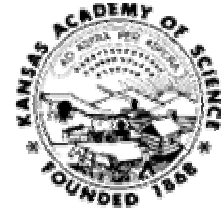


KAS BULLETIN



NEWSLETTER OF THE KANSAS ACADEMY OF SCIENCE

CHRIS BENNETTPRESIDENT	LARRY SKELTON TREASURER
ERIC TRUMPPRESIDENT-ELECT	ROY BECKEMEYER..... TRANSACTIONS EDITOR
JOHANNA FOSTER.....PAST PRESIDENT	MIKE EVERHART..... TRANSACTIONS EDITOR
SAM LEUNGWEBMASTER	HANK GUARISCO BULLETIN EDITOR
PIETER BERENDSENSECRETARY	JENNIFER HAIGHT BULLETIN ASSISTANT EDITOR

VOL. 32 NO 2

www.washburn.edu/kas/

AUGUST, 2007

WET KANSAS SUMMER YIELDS HIGH MUSHROOM DIVERSITY

written by **Hank Guarisco**, Editor
photography by **Bruce Horn** and **Richard Kay**



Auricularia auricula

Mushrooms are an ephemeral part of the Kansas biota which respond to a combination of rain and warm temperatures. During late June and early July, it rained for five consecutive days in the Lawrence vicinity, setting the stage for a bumper crop of mushrooms of many different species. On 1 July, I explored a mature oak hickory forest on private land in Jefferson County and discovered over one dozen species of mushrooms, including the large, stately parasol mushroom, *Lepiota procera*, which is common in Missouri but only rarely found in eastern Kansas. Another interesting find was a large number of “Tree Ears” (*Auricularia auricula*) on fallen logs. Some of them were 8 inches in diameter. This rubbery, jelly-like fungus is commonly found in Oriental dishes.

Several days later, I returned to this site with Sherry Kay, a competent mushroom aficionado. In 3.5 hours, we had collected 75 different species of mushrooms of all shapes and sizes, including a species new to Kansas. This is somewhat

surprising since the current checklist of Kansas mushrooms includes almost one thousand species! Amidst the wide variety of bright red cup fungi, bird’s nest fungi, jelly fungi, coral fungi, puffballs, earthstars, lobster mold, shelf fungi and jelly babies were the pure white, deadly *Amanita bisporigera*, the delicious yellow chanterelle (*Cantharellus cibarius*), and the rarely encountered “horn of plenty” (*Craterellus* sp.).

Mushrooms are actually the fruiting bodies of thread-like, fungal mycelia. These organisms are often intimately associated with the fine, terminal roots of a wide variety of trees and higher plants. This association, called a “mycorrhizal” association, benefits both the fungus and the plant. The fungus increases the ability of the plant roots to take up minerals from the soil, while the plant provides the fungus with nutrition in the form of sugars. These symbiotic associations are being actively investigated.



Chlorophyllum molybdites

Some mushrooms attract attention because they are large and are often found in lawns and on backyard trees. One common lawn mushroom, *Chlorophyllum molybdites*, is responsible for most of the cases of mushroom poisoning in Kansas. It is a large, meaty, white mushroom with white or

greenish gills often growing in rings in pastures and lawns. Once consumed, vomiting begins one or two hours after ingestion. This is followed by severe diarrhea. Luckily, this species is not deadly. However, consuming several species of *Amanita* or the brown autumn mushroom, *Galerina autumnalis*, can lead to death. Consuming alcohol in combination with inky cap mushrooms (*Coprinus* sp.) can also be an unpleasant experience – take my word for it. Inky caps grow in clusters on lawns and turn inky as they deteriorate with age. Several species contain coprine, the substance in “antibuse” which is given to alcoholics to prevent alcohol consumption. Alcohol should not be consumed for several days following a meal of inky cap mushrooms.



Coprinus sp.

Those interested in mushrooms may obtain more information by consulting: “A Guide to Kansas Mushrooms,” by Bruce Horn, Richard Kay, and Dean Abel 1993. University of Kansas Press, Lawrence, KS. and the privately published, “A Checklist of Kansas Mushrooms” by Richard Kay 1989.

