

KAS BULLETIN



NEWSLETTER OF THE KANSAS ACADEMY OF SCIENCE

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Kansas Academy of Science 145th Annual Meeting at Johnson County Community College a Great Success

On 5-6 April, 2013, the Kansas Academy of Science held its 145th annual meeting at the beautiful Regnier Center on the Johnson County Community College campus in Overland Park. The activities began Friday afternoon with two field trips: one which explored the geological features of the Kansas City Metro Area, and the second which examined the sustainability program on the college campus. Members of the JCCC Sustainability Program staff took us on a walking tour of several projects, starting with the storm water management plan. Besides grading the land around the parking lot so water would flow toward a biological catchment basin near a creek, permeable sidewalks and swales consisting of native plants were installed. All these measures effectively prevent erosion of adjacent natural environments.

We were then guided to the solar classroom/laboratory where students had just built a fully operational picnic shelter with a solar panel roof. The sunny day provided enough energy to play a radio, charge a cell phone and run a laptop computer. Then it was over to the in-vessel compost shed where all the food waste generated on campus was turned into useful compost for the nearby campus farm. The last stop was the Galileo Pavilion, a sustainable classroom building with a living interior wall. Foam and wire provided the necessary structure to support the dirt and plants (mainly ferns) that covered the wall with a living “hanging garden.” Rain water was collected in a cistern and pumped into the building to provide water for both the living wall and the lavatories. The outside of the building was sided with recycled slate blackboards from area schools.

All these features combine to create a very comfortable, joyous environment.

After the afternoon field trips, we all converged upon the banquet room to converse with colleagues and friends, and to share a wonderful buffet which included noodles with an alfredo sauce, a green salad, a fabulous fruit salad containing raspberries and blackberries, and a roast chicken dish. The keynote speaker, Dr. Tim Crews of the Land Institute, gave a dynamic presentation on the development of perennial crops, including wheat, corn, sorghum and rice. Ongoing breeding experiments at the Land Institute are seeking to produce perennial crops with the more traditional traits of annual plants, such as larger seed heads which don’t shatter. The large root systems of perennials retard soil erosion and the leaching of nitrogen compounds. The results are considerable savings in terms of production costs as well as environmental costs.

Saturday began with coffee and danish pastries in the lobby while students assembled their poster presentations. We then proceeded to four simultaneous oral presentation sessions which encompassed paleontology, ecology/organismal biology, chemistry/ biochemistry, anthropology/ archeology, and computer science.

Dustin Wilgers of McPherson College gave two insightful presentations on environmental factors and hormone levels affecting the behavior of a common wolf spider, *Rabidosa punctulata*. It appears that cold temperatures stimulate burrowing behavior but change in light intensity does not.

Different levels of the neuroendocrine hormone, octopamine, which is the invertebrate equivalent of adrenaline in vertebrates, affect mating behavior. Higher levels of this hormone in males were positively associated with the more aggressive “direct mount” courtship tactic.

Zack Falin, the collections manager of arthropods at the University of Kansas Biodiversity Institute (formerly the Snow Entomological Museum), gave us an update on his efforts to digitally catalogue the large collection of Kansas insects. He has made extensive collections around the state. About 25% of the collection has already been digitized.

After a coffee break, we heard about the willingness of CRP landowners to grant access to their private property to researchers. J.L. McCallum of the University of Central Missouri found that 80% of the landowners she contacted gave her access to study birds on their land. This is a much higher percentage than that reported from the few literature studies that are available.

Dr Taulman of Park University gave an interesting presentation on the use of remote cameras in wildlife research. His unique images of wildlife, including squirrels, deer, groundhogs, turkeys, and other small mammals produced some interesting information as well as interesting wildlife portraits. Many animals drank from a pond by travelling along a log instead of walking on the muddy ground. Several turkey and deer peacefully shared the same shaded space under trees during the hot days of summer.

The poster presentations were as interesting and varied as the oral sessions. Joe Arruda of Pittsburg State University presented a preliminary checklist of aquatic snails in Kansas. Blecha and Epp of Ottawa University explored the influence of light

levels on foraging behavior of dragonfly nymphs. Prey capture was more successful under brighter conditions. C. Yang of Emporia State University discovered that a natural compound found in oleanders (oleanolic acid) produced cell death in human malignant melanoma cells. This is just a sample of the breadth of topics that were presented.



The JCCC’s Galileo Pavilion

The Saturday luncheon was enlivened by the keynote speaker’s presentation on phosphorus levels in annual vs. perennial crop systems. Phosphorus is a limited resource in agricultural ecosystems. Most of the phosphorus (75%) in the world occurs in Morocco and northwest Africa. Within 25 years, the US may have a shortage of mined phosphorus. Annual crop lands have a significant percentage of phosphorus which becomes bound in the soil and is unavailable to plants. Perennial crop systems, however, appear to have more organic phosphorus which is available to plants.

