

THE Pteranodon

Highlights from the
Sternberg Museum of Natural History

No. 28

Spring 2004

Strange new animals discovered

Scientists have discovered new, almost alien life-forms, many of which are remarkably different than any known lifeforms on Earth! Was this discovery recently made by NASA on some distant planet?

No, the discovery was made high in the Canadian Rockies at a place called the Burgess Pass in 1909 by Charles Wilcott, then Secretary (Director) of the Smithsonian Institution in Washington, D.C. Visitors to the Sternberg Museum can view these alien lifeforms in a special exhibition entitled "Burgess Shale: Evolution's Big Bang."

Rocks which today are thrust up to towering heights in the mountains of western Canada originally were deposited 505 million years ago in an equatorial ocean. Strange creatures lived in those shallow tropical waters, but they were swept into deeper water by an underwater mudslide. The flowing sediments trapped the delicate creatures in an entombing mud, preserving their unusual anatomy in great detail. Wilcott named the mudrock deposit after the nearby pass.



Strange lifeforms lived in the tropical ocean 505 million years ago. These unusual animals were preserved in rocks now exposed in the Canadian Rockies. "Burgess Shale: Evolution's Big Bang" will be on display at the Sternberg Museum from March 27 to October 3.

Wilcott's discovery is significant for what the fossils show us about the early history of multicellular life. The fossil record of life stretches back 3.5 billion years but, for most of that time, life was no more complex than simple bacteria and algae.

But something dramatic happened to life on Earth just before the mudslide trapped the animals of the Burgess Shale. Lifeforms became more complex, organized into larger, more complex organisms with definite body plans. This was an amazing time in the history of life. A completely blank slate of possibilities offered itself,

and living organisms evolved all sorts of body arrangements and strategies for survival.

Ultimately, the surviving organisms were based on a limited number of basic strategies, and we see those represented in the taxonomic classification of life today. But the remaining strategies we see today are just that: those that were better adapted to the environment, giving them an edge for the future. Life, as a grand experiment, tried numerous other arrangements in organic organization, and the Burgess Shale fauna is a

snapshot of those options.

In a recent survey of paleontologists to name the discoveries that shed the most light on the history of life, the Burgess Shale fauna was consistently ranked among the top ten, making these fossils one of the most important scientific discoveries of all time.

From a scientific standpoint in understanding the history of life, "Burgess Shale" is arguably the most important exhibition ever hosted at the Sternberg Museum. The exhibition will be on display at the Sternberg Museum from March 27 to October 3, 2004.

Owls of South Africa come to museum

The Sternberg Museum will host an exhibition of art prints in conjunction with the Transvaal Museum of Natural History in Pretoria, South Africa. The exhibition is entitled “Owls of South Africa: scientific illustrations by Claude Gibney Finch-Davies.” The exhibition opens April 30 and runs through August 15, 2004.

“It is an interesting story how this exhibition found its way to Hays,” said Jerry Choate, Museum Director.

“During my first visit to South Africa, I met with Naas Rautenbach, the retiring director of the Transvaal Museum,” Choate said. “I was admiring some wonderful paintings they had on display, and as we left, Naas gave me a set of prints made from the paintings.” The prints are now part of the Sternberg Museum’s permanent collection.

Claude Gibney Finch-Davies was born in India to a British family in 1875. He went to school in England, but went to South Africa just after his eighteenth birthday. He served in the military for over twenty years but, during his free time, he was a consummate birdwatcher.

Finch-Davies made careful field notes, collected and prepared specimens, and began to make paintings of the various species he found. He produced a series of



The Spotted Eagle Owl, *Bubo africanus*, is among the prints of South African Owls painted by Claude Gibney Finch-Davies.

accurate bird illustrations and wrote several scientific papers in ornithology.

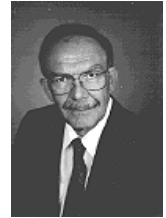
During the First World War, he served with the South African Mounted Riflemen in South West Africa (now Namibia). Although he had little time to devote to his hobby, he was able to finish his most extensive work, illustrating and writing about the eagles, hawks, falcons, and owls of southern Africa. After the war, Finch-Davies began an association with the Transvaal Museum.

