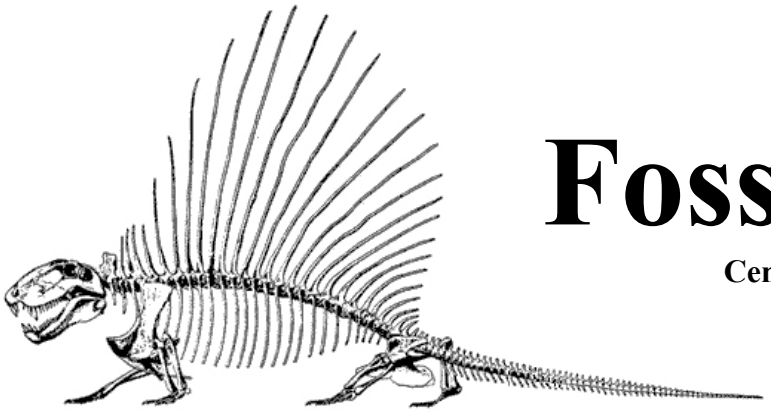

Fossil Footnotes

Central Texas Paleontological Society
August 2005

President's Message

By Danny Harlow

The dog days of summer are here and there is not a whole lot of news to report. We had a great turn out and excellent presentation by Dr. Ann Molineux on rudists at our last meeting. The LCRA board room completion has been delayed so we will be meeting at our regular date and time (Tuesday Aug 9th) but at the AGMS Bldg. on Burnet Lane. Our speaker will be Pamela Owens. This is another "don't miss" presentation. See the map and topic in the newsletter. We are one small booth away from being completely full for Fossil Fest. It is just around the corner and will be on top of us before we know it. See all of you at the meeting!

Danny

Photo of the month

Goniopygus texanus
Lower Cretaceous
Edwards Formation
Williamson County, Texas

A beautiful regular Echinoid collected, prepared and in the personal collection of club member Gary Rylander.

August 9th Meeting

Dr. Pamela Owens will be our speaker at the August meeting. The date is correct but due to the ongoing renovations at LCRA, we will be meeting at the Austin Gem and Mineral Society's Clubhouse at 6719 Burnet Lane.

Her talk will be on the Evolution of the Big Cats. Hope to see you there.

Glen Rose Field Trip

Saturday August 6th

lead by Glen Kuban

Glen Kuban, who has been researching Texas dinosaur tracks for many years, is leading a field trip to several Glen Rose track sites (most in or near Dinosaur Valley State Park) for the HGMS Paleo Section for Saturday, Aug. 6th. CTPS members are cordially invited to join the trip. The Paluxy River is running lower than usual, so barring heavy rains between now and then, it should be a good opportunity to see many interesting tracks, including ones not normally seen by most visitors. If you are interested please email

Glen at: gkpaleo@yahoo.com. For more information, including where and when to meet, what to bring, accommodations, etc., please visit the field trip planner at http://paleo.cc/hgmstrip.htm

July Field Trip to

By Ed Elliott

We finally made it back to the Brazos River! After a long dry spell, the water level went down, down, down, all the way to the depth we wanted. And then, the week before we were to go…the rain started again. The fossil Gods smiled on us though, and had the rain avoid the upstream Brazos watershed. It even rained hard the morning of the trip but stayed west of the Brazos. The light drizzle we had all morning only served to keep us cool during our pursuits as well as to make the fossils stand out. Weather wise, we were lucky.

We had a good group at San Felipe that morning: Melvin Noble, Miriam Hall, Dennis Fryar, Tom Oliphint, Dave and Mark Lindberg, Gary and Cathy Rylander, Mike Smith, Bill Thompson, Paul Hammerschmidt, Rich Geist and me. Nine kayaks and two canoes set out looking for Pleistocene vertebrate material and we didn't do too badly. Most of this material washes out from old Brazos Pleistocene terrace deposits or from the Beaumont Clay-late Pleistocene, Rancholabrean stage. The really dark, heavily mineralized specimens can come from early Pleistocene, Irvingtonian stage, or even Pliocene, Blancan stage. A great many of the fossils are from animals that became extinct during or after the Wisconsinan glaciations.

As for our trip, it couldn't have been any better. Certainly we all wish we had found more. I personally had my heart set on a mastodon jaw with full dentition; maybe next time. The water trip itself was very enjoyable. We kept cool all morning and we had a nice south breeze in our faces. Not bad for a July in Texas. Floating down a broad river, both banks resplendent with lush green vegetation, abundant bird life everywhere you look, looking and talking with friends. This was a good day in and of itself. At one stop I even saw a flock of roseate spoonbills; very pretty in flight. Add fossils to that, what more would you want?

A few highlights of what we found are in order. Bill picked up the prettiest and the largest alligator scute I have seen from the Brazos as well as a bison tooth and possible llama tooth. Paul picked up a nice horse toe and sloth claw core. Gary said he picked up a nice mammoth tooth. Dennis picked up a mandible that looked like bison to me, just a guess on my part. Rich, Tom and Paul all picked up some good palm wood pieces. There is an abundance of wood on the Brazos, probably of Eocene/Oligocene origin that was transported to the Pleistocene terrace deposits. At least six horse teeth were found, all very dark. Of course, we all picked up assorted bones-maybe to be identified.