This annual meeting was thoroughly enjoyable due to the efforts of Mark LaBarge and Lori Slavin of Johnson County Community College.

Graduate Research Grant Applications are due February 1, 2014!

For more information, please see the KAS webpage:
<http://www.KansasAcademyScience.org/research-grants.html>.

KAS Fall Field Trip Cheyenne Bottoms and the Kansas Wetlands Education Center

Saturday, October 5th 1:00pm
Meet at the Education Center
592 NE K-156 Highway, Great Bend, KS
<http://wetlandcenter.fhsu.edu>



New Magazine on Mushrooms

Hank Guarisco, KAS Bulletin Editor

Fungi is a wonderful magazine with in-depth articles and fabulous articles on mushrooms and those who pursue them throughout the world. Publisher and editor in chief, Britt Bunyard, recently visited members of the Kaw Valley Mycological Society in Lawrence, where he presented a memorable presentation on the genus *Amanita*, which includes some of the deadliest mushrooms in the world. Two field trips, one in the vicinity of Atchison, and the second to the Chautauqua Hills in southeastern Kansas revealed many mushrooms, including new state records. The fungi is a very diverse group, with over 1,000 species known from Kansas.



Boletellus russellii
Photo by Britt Bunyard

Returning to the magazine, Volume 6 No.1 features morel mushrooms, the “gold standard” of mushroom aficionados across the country. Besides a detailed review of the current taxonomy of the family to which morels belong, interesting recipes are provided, such as: “morels with foie gras,” “black morels with back fin crabmeat,” and “morel popsicles with calf sweetbreads.” On the west coast, mushrooming has become a more mainstream activity, resulting in some conflicts in the field. The increase in commercial collecting has resulted in more rigorous oversight by forest service officials. Finally, there is an article on mushroom photography.



Amanita whetstonae
A southern species newly discovered in Kansas
Photo by Britt Bunyard

After perusing other issues of this fine magazine, I realized how much I don't know about mushrooms. Touted as “the most comprehensive guide to chaga ever published,” Volume 6 No.3 describes this large, black, tumor-like growth on birch trees and its purported medicinal benefits, which include anticancer properties. This rare species has been known as a traditional medicine for centuries in Russia. Another highly prized medicinal mushroom, called “yartsa gunbu,” is found in Tibet. This species (*Ophiocordyceps sinensis*) attacks caterpillars underground, then sends up a spike-like mushroom above the surface. Studies have shown cordycepin derived from the mushrooms prevent cancer cells from multiplying as well as hastening their death.

I urge anyone interested in fungi to visit the web site: www.FungiMag.com.

Symposium on Ecohydrology and Climate Change at Kansas Natural Areas and Research Stations

The symposium planned for the 146th Annual KAS Meeting will concentrate on research and education activities conducted at natural areas and research stations in Kansas that focus on ecological-hydrological interactions and climate change. These topics are of importance for understanding current and projected ecological changes related to variations in temperature, precipitation, evapotranspiration, atmospheric carbon dioxide, soil moisture, streamflow and other hydrologic factors associated with climate change. Presentations will include overviews of the research and education programs conducted at Kansas sites that encompass these topics, along with reports on specific studies. Future cooperative research at the different sites will then be discussed.

Beware: Lichens Can Be Lethal

- Taken from *Fungi* Vol 5 No 3 Editor's Picks

I've seen recent chatter on Facebook regarding collecting and consuming lichens, and photos of package of lichens that were commercially-collected and sold. My guess is that many people consume these interesting organisms without much thought of what they are, or their chemical makeup. Lichens are symbiotic associations between fungi and photosynthetic algae or cyanobacteria.



Nostoc, a ubiquitous filamentous cyanobacterium, is a partner in what are known as cyanolichens. When *Nostoc* gets together with other freshwater bloom-forming cyanobacteria, the association can lead to the production of cyclic peptide toxins such as microcystins and nodularins. These compounds act as hepatotoxins in animals and are likely carcinogenic in mammals as well. A new study published in the *Proceedings of the National Academy of Science USA* (109[15]:5886-5891) shows that lichens commonly produce these same toxins. In the study, 803 lichen specimens from five different continents were screened for cyanobacterial toxins using two methods. Collected lichen thalli were analyzed directly for toxin content. The researchers also took a genetic approach; DNA was extracted from all samples and the scientists searched through genomes, watching out for genes known to code for microcystin toxin production. The team found these dangerous toxins in 12% of all analyzed lichen specimens. Moreover, they were surprised to find an amazing diversity of many different kinds of microcystin toxins.