***Arctic tundra life
Among the lichens and moss
Thrives the great mushroom***

A MUSHROOM HAIKU by Rustin Director

REPORT ON THE 2007 JOINT ANNUAL MEETING OF THE KANSAS COLLEGE CHEMISTRY TEACHERS CONFERENCE AND THE KANSAS ACADEMY OF SCIENCE

written by **Hank Guarisco**, Editor

The annual meeting of the Kansas College Chemistry Teachers Conference (KCCTC) was held in Salina from Thursday evening, April 12 through Saturday morning, April 14. The Kansas Academy of Science (KAS) 139th annual meeting was to be held jointly with the KCCTC, but was cancelled several hours before scheduled events began due to the threat of inclement weather. Inclement weather? Hard to imagine that in Kansas! However, a few intrepid KAS members who were not aware of its cancellation arrived for the meeting. Since the meeting was officially cancelled, the gathering of the six KAS members will be referred to subsequently in this article as the “2007 KAS Un-meeting.”

On Friday afternoon, three KAS Un-meeting participants were given a wonderful tour of the Land Institute by managing director, Ken Warren. Since it was raining at the time, Ken led us through the greenhouses and explained the Land Institute’s major project, the development of perennial grains. He showed us bench after bench of perennial wheat grass and annual wheat hybrids, and explained the intricate processes involved in developing good hybrid characteristics, such as high yield and relatively short stalk length. The overall focus is to create a system of sustainable agriculture which mimics the natural ecodynamics of the prairie. Therefore, the plan involves interplanting hybrid strains of four different perennial crops: intermediate wheat grass (*Thinopyrum intermedium*), sorghum (*Sorghum halepense*), sunflower (*Helianthus maximiliani*, *H. rigidus*, and *H. tuberosus*), and Illinois bundleflower (*Desmanthus illinoensis*), a native prairie legume that fixes atmospheric nitrogen and produces abundant protein-rich seeds. These plants have very different lengths and other root characteristics which act synergistically. The side-by-side demonstration of an intermediate wheat grass plant next to annual wheat was most impressive. The massive root system of the perennial plant was over six feet long! This root system is able to bring water up from deep below the soil surface. A field of these plants will help

prevent soil erosion as well as the establishment of weedy vegetation just by its presence.

Later that evening, four KAS Un-meeting participants joined with the KCCTC chemists in an enjoyable banquet dinner at the Salina Holiday Inn. The guest speaker was none other than Wes Jackson, the visionary founder and director of the Land Institute. He presented us with the current wisdom of the scientific community on global warming and challenged us to become involved, because this issue is of vital importance to humanities' projected quality of life on earth in the very near future.

The next morning, two more KAS members arrived and presented the only poster at the Un-meeting. The Abers showed us a map of Kansas with a new look at the physiographic provinces and ecoregions. They have been taking photos of representative ecoregions in the state from the air by attaching cameras to kites! Following the poster session, which coincided with the consumption of coffee and donuts, we adjourned to the next room to hear the KCCTC morning presentations.

Barbara Johnson, of the K-State Pollution Prevention Institute, began the session by informing us of the assistance her organization extends to Kansas college science labs in identifying and disposing of unused hazardous chemicals, such as mercury. In the interest of safety as well as compliance with environmental regulations and recommendations, detailed inventories of the chemicals in science labs should be undertaken. Persistent, bioaccumulative and toxic materials should be identified and reduced or eliminated when possible.

Gary Histan, of Bethel College, related how he developed a hands-on unit measuring green house gases using a spectrophotometer and a simple apparatus to collect various gases. The resulting spectra compared quite well with the published spectra of several green house gases.

An interesting demonstration of a "green" organic chemistry lab experiment involving the extraction of limene from orange peels using liquid CO₂ was presented by Peter Hamlet of Pittsburg State University. Dry ice (solid carbon dioxide) usually sublimates to a gaseous phase without going through a liquid phase at room temperature and pressure. However, liquid CO₂ is produced when

dry ice is placed under pressure in a warm water bath. Orange peel fragments were placed in a plastic test tube, then crushed dry ice was placed on top of the peels and the vial was capped. After being placed in warm water, CO₂ gas began escaping around the cap, liquid CO₂ was formed and flowed down through the orange peels. At the end of the process, the remaining dry ice was discarded and a limene residue was formed in the bottom of the test tube. No toxic chemicals were involved in this experiment. This process will also extract caffeine from coffee grounds.

