KAS BULLETIN

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141st Annual Meeting of the Kansas Academy of Science at Washburn University

Despite inclement weather (most of the state was covered with significant amounts of snow), the 141st Annual Meeting of the Kansas Academy of Science was held on Friday and Saturday, March 27 and 28, 2009 at Washburn University in Topeka. Although many participants were unable to attend, the diversity and quality of the oral and poster presentations, the geology field trip, and the banquet dinner and luncheon contributed to our enjoyment of this thoroughly delightful meeting.

After a brief explanation of the local geology, we drove out to a small park near Echo Cliff on Friday afternoon. This cliff is a cut-away section of a river deposit left during the late Pennsylvanian. We saw several good examples of "cross-bedding," in which the deposited silt and sand layers meet at odd angles to one another. This indicates the ancient river's meandering path and subsequent filling. On the way to Echo Cliff, we stopped to examine fine examples of Sioux quartzite, which is a pink rock (a "glacial erratic") that was transported into northeastern Kansas by the Independence Glacier about 600,000 to 700,000 years ago. The nearest source for this type of bedrock is Sioux Falls, South Dakota. The proposed tour of the National Weather Service was cancelled because of the imminent snow storm.

We enjoyed a delicious banquet dinner of grilled chicken, potatoes and vegetables, topped off by a wonderful dessert, while listening to a very informative lecture by the keynote speaker, Dr. Johannes Feddema of the University of Kansas, on climate change and projected effects on Kansas. It was a relief to hear an in-depth presentation on this timely topic, instead of often conflicting media sound bites. The speaker traced the various components contributing to global warming and the increasing accuracy of models and their projections into the future. Human beings have created high levels of CO_2 and these increased levels are primarily responsible for projected increases in global temperature. He dispelled much of the media "controversy" on this topic. In Kansas, the increasing temperatures will have a drying effect, i.e. more water will be needed for crop production, and rainfall events will become more irregular and severe.

Meeting Participants Enjoy Banquet Dinner

On Saturday morning, we enjoyed breakfast snacks and drinks, then examined the posters and attended oral presentations. The latter included the paleontology symposium, molecular and cell biology, organismal biology and ecology, chemistry, and science education. Richard Schrock of Emporia State University reminded us of the problems with online media in science teaching and publication and presented ten reasons why simulations do not replace genuine lab and fieldwork. Neil McKay of Highland Park High School developed a successful program involving the extraction of fossils from limestone using harmless materials, such as vinegar, for at-risk, special students. Some became so engrossed in the process of using the dissecting microscope and working on fossils that they may pursue this as a career in the future. Randy Miller and his students from Baker University presented several interesting posters on "water bears," officially classified as the phylum Tardigrada. Y. Zhao gave a thorough explanation of the dose-dependent inhibition of

melanoma cell proliferation by *Ginko biloba* leaf extract and by its isoflavonoid constituents, Kaempferol and Quercetin.

After the lectures and poster presentations, we adjourned to the dining hall for a buffet lunch of cold-cut sandwiches as well as hummus, dried tomatoes and other vegetables. The guest speaker, Dr. Feddema, told us how we can link urban planning and climate change. Models are being developed to determine how various architectural treatments may ameliorate local climate change effects. Awards for the best student oral and poster presentations were presented. We then ventured into the ice-covered parking lot to scrape our windshields and begin our journeys home.

Memories of Henry S. Fitch, a Great Naturalist

Henry S. Fitch with Daughter Alice - Spring of 1999

Earlier this month a great man past away at 99 years of age. He was my mentor and friend during the past 39 years. Henry S. Fitch was one of the truly amazing old-time naturalists who freely shared his extensive experience and knowledge of so many diverse aspects of the natural world with friends, students and colleagues. His quiet, almost shy demeanor while teaching a course entitled, "Animal Natural History," at the University of Kansas in 1970 created a special atmosphere where I and other students felt he was telling us secrets of the lives of the animals which lived on the Fitch Natural History Reservation (FNHR). He was hired as the first superintendent and resident naturalist of the newly created reservation in 1948. Field trips to the FNHR were always memorable. As we made our way along paths up a wooded hillside near the pond, Dr. Fitch stopped lecturing for a moment to pin down and capture a slowly moving copperhead he spied near his feet. It was a magical moment which captured our attention.