“It seems that, in the 1920s, Finch-Davies was caught tearing plates out of books in the library of the Transvaal Museum, and he gave the museum a wonderful set of owl paintings to hold until he could replace the books he had damaged,” Choate continued. “However, he died suddenly and so never claimed the paintings.”

The “Owls of South Africa” exhibition complements the “Journey to South Africa” exhibition already on display, and will open with the Spring Gallery Walk sponsored by the Hays Arts Council.

Choate's Notes

Dr. J. R. Choate
Director




You don't realize how much you need something until you lose it. Last September, there was a major thunderstorm in Hays that produced severe lightning, several inches of rain, and localized flooding in low-lying areas. During that storm, lightning struck somewhere near the Sternberg Museum and fried the Discovery Room's weather station and associated software. It literally put the museum out of the weather business.

A good friend of the museum agreed to cover the cost of repairs, so we ordered replacement parts. After we finally got everything working again, we learned that the weather station endangered the museum's computing system without a fusible link to protect the system from future electrical strikes. So, we needed to install that piece of equipment as well.

We got the weather station back on-line the afternoon of 27 January 2004. Within 24 hours, the website counter indicated 1,700 “hits” by persons checking the page. As I write this column, on 1 February 2004, the weather station has recorded 5,135 “hits.” Obviously, the weather station in the Discovery Room serves a community need and was missed during the time it was off-line.

Cultural attractions of all kinds are like the museum's weather station. Our community is blessed with an amazing array of museums, galleries, and other attractions, and the university provides a great diversity of programs to satisfy the cultural needs of the community. If these programs are not supported adequately by the community, they may disappear. And when they are gone, they will be sorely missed.

**THE Pteranodon**
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Herpetology research continues even in the winter

Much happens behind the scenes at the Sternberg Museum. For example, starting in October, the museum began working on the largest research grant it has ever received. The grant was funded in part by a State Wildlife Grant from the Fish and Wildlife Service, Department of the Interior, and the Kansas Department of Wildlife and Parks.

The primary objective of the two-year project is to assess the state's herpetofauna, or herps for short, which includes things like frogs, salamanders, lizards, snakes, and turtles. Two fulltime faculty members work on the project, Travis Taggart and Curtis Schmidt, both Associate Curators of Herpetology.

Their objectives for the project include scouring the state looking for new localities, documenting the herps they find, looking particularly for species that are threatened or endangered, and assessing their stability.

Although the winter months are not the best time to find herps, this does not mean that the team has had nothing to do.

"As soon as the ice gets off the rivers, we will be out collecting Mudpuppies," said Taggart, referring to a large and unusual salamander that lives in the streams of southeast Kansas. "But right now, we are mostly focused on organizing the collection and curating a backlog of previously collected specimens."

Almost every museum has a backlog of material. Specimens get collected and placed in storage, but to be valuable for research they must be curated, which might involve removing tissue samples, formally documenting the specimen in the museum's records, assigning a museum number, and entering its data into the database.

"In the last few months, we have added over 2,500 records to the herpetology collection. Many of them were in the freezer," Taggart said.

Prior to the Christmas break, Taggart and Schmidt visited southeastern Kansas, scouting out areas they may want to collect in the spring, but also visiting caves in the area.

"Even in the winter, some herps are active in caves since the temperature in caves is stable," explained Schmidt. In fact, the team documented a range extension for the Eastern Newt (*Notophthalmus viridescens*), finding this species at least 50 miles from where it was known to have occurred.

In addition, the curators have been fulfilling requests for loans of specimens and tissues.

"We recently began saving tissue samples from all the specimens to preserve for DNA and other such studies.



Travis Taggart (left) and Curtis Schmidt, both Associate Curators of Herpetology, remove tissue samples from snakes. The tissues are used in DNA studies.

More and more, DNA is being used to help us understand the relationships of species, and already this winter we have sent samples to California, Texas, and New York," Taggart said.

Also, the team has been ordering the equipment they will need for when the fieldwork begins in earnest. Everything from sampling gear like collection bottles and nets to computers needed to be ordered and set up.

"We've already been busy on this project, and we are just waiting for the ice to melt," said Schmidt, eager to get back in the field.