A very interesting laboratory experiment was developed by Eddie Olmstead of Fort Hays State University who braved the weather to come to the meeting from Hays. He and his class decided to determine the amount of iron in fertilizer. After testing a few samples to obtain the sample variation, they determined the sample size needed to obtain a value of iron concentration within prescribed confidence intervals by using a text book formula. They discovered that the average value, based upon the recommended number of samples, actually fell within the confidence limits only 45% of the time. Therefore, the number of samples needed was much larger than the recommended number. After further experimentation, Mr. Olmstead discovered that part of the error was due to the skewed distribution of the t-statistic at small sample sizes. In this case, the modal value was much different from the statistical mean value. As sample size increased, the difference between these values decreased. However, most of the error involved the lack of uniform distribution of iron granules within the fertilizer. By finely grinding the substance, the samples became more uniform. This very practical exercise demonstrated the potential pitfalls of methodology and some interesting parameters of statistical applications in chemical measurements.

Following the paper session, we shared a catered lunch before the gathering was adjourned. Despite the expected bad weather and the cancellation of the 139th annual KAS meeting, KAS members who did attend enjoyed good company, good food, stimulating presentations and a very interesting field trip.

Kansas Academy of Science Awards

3 More Student Grants

written by **Hank Guarisco**, Editor

This year, the Kansas Academy of Science board members were pleased to award three student grants to fund a variety of interesting studies. These included: the effects of fire on soil respiration in tallgrass prairie, the effects of hydrogeomorphic fluctuations in the Kansas River on ecological parameters in benthic macroinvertebrates, and the effects of inhibited cellular division upon the differentiation of procambium tissue within a seedling's coleoptile.

Cassandra Brickell, a junior at Emporia State University, received a \$500 award to investigate the effects of fire on soil respiration in tallgrass prairie by comparing soil respiration among burned and unburned plots over time. Soil moisture, soil temperature and available nitrogen will be measured as well as general soil characteristics, such as carbon, nitrogen, soil texture and soil acidity. She predicts that soil temperatures of the burned plots will increase because the darker surface will reflect less radiation and limited plant cover will reduce shading. The elevated temperatures should temporarily increase soil respiration. This study may help elucidate some of the effects of the common management practice of burning prairies in the spring.

Brian O'Neill, a PhD student at the University of Kansas, received a \$1,000 grant to investigate the effects of hydrogeomorphic changes in the Kansas River and how these changes affect the benthic macroinvertebrate community. Several aspects of the ecology of large prairie rivers will be investigated. The importance of slackwater habitats around sandbars will be assessed as potential "oases" for invertebrate and fish production. A more biologically meaningful river channel complexity index will be developed to improve the assessment of intermittent discharges upon the communities in these critical areas.

Anthony Westby, a junior at Emporia State University, was awarded a \$500 grant to compare the growth and tissue differentiation of treated and untreated oat and wheat seedlings. The treatments consist of exposure to cholchicine or irradiation to prevent cellular mitosis. This study should ascertain if cellular division is the driving force of the differential growth of the overall seedling structure (cellular theory), or whether other factors

drive morphological differentiation (organismal theory). The results could increase our understanding of the links between developmental morphology and gene expression in plants.

KAS Student Research Grant Program

The Kansas Academy of Science (KAS) Student Research Grant Program has been established to foster the scientific research endeavors of student members of the KAS or students whose major advisor is a member of the KAS. Research funds may be used to support investigation in any scientific field and in any locality.

A maximum of three research grants (up to \$1000 each) for graduate students and a maximum of three research grants (up to \$500 each) for undergraduate students will be given each year. Grant recipients are required to present research results at the KAS Annual Meeting in the following spring (registration and meal fees will be waived).

Application/Proposal Deadline: June 1
(Grants will be awarded by August 1)

Information concerning the student grant program, eligibility, deadlines etc may be found at the Kansas Academy website: www.washburn.edu/kas/.

KJAS Update

written by **Amy Strong**, KJAS Director
amy.strong@wichita.edu
<http://webs.wichita.edu/kjas/>

The 2007 Kansas Junior Academy of Science (KJAS) Annual Meeting was a success with 79 oral presentations by students from 14 schools. The event took place on May 3 in the Rhatigan Student Center at Wichita State University. Next year we have plans to include a poster session which will give judges a chance to review research done by students that are not in their oral sessions. Last year we modified the judging form to help clarify the judging process but will continue to work on this form so that it puts a stronger emphasis on the actual stages of the scientific process. The Junior Academy feels this is where students really need to focus at this stage of their scientific work. We will also be updating the KJAS handbook and web site in the near future.

KJAS would like to express its thanks to the Kansas Academy of Science (KAS) for providing a \$500 travel stipend for one of our overall winners to attend the American Junior Academy of Science (AmJAS) meeting each year. This event is held in conjunction with the American Association for the Advancement of Science (AAAS) meeting which gives students a chance to network with scientists from the international community during the Breakfast with the Scientists, the poster session and finally during their oral presentation.