He lived on the FNHR with his wife, Virginia, and three children, John, Alice and Chester for many years. Long enough to complete the longest running natural history study of snakes ever undertaken – 50 consecutive years of trapping, marking and recapturing snakes on the FNHR. Although working with very limited funds, he managed to make extensive inquiries into the lives of many animals on the reservation, and his herpetological publications are legendary. A study of the ecology of the copperhead which was published in 1960 even caught the attention of local journalists who began a myth which has persisted in the community until the present day. His high population estimate of copperheads in the area led some journalists to believe that he was artificially breeding snakes and releasing them, and so they dubbed the reservation the "Snake Farm."

Although he is best known for his extensive studies of reptiles, Henry Fitch has done radiotelemetry of small mammals and a detailed study of the 192 species of spiders which were known from the FNHR in 1963. Through the years, I have approached him with many research ideas on spiders and always found him interested, supportive and full of wise suggestions. Neighbors would sometimes bring him snakes they found in their chicken coups. He would dutifully weigh, measure, mark and release them. Several years ago, a black rat snake had eaten a ceramic egg and the landowner was concerned about the health of the snake. Henry Fitch simply squeezed the egg up from the snake's stomach, in the same way he has done to determine the diet of local snakes. Any recent food item would be examined in this manner, and then squeezed back down into the stomach so the snake would not lose a meal.

Those of us who had the opportunity to spend some time with Henry Fitch shared much more than a fascination of nature. He was kind, humble, accepted all types of people and didn't "play politics." He was an avid basketball fan, and in earlier days, would invite graduate students to the reservation to play heated games of ping pong and basketball in the front yard. He was also a long distance runner since his college days in the 1930s. I remember visiting the FNHR when he and his daughter were getting ready to go for a run, so I joined them. We ran along trails through woods, up and down hills, with Henry leading the way. We ran continuously for one hour. At the time, he was 87 years old.

Henry Fitch lives on in the minds and hearts of family, friends and former students who have carried on his tradition of natural history study. His cremated remains will be scattered on the reservation where he has spent so many wonderful days. There may be a memorial service at some future time where we can come together to commemorate this great man.

by Hank Guarisco, KAS Newsletter Editor

Discovery Challenges Ideas on Plant Amber

by Henry Fountain, The New York Times, October 6, 2009

Scientists who study amber, fossilized resin that oozed from injured plants millions of years ago, divide the common type into a couple of categories, based on chemical makeup. Some consists of resin from gymnosperms, or conifers – the most famous being Baltic amber. Other amber, including that from the Dominican Republic, is made of resin from angiosperms, or flowering plants.

But amber found in a coal seam in southern Illinois appears to confound categories. It has a chemical makeup similar to amber from angiosperms, but it dates from about 200 million year before the flowering plants evolved.

The amber, in droplets barely a quarter of an inch in diameter, was analyzed by Ken B Anderson of Southern Illinois University and P. Sargent Gray, now at Macquarie University in Australia, and described in Science. Samples were heated until they decomposed, then were separated and analyzed.

At 320 million years old, the Illinois amber is far older than other amber, which did not become common until about 250 million years ago (Baltic and Dominican amber are much younger than that).

Dr. Anderson said they assumed the amber had to be associated with early gymnosperms, because angiosperms did not exist then. "But it turned out to be very much like the amber we find in modern angiosperms," he said, "and that was a huge surprise."
The findings demonstrate that plants evolved complex resins for use as protection against injury much earlier than thought, Dr Anderson added. "And now that we know it's there, we want to nail down when it evolved," he said. "Ultimately, we want to know what kind of plants were producing it."

Near-Complete Fossil Offers Insight on Early Fish

by Henry Fountain, The New York Times, March 31 2009

In trying to make evolutionary sense of the bony fish (and, by extension, land vertebrates) scientists have been hampered by a lack of completeness. Most of the earliest fossils of bony fish, dating to the Silurian period more than 416 million years ago, are fragmentary – a jawbone here, a tooth there.