These data demonstrate that the production of cyanobacterial hepatotoxins in lichen symbiosis is a global phenomenon and occurs in many different lichen lineages. The very high chemical diversity of microcystins discovered in this study suggests that lichen symbioses may have been an important "environment" for diversification of the cyanobacteria. It's likely that being trapped in a relationship with a fungus tends to lead to local population bottlenecks, which may have been instrumental in the evolutions of such a surprising diversity of toxins.

DNA Double Take

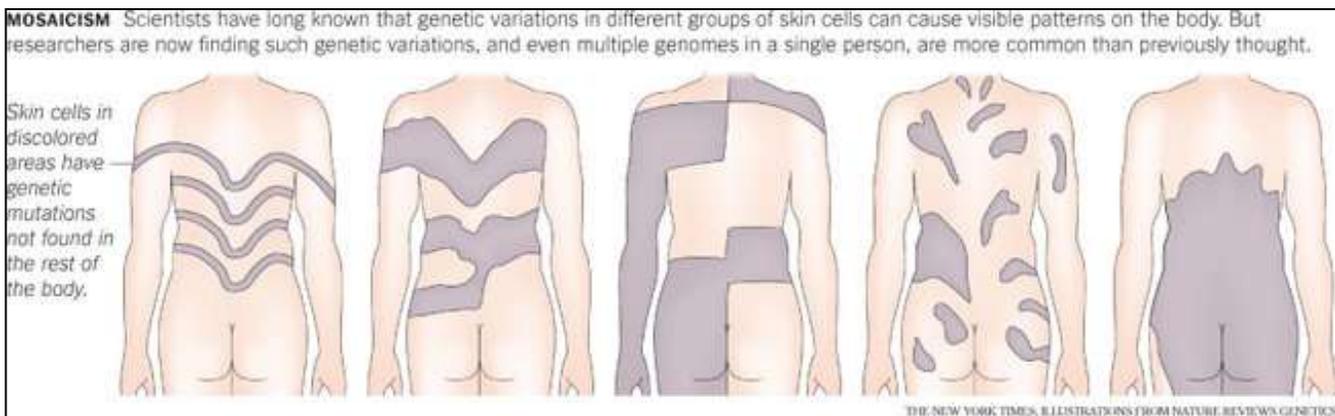
Excerpts from article from the New York Times
by Carl Zimmer
Tuesday, September 17, 2013

From biology class to “C.S.I.,” we are told again and again that our genome is at the heart of our identity. Read the sequences in the chromosomes of a single cell, and learn everything about a person’s genetic information — or, as 23andme, a prominent genetic testing company, says on its Web site, “The more you know about your DNA, the more you know about yourself.”

one cell can tell them about the DNA throughout a person’s body.

Chimerism, as such conditions came to be known, seemed for many years to be a rarity. But “it can be commoner than we realized,” said Dr. Linda Randolph, a pediatrician at Children’s Hospital in Los Angeles who is an author of a review of chimerism published in *The American Journal of Medical Genetics* in July.

Twins can end up with a mixed supply of blood when they get nutrients in the womb through the same set of blood vessels. In other



But scientists are discovering that — to a surprising degree — we contain genetic multitudes. Not long ago, researchers had thought it was rare for the cells in a single healthy person to differ genetically in a significant way. But scientists are finding that it’s quite common for an individual to have multiple genomes. Some people, for example, have groups of cells with mutations that are not found in the rest of the body. Some have genomes that came from other people.

Scientists are finding links from multiple genomes to certain rare diseases, and now they’re beginning to investigate genetic variations to shed light on more common disorders.

Science’s changing view is also raising questions about how forensic scientists should use DNA evidence to identify people. It’s also posing challenges for genetic counselors, who can’t assume that the genetic information from

cases, two fertilized eggs may fuse together. These so-called embryonic chimeras may go through life blissfully unaware of their origins.

One woman discovered she was a chimera as late as age 52. In need of a kidney transplant, she was tested so that she might find a match. The results indicated that she was not the mother of two of her three biological children. It turned out that she had originated from two genomes. One genome gave rise to her blood and some of her eggs; other eggs carried a separate genome.

Women can also gain genomes from their children. After a baby is born, it may leave some fetal cells behind in its mother’s body, where they can travel to different organs and be absorbed into those tissues. “It’s pretty likely that any woman who has been pregnant is a chimera,” Dr. Randolph said.



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The 146th KAS Annual Meeting will be held at Emporia State
University on April 4 - 5, 2014.