In February, 2007 Steven Crooke (*Natural Refrigeration; A Zeer Pot Experiment*) and Arjun Kumar (*Picture Perfect*) both KJAS Overall Winners and from the Shawnee Mission School District traveled with me to San Francisco to the AmJAS meeting. We had the honor of visiting the Berkeley National Laboratories and listened to presentations by Steve Chu and George Smoot (both Nobel Prize winners). We also toured the city, stopped at the Exploratorium and had a great dinner in Chinatown. In February, 2006 Linda Kuenzi from the Shawnee Mission school district presented her work *Brace for the Quake* and Julia Jezmir from the Blue Valley school district presented *Geologic Barriers to Reduce MTBE Contamination of Water Supplies*. The 2006 AmJAS meeting was held in St. Louis so a tour of the Arch and a riverboat ride on the Mississippi were part of the experience. Linda's work has now been published in the *Transactions of the Kansas Academy of Science*. Calen Henderson a 2005 winner and from Blue Valley was also able to publish his research; *Potential of Color Analysis of Astrographs to Group Asteroids*. We will continue to work with students and the KAS to publish the best works of the Junior Academy as this is a wonderful opportunity for our students. Certain students are also able to have their work published in the Ecological Congress International Journal at the invitation of Donna Bogner, past KJAS Director and long time judge.

BURMESE PYTHON THRIVES IN FLORIDA

summary of, "A Movable Beast: Asian Pythons Thrive in the Florida Everglades," by **Andrew C. Revkin**,
The New York Times, Tuesday, July 24, 2007

For many years, a variety of exotic animals have occasionally been found in Everglades National

Park and surrounding areas. These occurrences are usually the result of the accidental or intentional release of captive individuals. Most survive for a period of time, but only some species establish breeding populations in their new environment. The Burmese python, a large snake native to India and southeastern Asia, readily grows to over 20 feet in length and can weigh over 200 pounds. Since 2002, more than 350 individuals have been found in Everglades National Park. One female python, whose movements were tracked after being fitted with a radio transmitter, led park officials to a clutch of 46 eggs in May 2006. Shortly after, they discovered another clutch of two dozen recently hatched python eggs. The python seems to be rapidly expanding its range in southern Florida, and appears to have life history traits, which make it a good colonizer. The clutch sizes indicate a large reproductive output, and examination of the stomach contents of road-killed and captured pythons revealed a wide variety of birds and mammals in its diet. These include: rodents, rabbits, squirrels, opossums, raccoons, bobcats, deer, alligators, egrets, coots and limpkins.

It is an uphill battle to control and regulate the introduction and spread of exotic species. In addition to increased funding, park officials have requested tighter restrictions on the pet trade in Florida. Presently, there are an estimated 5,000 Burmese pythons kept in captivity within the state. Recently, forest service workers in Big Cypress National Preserve discovered an eight-foot-long yellow-bellied snake which was identified as a yellow anaconda, a native of South America. Whether this species will be a successful colonist in southern Florida is still an open question.

Editor's Note: For the past 20 or 30 years, this species has been successfully bred in captivity. The international trade in the Burmese python, along with other large pythons and crocodylians, is regulated since these species are being rapidly eliminated in their native habitat because of the commercial use of their skins. These facts have lead to the following incongruous situation. Efforts have been made to help secure the continued existence of this large snake in its native lands, but as an alien introduction with unforeseen detrimental effects upon native wildlife, newly established populations in southern Florida are being actively destroyed. We can wish for more

responsible behavior from pet owners and dealers or look forward to new stringent laws intended to prevent the negative effects of irresponsible actions. Luckily, the Burmese python is not venomous. I wonder if the Everglades could become the new "Promised Land" of water cobras?

Design by Gecko, Plus Glue by Mussel, Yields a Powerful Adhesive

written by **Kenneth Chang**

The New York Times, Tuesday, July 24, 2007

Cross a gecko with a mussel and what comes out is a new type of adhesive tape that can repeatedly stick and restick, even underwater. Geckos and mussels both have astounding abilities to stick. The feet of many gecko species are padded with millions of tiny hairs that enable them to ascend smooth vertical walls. Mussels glue themselves to wet rocks, unmoved by crashing surf.

Researchers at Northwestern University led by Phillip B. Messersmith, a professor of biomedical engineering, have made a small piece of adhesive, about two square millimeters, that mimics the structure of the gecko foot and then coated it with a polymer inspired by mussel glue.