Calendar of Events

**Burgess Shale:
Evolution's Big Bang**
March 27 – Oct. 3, 2004

**Owls of South Africa: scientific
illustrations by Claude Gibney
Finch-Davies**
April 30 – Aug. 15, 2004

**Museum Memories:
A Centennial Exhibition**
Closing Date to be announced

**Journey to South Africa: An
Exhibit Experience**
Closing Date to be announced



Curtis Schmidt explores a cave in southeastern Kansas for salamanders and frogs. This cave system is the principle home of four species of cave salamanders.

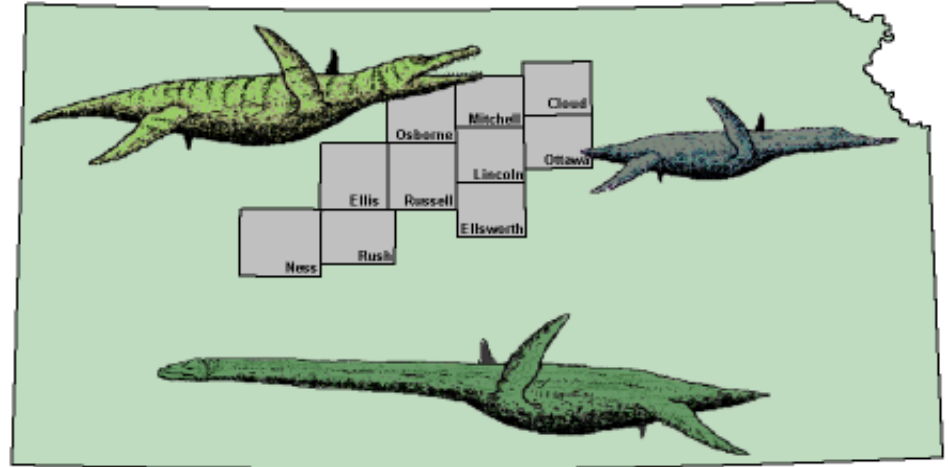
I brake for Plesiosaurs!

[Editor's Note: The following story is by Bruce Schumacher, Zone Paleontologist for the USDA Forest Service and Adjunct Curator of Vertebrate Paleontology for Sternberg Museum.]

Plesiosaurs were a diverse group of marine reptiles that inhabited the world's oceans throughout the Age of Reptiles. As many Kansans know, our state was covered by a shallow inland seaway, roughly from 100 to 70 million years ago during the Late Cretaceous Period. So rather than the remains of dinosaur skeletons, Kansas more typically contains the remains of seagoing animals, including giant fish, and numerous swimming reptiles such as mosasaurs, plesiosaurs, and turtles, as well as flying reptiles.

What we know about Cretaceous plesiosaurs is largely based on skeletons from North America: in particular, those from western and central Kansas. More new kinds of plesiosaurs have been named from our little corner of the world than from any comparable region on Earth.

Although the state's more famous plesiosaurs are from the Smoky Hill Chalk beds in western Kansas, an equally important group of plesiosaur skeletons comes from central Kansas.



The counties of central Kansas have produced many significant fossils of the three types of plesiosaurs known: long-necked forms with small heads (bottom); giant-headed short-necked forms (above left); and short-necked, needle-snouted forms (above right).

Here the rocks are slightly older than the more famous chalk beds of the west, and one particular rock layer of this age is widely known for its local use as fence posts. Historically these rock layers were referred to as the "Fort Benton Group," but in modern terminology we know them as the Graneros Shale, Greenhorn Limestone, and Carlile Shale.

Although those rock layers are not as well exposed as the western Kansas chalk

beds, they are best exposed along the Saline River valley in Ellis and Russell counties.

Beginning with the discoveries made by B. F. Mudge near Paradise, Kansas, in 1873, a host of fine plesiosaur skeletons has been collected from these Cretaceous rocks in central Kansas (see map). Nearly twenty skeletons of three major types of plesiosaurs are now known from the old Fort Benton Group, and many of these



A crew from Emporia State University, including DeWayne Backhus (left) and graduate students, excavates a needle-snouted plesiosaur near Wilson Lake in the 1970s. **Right** is a partial paddle of a giant-headed plesiosaur collected in Russell County in 1997.