A new find from limestone deposits in southern China is helping to clarify the situation. In a paper in Nature, Min Zhu and colleagues at the Institute of Vertebrate Paleontology and Peleoanthropology of the Chinese Academy of Sciences describe a well-preserved and practically complete fish fossil that is 418 million years old.

The fish, which they call Guiyu oneiros, is about a foot long. Only the tail fin is lacking from the fossil, which even shows skin scales. The fish has a jaw, which makes it the oldest near-complete jawed vertebrate ever found. The fish is lobe-finned, meaning its fins are fleshier than ray-finned fish, and counts among its few living relatives the coelacanths.

The finding also establishes a minimum date for the evolutionary divergence between lobe- and ray-finned fish. Since this lobe-finned one existed 418 million years ago, the split must have occurred sometime before.

Guiyu, a fossil fish that represents the oldest near-complete jawed vertebrate

Megalodon Not Ancestor of Great White Shark

Summary of "In a Shark's Tooth, a New Family Tree"
by Sean B. Carroll, The New York Times, September 15, 2009

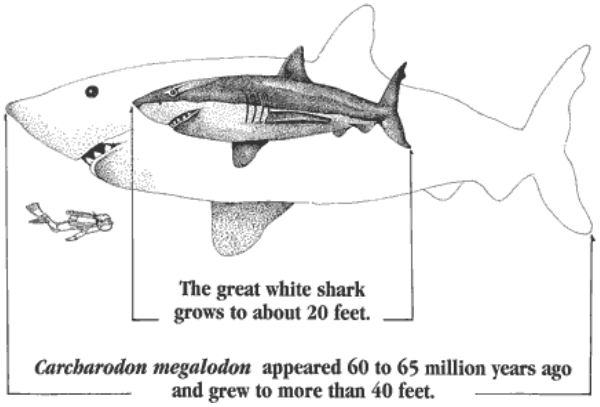
Until new shark fossils were recently discovered in the Peruvian desert, the great white shark (*Carcharodon carcharias*) was believed to be descended from the enormous, extinct shark known as "megalodon" (*Carcharodon megalodon*), mainly because both species have serrated teeth. Scientists now believe the great white evolved from a relative of the smooth-toothed, mako shark.

"Kevin Nyberg and Gregory Wray of Duke University and Charles Ciampaglio of Wright State University used new computer-assisted imaging and measurement methods to better assess the similarities and differences among great white, megalodon and extinct mako teeth. They determined that the extinct mako and great white

teeth and roots were similar in shape and clearly distinct from megalodon."

"Furthermore, high-resolution electron microscopy revealed that the shape and spacing of serrations of great white teeth were markedly different from those of megalodon teeth."

"Rather, it appears that great whites evolved from a less ferocious-looking ancestor and independently evolved sharp serrations. A remarkably well-preserved fossil of what a great white ancestor may have looked like was recently brought to light. The desert region of southwestern Peru is a graveyard of marine animals from the past 40 million years, including spectacularly preserved whales, dolphins, walruses, seals, turtles and sharks. It was there that Gordon Hubbell, a shark expert, collected the four-million-year-old fossil that had not only its jaws intact with 222 teeth, but also 45 vertebrae – both rarities for shark fossils and rare opportunities for shark experts."



"The preservation of the teeth in their proper place, as opposed to being found scattered in sediments, allowed an unprecedented analysis of individual teeth and the pattern of tooth development in the shark. Similarities were found to both extinct mako sharks and living great whites, including weak serrations, suggesting that the Peruvian fossil might be a transitional form, a link between a smooth-toothed mako ancestor and the great white."

"The serrations of great white teeth undoubtedly evolved to exploit expanding populations of marine mammals. That adaptation appears to have given the predators an advantage as they, like megalodon in its day, enjoy a broad ocean-wide distribution. At least for now."

