein that decomposes the plastic into molecules the bacterium can munch on (*SN*: 2/20/16, p. 20).

Millions of tons of PET are manufactured yearly, and the long-lasting plastic can pose an environmental threat as it builds up in ecosystems. With its appetite for this environmental hazard, *I. sakaiensis* might be valuable in plastic waste cleanup, the researchers say.

Killer Prairie Dogs Make Good Moms

Science News Magazine Apr. 16, 2016
By Susan Milius

White-tailed prairie dogs — those stand-up, nose-wiggling nibblers of grass — turn out to be routine killers of baby ground squirrels. And the strongest sign of successful white-tailed motherhood could be repeat ground squirrel kills, researchers say.



At a Colorado prairie dog colony, females that kill at least two ground squirrels raise three times as many offspring during their lives as nonkiller females, says John Hoogland of the University of Maryland Center for Environmental Science in Frostburg. The “serial killers,” as he calls repeat-attack females, rarely even nibble at the carcasses and aren't getting much, if any, meat bonus. Instead, the supermom assassins may improve grazing in their territories by reducing competition from grass-snitching ground squirrels, Hoogland and Charles Brown of the University of Tulsa propose March 23 in *Proceedings of the Royal Society B*.

“This really caught me by surprise,” Hoogland says. Carnivorous mammals killing other carnivore species wouldn't be surprising, but prairie dogs and ground squirrels eat plants. He knows of no other systematic study documenting routine fatal attacks by one herbivore species on another.

Fall Fieldtrip to Baker Wetlands

Noon Saturday, October 29th, 2016

RSVP to emorris@bakeru.edu if you plan to attend.

Dr. Roger Boyd and Dr. Scott Kimball will be available to escort visitors around the new Discovery Visitor Center and wetland trails while answering questions about the natural history of the area and mitigation of new land that began in 2010. Information about the Baker Wetlands can be found at the website:

<http://www.bakeru.edu/wetlands/>

New Process Encourages Ice to Slip, Slide Away

Science News Magazine Apr. 16, 2016

By Cassie Martin

Ice removal may soon become a lot easier. Researchers have developed a new method for making ice-phobic surfaces by altering the density and slipperiness of spray-on polymer coatings.

The process, reported online March 11 in *Science Advances*, could lead to a wide range of long-lasting ice-repellent products including windshields, airplane wings, power cables and frozen food packaging, researchers say.

Scientists know that ice easily detaches from softer, less dense materials. Further adjusting the density of rubber polymers used to make the coatings and adding silicone or other lubricants such as vegetable oil, cod-liver oil and safflower oil amplifies the effect, Anish Tuteja, a materials science engineer at the University of Michigan in Ann Arbor, and colleagues found.

In multiple laboratory and field tests, ice slid off treated surfaces under its own weight or when it was pushed by mild wind. The researchers further tested the coatings'

durability on various surfaces such as metal license plates and glass panes. The coatings performed well through two Michigan winters and retained their ice-repelling properties after controlled exposure to icing and heat cycles, corrosive substances such as hydrochloric acid, and wear and tear.

The process has already yielded more than 100 different coatings tailored for specific surfaces, including metal, glass, wood, plastic and cardboard. Tuteja says his team is working on licensing the materials for commercial use.

New Life Form Found in Saliva

Excerpted from New Scientist July 2-8, 2016

By Andy Coghian

Parasitic bacteria that are entirely dependent on the larger bacteria they infect have been discovered in human saliva. The tiny cells have gone undetected, but appear to be linked to gum disease, cystic fibrosis and anti-microbial resistance.

McLean and his colleagues discovered the organisms by searching for bacterial strains in human saliva samples. Analyzing the DNA of all the species they managed to grow from these samples, they came across a mystery fragment of genetic material. This piece of RNA had been discovered by other researchers before, but no one could tell what organism it came from.

McLean's team has now shown that this RNA belongs to a bacterium that lives on another species, *Actinomyces odontolyticus*. When the researchers viewed this species under the microscope, they found that the cells were covered with much smaller bacteria – the first species ever discovered to parasitize another bacterium.

At first, *Actinomyces* is able to tolerate the parasites, which attach themselves to its outer membrane, drawing nutrients out of their host. "Later, they start attacking and killing the host," said McLean. Towards the end of the infection process, holes seem to form in the

membrane of the *Actinomyces* cell and its contents gush out. “We’re trying to decipher what’s going on,” he said.

The parasitic bacterium is unlike any previously known species. It has just 700 genes and is the first bacterial strain identified that cannot make its own amino acids – the building blocks for the proteins essential to life – but depends instead on a supply from its host. By comparison, *A. odontolyticus* has 2200 genes.

In previous work, the team had identified a type of bacterium that infects some members of the archaea – a different type of single-celled life that is genetically distinct from bacteria, but similar in its lack of a true cell nucleus and other complex cell machinery.