On the theme of lessons learned: five of our members over the course of the five or six mile trip, found themselves with their vessels in less than an upright position. It is all well and good to strap your ice chest or other items down. It is even better to secure your fossils. The river can take back what it gives. Quickly. Also, if you are practically blind, you might strap your glasses to your head too. Not being able to see what is in front of you can ruin the trip.

All things taken together, it was a wonderful trip and I can't wait to go back. Details of the next trip will be on the website.

Thanks, Ed

July Speaker was a Real Treat!!

If you were not able to attend the July meeting held at the Pickle Center, you missed a great presentation. We were asked to critique a program that Ann and others are working on to put on the Internet as a teaching aid. The effort is to make short "lessons"

from the material they gathered while visiting the Canyon Lake Spillway. Several ideas were given and it was just fun knowing we were participating in a project that will teach kids about science and geology. Thank you Ann Mollineux for having us as your guests at the Pickle Center for such an interesting talk. She had lots of examples of rudists, which made it even more interesting. There is more to a rudist than you might think.

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For information about CTPS and our meetings and Fossil Fest, **Visit our Web Site**

http://www.texaspaleo.com/ctps/index.html

Minutes July Meeting

By Hollis Thompson

I did not really write formal minutes, just would like to say for the record, we had a great turnout for Ann's talk. Meeting at the Pickle Center and seeing numerous samples of rudists and watched a film she is working on with others to give teachers some learning aids on science and geology.

We had several members of both the CTPS and APS groups represented. CTPS even had a few door prizes to give away. It was great!!

2005 Field Trips

Schedule for this year's field trips but subject to change

Aug 13th	Non-Vertebrate Lab (UT)
Sept 17th	Midlothian
Oct 15th-16th	Sulfur/Red River
Nov	Kerrville

From: Earth Magazine June 1998

Deep Impressions

By Daniel Pendick

You've got a hungry predator hot on your heels. You dash into a dense stand of palms to evade the large-toothed beast. Now you're safe, but you've heated up from your high-speed getaway. You're sweating. You're panting.

At least that's what you're doing if you're human. If you're a duck-billed dinosaur, however, you might just sit quietly in the shade and vent heat from hundreds of tiny cones.

The cone-shaped bumps have shown up in impressions of dinosaur skin pressed into soft ground seventy million years ago when one of these beasts died in what is now New Mexico. Paleontologists think these bumps may have acted as radiators to unload excess body heat. The impressions are also alerting paleontologists to the value of a type of fossil that frenzied bone-hunters have sometimes ignored or, worse yet, jack hammered right through. "Their main objective was to crank out the bones," laments Brian Anderson, a paleontologist at Arizona's Mesa Southwest Museum. "There's some speculation that they were just blowing through the rock and not looking for skin impressions at all."

In 1989 — in a far cry from rock blasting — graduate student George Basa-bilvazo from New Mexico State University was carefully studying ancient lake deposits in New Mexico's Little Hatchet Mountains when he found a chunk of sandstone about the size of a kitchen garbage can, with shallow, conical nubs on one of its sides. The smallest nubs were about a tenth of an inch across; the largest, about half an inch across. On the opposite side of the rock, he saw fossilized tendons connected to bones. Basabilvazo had stumbled onto a chunk of dinosaur. He suspected the dimpled surfaces were actually skin impressions from the tail of a duckbilled dinosaur, judging from their similarity to skin impressions discovered elsewhere. He showed the site to paleontologist Spencer Lucas, who works at the New Mexico Museum of Natural History and Science in Albuquerque.

Through Lucas, news of the impressions came to Anderson's attention. He and Reese Barrick, a paleobiologist at North Carolina State University in Raleigh, were already scrutinizing similar finds from Utah. When Anderson went to visit the new site, he was truly amazed. The New Mexico bumps, called tubercles, are engraved with fine grooves radiating outward from their peaks, like streams cutting down the slope of a mountain. The largest bumps have up to thirty-two grooves. "It's the most detail I've ever seen," says Anderson, one of the few paleontologists in the world who specialize in the study of dinosaur skin.

The material was so well preserved that Anderson wanted more of it. In January 1997 he and his colleagues excavated several square feet of skin impressions from Basabilvazo's original site. The duckbill's tail had been coated by lake sediments that, over the millennia, solidified into sandstone, recording the skin contours like putty pressed onto a medallion.

Those contours revealed an ornamentation not seen before in any other kind of animal, living or extinct. The grooves in particular stood out, and Barrick wondered why they were there. "One thing we do know is that grooves increase surface area, and by quite a bit," he says. That suggested to him that maybe the grooves helped dinosaurs regulate body temperature. The increased surface area could function like a solar collector, warming up the dinosaur's body. Or it could act like an automobile radiator, enabling heat to escape.