Megalodon Tooth

Exquisitely Tipped Teeth Let Sea Urchin Carve A Home From Stone

by Henry Fountain, The New York Times, March 31, 2009

Sea Urchin Close-up

It may be prickly on the outside, but the sea urchin's spines hide – well, if not a heart of gold, at least teeth of calcite.

The urchin's five teeth are vey strong and capable of grinding limestone, creating depressions in the rock that the sea urchin can settle in. Since limestone also consists of calcite (a form of calcium carbonate), how can the teeth grind the rock without being ground down, too?

An international team of researchers has used high-resolution X-ray analytical techniques to discover the secret. The structure and composition of the tip, particularly the orientation of the calcite crystals, is exquisitely controlled, they write in The Proceedings of the National Academy of Sciences.

The teeth consist of calcite crystals (including a small amount of magnesium) in the shapes of needles and plates, and a polycrystalline calcite matrix that contains a higher concentration of magnesium. Yurong Ma, Lia Addadi and Steve Weiner of the Weizmann Institute of Science in Israel, with Pupa Gilbert of the University of Wisconsin and other colleagues, show that the magnesium levels increase toward the tip, contributing to the hardness, and that all the elements are aligned in what they call polycrystalline blocks.

The entire tooth, the researchers report, is composed of two of these blocks, which are interleaved near the tip and may create a corrugated surface that contributes to the grinding efficiency.

Toolmakers might be able to learn something from the sea urchin's approach, the researchers say.

2009 KAS Student Presentation Awards

1st Place Awards **2nd Place Awards** **3rd Place Awards**

Undergraduate Poster Presentations

Rachael Lane
Emporia State University

Use of Poly(4-vinylpyridine) for Removal of Perchlorate from aqueous Solution Through Polyelectrolyte Enhanced Ultrafiltration

Stephanie Schifferdecker
Emporia State University

An *In Vitro* Approach to Determine Selective Toxicity of Anti-Cancer Drugs

Scott Ashley
Washburn University

Determination Of Unique Protein Densities In Giant Ragweed Pollen By Molecular Weight And Isoelectric Point

Masters Poster Presentations

Leah Kasten
Wichita State University

The Thermal Regime of Dupuyer Creek, Pondera and Teton Counties Montana

Yunqi Zhao
Emporia State University

Gene Expression Profile of Malignant Melanoma Cells in Response to the Treatment By *Ginkgo Biloba* Leaf Extract

Xiaobo Wang
Emporia State University

Effect of Mercuric Compound at Sublethal Concentrations on the Survivability of Bacterial Cells Challenged by Ultraviolet Light or *N*Ethyl-*N*-Nitrosourea

Undergraduate Oral Presentations

Andrea Walters
Washburn University

Further Studies on the Benzylic Oxidation of Pyrroles by Oxone

Sean Armstrong
Washburn University

Application of Computational Results for the Borane Reduction of Nitriles to Primary Amines

Jackie Peda
Washburn University

Characterization of Magnesium Transporters in *Bacillus subtilis*

Masters Oral Presentations

Ashley Long
Emporia State University

Negative Effects of Mesquite Density on Lark Sparrow Nest Success

Wendy Eash-Loucks
University of Kansas

A New Species of a Ptychodactiarian Sea Anemone from the Aleutian Islands

Amanda Falk
University of Kansas

Determining Mesozoic Bird Tracks with Behavioral Criteria

PhD Oral Presentations

Andrea Crowther
University of Kansas

Indo-Pacific Sea Anemones Possessing Branched Outgrowths: How Many Species?

Kathryn Mickle
University of Kansas

The Lower Actinopterygian Fauna of the Manning Canyon Shale Formation (Upper Mississippian, Lower Pennsylvanian) of Utah

New Research Grant Applications

Student members of the KAS or those whose major advisor is a member of the KAS may apply for research funds up to $1,000 (graduate) or $500 (undergraduate).

Application Deadline: June 1st, 2010
Grants are awarded by August 1st

www.KansasAcademyScience.org/Research_Grant.html

KANSAS ACADEMY OF SCIENCE
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The 142nd Annual Meeting of the
Kansas Academy of Science
will be held at
Fort Hays State University
on
April 9 and 10, 2010.