One of the most exciting plesiosaur fossils known is the large head of *Brachauchenius lucasi*. This exciting specimen is 5.5 feet long and is the best example of a big-headed, short-necked plesiosaur in the world. **Right**, George F. Sternberg and Robert Jennrich, who discovered the specimen with his brother Frank, take a moment's rest while excavating the head.

specimens were collected from manmade roadcuts.

This suggests that the Benton rocks of central Kansas may be richer in fossils than they commonly are thought to be, but that the rocks are simply poorly exposed and largely inaccessible on private lands.

There are three types of plesiosaurs present in these rock layers, including long-necked elasmosaurs, bizarre forms that grew to over forty feet in length (some have suggested that the mythical beast of Loch Ness may fit that description). "Longnecks" are thought to have been superb fishers, capturing vast quantities of small, schooling fish through the use of their snakelike necks.

The needle-snouted polycotyliids were smaller, with a maximum size of about twenty feet, but were fast and highly maneuverable. Needle-snouted plesiosaurs are thought to have eaten fast, elusive prey such as speedy fish and squid.

The third type of plesiosaur is the giant-headed plesiosaurs, some of which may have exceeded forty feet in length, were the reigning monarchs of the sea and likely were the "killer whales" of those ancient oceans.

These giants were likely opportunistic feeders, eating anything and everything they were able to catch.

In November 2003, Greg Liggett and the author accompanied Robert Jennrich to the site of an historical plesiosaur dig that took place in 1950. Mr. Robert Jennrich and his brother Frank discovered one of the museum's most famous, and scientifically

most important, specimens: a huge skull of *Brachauchenius lucasi*.

However, the exact rock layers from which the skull was unearthed were never properly recorded. Fortunately, Jennrich was able to lead the museum team to the precise spot of the excavation and made available a wonderful historic photograph of himself and George Sternberg posing above the digsite. Many thanks to Robert and Frank for their contributions to Kansas paleontology.

The *Brachauchenius* skull he found is, to date, perhaps the finest example of a giant-headed plesiosaur skull known anywhere in the world and has the distinction of being the largest complete reptile skull thus far found in Kansas.

Many other plesiosaur skeletons have been found in central Kansas, and a surprising number of these were located in small rock exposures in roadcuts.

Roadcut plesiosaurs have a long-standing history in central Kansas. In 1944, Elmer S. Riggs described a new kind of needle-snouted plesiosaur discovered by road crews making a cut on the present US Highway 81, south of Concordia in Cloud County.

In the early 1970s, Dr. Paul Johnson of Emporia State University discovered a needle-snouted plesiosaur in a roadcut south of Wilson Lake in Russell County. Tragically, most of this specimen was stolen by thieves before it could be properly collected.

Michael Cox of the Kansas Department of Wildlife and Parks unearthed a needle-

snouted plesiosaur from a roadcut just north of Gorham in 1981.

In 1991, the author excavated another needle-snouted plesiosaur from a roadcut in northeastern Ellis County.

And recently, in 1997, only a few miles away from the 1950 *Brachauchenius* discovery, Greg Liggett collected a cluster of paddle bones along a blacktop road in northwestern Russell County. These bones likely belong to another giant-headed plesiosaur, a huge individual that in life easily could have been more than 30 feet in length and 5 tons in weight.

The search for fossils from the old Fort Benton Group continues. Most of the specimens mentioned here are not on exhibit, but rather form part of the "backbone" of the museum—its stored research collections. Only by studying and maintaining specimens from past, present, and future finds can we learn more about the plesiosaurs that lived in central Kansas—or about any group of animals, living or extinct.

We know from the number of plesiosaurs found in manmade roadcuts that there are many more undiscovered skeletons out there.

It is through the cooperation of landowners and local communities with the museum that we can continue to learn about these magnificent beasts that once called our state home.

The next time you travel down a long, dusty backroad in central Kansas, you might just think what could be lurking within that roadcut!

Museum education—ever-changing

The Sternberg Museum's education division stays busy year-round working to provide not only museum programs delivered directly to kids but also support to other adults who provide children's science education. This includes more than just classroom teachers.

To help clarify this, museum professionals distinguish between formal and informal science education. Formal science education refers to student learning in the formal classroom or homeschool environment.

programs to answering inquiries for science information, and includes a variety of elements in-between. The demand for specific types of educator support follows an annual cycle. So as you read this spring newsletter, we have entered our own spring phase, when we are occupied with specific types of educator support.