The two parasitic bacteria also both somehow make their host cells become resistant to the antibiotic streptomycin – another finding that may prove important in the midst of our present antimicrobial-resistance crisis.

Pluto Must Still Have a Liquid Sea

New Scientist July 2-8, 2016
By Conan Gearin

Pluto probably has a liquid ocean sandwiched between a rocky core and an icy shell.

When the New Horizons probe flew by the tiny world last year, it saw signs of geological activity, perhaps caused by a subsurface ocean. Noah Hammond of Brown University in Rhode Island and his colleagues say such an ocean must still be liquid today.

If it had frozen solid, the pressure from the outer ice would have squished the ocean into a denser form called ice-II, reducing its volume. Pluto would have contracted, covering it in wrinkles.

But New Horizons saw deep cracks instead, suggesting Pluto is slowly growing through the formation of normal ice, which has a larger volume than liquid water.

If so, something must be keeping the ocean wet – probably heat from radioactive decay in Pluto’s core.



Tipping Point for Ice Sheet Looms: Antarctica’s Past May be a Guide to Future Melting

Science News Magazine Apr. 16, 2016
By Thomas Sumner

Assembling a detailed timeline of the Antarctic ice sheet's inception around 34 million years ago, scientists have identified a carbon dioxide "danger zone" that could trigger the ice sheet's demise.

Based on CO₂ levels at the time the ice sheet formed, the researchers report that Antarctica's ice will be "dramatically" more vulnerable to melting once CO₂ surpasses 600 parts per million in the atmosphere. Concentrations of the greenhouse gas reached 400 ppm last year, well above its 280 ppm preindustrial level.

"With present-day emission rates, it's expected that we'll reach 600 ppm before the end of this century," says Simone Galeotti, a paleoclimate scientist at the University of Urbino in Italy. The ice sheet stockpiles enough water to raise sea levels by about 60 meters and reshape Earth's coastlines.

Book Review:
The Last Wild Places of Kansas
by George Frazier
By Hank Guarisco, editor

I want to alert KAS members of a very interesting, informative, new book, printed this year by the University Press of Kansas, detailing the personal journey of the author into hidden native landscapes of Kansas in his quest for rare animals, ecosystems, folk lore, and for the “Kansas Wilderness.” His journey takes him to the Arikaree Breaks and Cimarron National Grasslands of western Kansas, the Red Hills, Flint Hills, Chautauqua Hills, Osage Questas, the Kansas Ozarks of southeastern Kansas, hidden springs in Kansas City, and the northernmost stand of pecan trees at Fort Leavenworth. Kayaking the Kaw River and the upper reaches of the Verdigris with several close friends and family members, George sees into the history of magical places and attempts to track down elusive legends, such as the legend of Black Bob, who belonged to a clan of the Shawnee Tribe.

He goes on a search for river otters in Kansas, first documenting their occurrence in the Baker Wetlands of Douglas County. He recounts the prairie dog wars of Logan County, which pitted several landowners who wanted to preserve this iconic, keystone species, against the county commissioners who believed in poisoning “varmints,” especially prairie dogs. There is a very interesting treatment of the legal battles which led to the criminalization of canoeing on most Kansas waterways, except those that are navigable for commerce, namely the Kansas, Missouri, and Arkansas Rivers. The author summarizes the situation: “I agree with the Kansas Supreme Court, Shoal Creek and other renegade streams of eastern Kansas are not highways of commerce, they are highways of history, highways of wildlife, highways of

adventure, highways of the imagination, highways to the last wild places of Kansas. They are also, like it or not, highways clearly marked “no trespassing.””

The author’s dynamic, flowing style, and good command of the English language makes this book a joy to read. Although it is not abundantly illustrated, the tasteful, black and white images do enhance the text by revealing the appearance of a variety of Kansas landscapes. This hardback first edition belongs on the bookshelves of biologists and outdoor enthusiasts of all kinds. It will go a long way to dispel the myth of Kansas as a flatland. This may be troubling to some of us who really do want travelers from the coasts to quickly traverse our state, and not decide to move here. However, it takes time and patience to find the hidden treasures of natural Kansas, and few outsiders will have either commodity.

Book Review:
Kansas Trail Guide by Jonathan
and Kristin Conard
By Hank Guarisco, editor

Here is another book, printed in 2015, by the University Press of Kansas, which highlights the beauty and diversity of the Kansas landscape. It is a softbound guide to biking and hiking trails in public areas across the state. In addition to detailed maps, the authors provide information on the panoramic views and a history of each area. It is liberally sprinkled with enticing color images of natural areas – views people will see when traveling along the trails. All parts of the state and the most significant areas with trails are included. However, one important area in the Kansas Ozarks, namely Schermerhorn Park near Galena, was not included. Despite this omission, I highly recommend this trail guide to anyone interested in further exploring natural Kansas. It is thoughtfully written, and provides an amazing amount of detail concerning the trails and nearby areas.



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The 149th KAS Annual Meeting will be held at Fort Hays
University on April 7 - 8, 2017.