While other researchers have made gecko-inspired adhesives, this is the first that adheres well when wet, which could make it useful for bandages and underwater robots. "Under wet conditions, our adhesive is equally as adhesive as a gecko foot is under dry conditions," Dr. Messersmith said.

The researchers describe their invention, which they have named "geckel," in the current issue of the journal *Nature*. "I think it's very original," said Ralph Spolenak, a professor of nanometallurgy at the Swiss Federal Institute of Technology who was not involved in the research. "It combines two completely different concepts and creates something new out of it."

Gecko feet employ a weak attraction known as the van der Waals force to hold on. Multiplied across millions of hairs, that is enough to hold up the gecko. Even more remarkable, when the gecko lifts its foot in a certain direction, the hairs effortlessly detach. And the gecko foot is self-cleaning. It does not pick up dirt and dust as the gecko walks along.

Mussels, meanwhile, excrete a protein that can displace water molecules and very strongly bind several oxygen atoms in the protein to an atom in a metal or mineral. Mimicking the gecko foot hairs, the adhesive consists of tiny silicone pillars that were coated with the mussel-inspired polymer. Because the researchers wanted the adhesive to be reusable, they lowered the number of metal-oxygen bonds.

Coming Soon to An IMAX Theater Near You

written by **Patty Nicholas**

Special Collections/University Archives
Forsyth Library, Fort Hays State University

The University Archives, located in Forsyth Library, has worked with representatives from National Geographic over the past 1½ years to provide them with images of the Sternberg family and their palaeontological digs in Western Kansas. The images were used to hire actors to portray the Sternbergs, to recreate the methods used by the Sternbergs when they worked out in the field, and to set up scenes as they would have looked during the time of the digs during the early to mid 1900's. The results can be seen in a new film that will be debuting in IMAX theaters around the world on October 5, 2007, and in a new book written by Michael Everhart, an adjunct professor of paleontology at FHSU's Sternberg Museum of Natural History.

Sea Monsters: A Prehistoric Adventure is a film that has a series of stories about palaeontological digs from around the globe, past and present, in which scientists work as prehistoric detectives to uncover the mysteries of the ancient ocean world. A curious and adventurous dolichorhynchops will take the audience on a 2-D and 3-D adventure where all will encounter long-necked pleiosaurs, giant turtles, enormous fish, ferocious crocs, fierce sharks, and the most dangerous of all sea monsters, the mosasaurs.

The film is narrated by Tony Award-winning actor Liev Schreiber (most recently seen on *CSI: Crime Scene Investigation* as Michael Keppler, the team leader who replaced Gil Grissom while he was on teaching sabbatical).

The book written by Michael Everhart, also titled *Sea Monsters: Prehistoric Creatures of the Deep*, will be available for purchase on October 2, 2007. In the book, Mike writes about the historical

discoveries of these creatures in Kansas, starting in 1867 when *Elasmosaurus* was found near Fort Wallace in western Kansas. Mike served as technical advisor to the project and was present when the “real life” and “historical scenes” were filmed in Kansas in 2006. Nearly all of the scenes were filmed in Kansas, even the ones from “Australia, The Netherlands and Israel”. In addition, Mike’s web site [Oceans of Kansas](#) and book of the same name provided the background for the central “plot” of the movie and some of the historical information in the new book.

There are several IMAX Theaters in the region which will be showing the film. The Kansas Cosmosphere & Space Center IMAX in Hutchinson, the Union Station Kansas City Vic & Helen Regnier Extreme Screen Theater in Kansas City, Missouri, and the Cinemax IMAX in Colorado Springs will show the film beginning October 5; and the Hastings (Nebraska) Museum Lied Super Screen Theatre will begin showing the film on March 3, 2008.

Visit

www.nationalgeographic.com/giantscreenfilms/se-a-monsters-a-prehistoric-adventure.html

to view a trailer and a short feature.



Amanita bisporigera – Deadly!



Cantharellus cibarius – Delicious!



KANSAS ACADEMY OF SCIENCE
ATTN: Pieter Berendsen
Kansas Geological Survey,
University of Kansas,
Lawrence, KS 66047

The 140th Annual Meeting of the Kansas Academy of Science will be held at Emporia State University on **March 28 and 29, 2008.**

Updates can be found on the KAS website. The next issue of The Bulletin will have more complete information about the annual meeting.

KAS Guest Speaker

The keynote speaker for the 2008 KAS meeting will be **Dr. Stan Bull**, a senior scientist at the National Renewal Energy Laboratory in Golden, Colorado, and a leading expert in solar energy research.