January through May is the busiest time for our presentations of classroom programs and for docent-led tours of museum exhibits (which includes a native-animal presentation in the Discovery

about the fossils of the Burgess Shale, we are offering workshops about using rocks and fossils to reconstruct the past.

Informal science educators and homeschool educators are as welcome at these workshops as classroom teachers!

Another of our resources, offered to a very special group of educators, comprises the initial sixteen-hour training and monthly continuing education for our own docents—that elite group of volunteers who provide the guided tours at the Sternberg Museum.



Grade school children lie on a buffalo skin brought into their classroom by Cameron Liggett, Museum Educator (center top). Such material provided by the museum is popular with area educators.

Informal science education includes learning as part of a youth group such as 4-H and scouts; learning at museums, zoos, and science centers and at public expositions such as garden shows; learning through activities at after-school programs; and learning at home, including activities with parents, grandparents and other family members.

Recognize that this means that most people reading this article are science educators of one kind or another. *Perhaps you are an informal science educator!*

Our support of both formal and informal science educators ranges from presenting

Room). Classroom and homeschool educators set up these tours to enrich their science curriculum. There are many education resources available on our website. Just follow the links for education at www.SternbergMuseum.com.

Among the resources are background information and student worksheets for school visits, a formalized list of twelve classroom presentations, and items available to check out.

Each year in February we offer educator workshops relating to our exhibits (permanent or changing). This year, correlating with our upcoming exhibition

Throughout the school year, the education division experiences a steady demand for its check-out resources. These range from single items (the bison skin, for example) to complete resource kits. Our three most popular resource kits are about life cycles, rocks and minerals, and bats.

So, as our members read their museum newsletters, we're hard at work providing support to science educators of all types on their behalf—including both formal and informal science educators. And when you receive your next newsletter, we'll already be gearing up for a whole different set of educator support activities.

Museum's own "artist-in-residence"

Every organization that relies heavily on volunteer help is greatly enriched by those volunteers who not only give their valuable time but bring their unique talents to the organization.

Consider that every new exhibition that the museum displays contains elements of original artwork, each one custom made for the purpose. Since the opening of "Journey to South Africa," highlighting the museum's recent photo safari to that



Mitch Sommers paints a mural of the South African grasslands for the "Journey to South Africa" exhibition.

country, many visitors have commented on the diorama depicting a lion in a grassland scene, recognizing that it must have been painted especially for that exhibition.

The artist who skillfully executed the mural painting was Mitch Sommers, a longtime museum volunteer. Sommers attended Fort Hays State University and Emporia State University, earning degrees in art and art education.

"I have always had a strong interest in art," said Sommers. "I also have a strong interest in science, and while I never did, I was certified to teach it."

After graduation, Sommers taught junior high and high school art in Liberal, Kansas, for many years. He returned to FHSU to complete a Masters of Fine Arts in 1994. However, around the time of his graduation, Sommers became fully disabled. He has remained in Hays to be close to family in the area. He continues to find enjoyment in his artwork.

"I am really interested in trompe l'oeil, which means 'fool the eye' in French. At first glance things might seem normal, but



The lion diorama in the "Journey to South Africa" exhibition is popular with visitors.

as you study it, you begin to notice that things are off somehow.

"I don't want you to be able to take in the whole story of my art at one time, but I want to interact with the viewer so that you see things over time," Sommers explained.

You will not find anything to fool the eye in the museum's diorama, however.

"When doing work like that for the museum, I focus on the craft of the project, producing whatever art is needed for the situation. I make a distinction between my craft and my art."

The museum is a considerably richer place thanks to all of our volunteers.

Sternberg Museum Associates



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— Charles F. Sternberg
The Life of a Fossil Hunter

"In this John Day region [Oregon], ten thousand feet, or nearly two miles, of sedimentary and volcanic rock lie above the Niobrara Group of the Cretaceous, from which I dug last summer the beautiful skull of a Xgasas mosasaur... How many ages were those ten thousand feet in building? ... And yet all this has taken place since my mosasaur, which seems to watch me as I write, fought its last battle and sank to rest beneath the waves of the Cretaceous sea."