Barrick favors the radiator theory. "In order to absorb heat, you're going to want a lot of flat surface areas aimed toward the sun," he says. Tubercles with flat faces present the most surface area to the sun, he says, and would be the most efficient collectors. By contrast, conical bumps with grooves hide part of the surface, shading it from the sun yet still allowing that extra skin to radiate heat.

But the radiator idea has some leaks, says John Ruben, a zoologist at Oregon State University in Corvallis. For skin to be a good radiator, there must be a dense web of blood vessels in the underlying tissue to carry body heat to the surface where the air can carry it away, he points out. But a hide riddled with fine blood vessels might leave a dinosaur vulnerable to scratching by tree branches and brush — like those in the duckbill's coastal forest home. "You sure wouldn't want it on a surface that's likely to be abraded by the environment," Ruben says. In no time, the dinosaur's skin might become one big oozing scab.

Barrick disagrees. For one thing, he says, the outermost skin layer in animals contains no blood vessels. That tough outer layer, called the epidermis, is basically a bunch of layers of dead skin. And adding grooves to that layer might even further reduce injuries. “Like corrugated tin, they increase total surface area able to radiate heat while reducing the surface area exposed to external objects that might scratch the animal,” he says.

Even if nothing comes of his radiator theory, Barrick and coworkers hope that the magnificent detail in the skin impressions will inspire other paleontologists to look for bumpy surfaces. They may offer a new way to tell dinosaurs apart when key distinguishing parts, such as skulls, are missing. Paleontologist have already noted differences in the shape and size of tubercles, particularly among different duckbills. If you look at modern reptiles, many are distinguished from each other by skin color, texture, pattern. Why shouldn’t dinosaurs have been the same way?” Lucas says.

Worldwide, Anderson says, there are fewer than two dozen examples of irrefutably dinosaurian skin impressions. That is why he scrutinizes the sediments around skin impressions for clues to the kinds of environments that best preserve them. This, he hopes, might point the way for other paleontologists who want to get into the skin trade.

Earth Magazine, December 1997
Flapping thru the Bottleneck
From EarthBeat
By Rosemary Sullivant

Bones of ancient birds speak of a past mass extinction, but modern genes tell of a large flock of survivors.

Most birds alive during the time of the dinosaurs seem to have suffered the same fate as those doomed beasts. Or so say their bones. Few, if any, fossils of modern birds pre-date the mass extinction sixty-five million years ago that wiped out sixty to ninety percent of Earth’s creatures, including the dinosaurs. Only afterward do fossils of modern birds begin to appear. The bones say this extinction was an evolutionary bottleneck, and the lucky few birds who squeezed through spread their wings and flew off to populate the avian world, quickly diversifying into today’s nine thousand or so species.

But fossils may not tell the whole bird story. By using the DNA of living birds as a “molecular clock” that counts backwards in time, to the beginning of a species, molecular evolutionist Alan Cooper of Oxford University and theoretical biologist David Penny of Massey University in New Zealand have found that at least twenty-two bird lineages flapped right through the great extinction. Actually, most had their beginnings millions of years before the great die-off, known as the Cretaceous-Tertiary, or K-T, extinction. So many birds made it past the event, they say, that it was more like a mass survival. “Because this is such a common phrase-the K-T mass extinction-we are playing devil’s advocate a bit by saying it is the other way around,” Cooper notes. Indeed, the claim has caused a bit of flap among some bird experts.

Molecular clocks work because, after two species split from a common ancestor, each takes its own genetic path. As the years pass, the DNA of each species steadily accumulates mutations. These mutations are the ticks of the clock, and if the rate at which they occur can be determined, researches can calculate how long ago the two lines diverged. For instance, if there are ten mutations that differ between two species, and one mutation occurs every thousand years, then the two lineages must have split about ten thousand years ago.

Cooper and Penny looked at the differences in DNA sequences in small sections of genes from sixteen modern orders of birds. First they chose a pair of closely related birds, such as rheas and ostriches, and counted the number of differences in gene fragments found in both birds. Next, the researchers used the oldest known fossil of the pair to date when the two diverged and established a rate of change. For example, the old rhea fossil is sixty million years old, much older than the oldest ostrich fossil. Cooper and Penny established sixty million years ago as the date for when the two lineages split. They then calculated the mutation rate for each pair of birds. In the case of the rhea and ostrich, the birds had acquired fifty-seven genetic differences over the sixty million year period. Cooper and Penny repeated the process with loons and shearwaters, another pair of birds that are distantly related to the first group. Then they averaged the mutation rates of the two pairs to come up with a frequency of about one mutation per million years.

With the rate set, the researchers then simply took the genes within the fragment that the individuals of a pair shared and counted the number of genetic differences that actually separated the two pairs. There ware thirty-eight such mutations, which meant about thirty-eight million years of change. Since those differences did not exist between the individuals of the pair, they must have occurred before each pair diverged. So Cooper and Penny added those thirty-eight million years onto the oldest fossil date of sixty million years, ending up with a grand total age for the lineage of ninety-eight million years. And that's about thirty million years before the K-T extinction.

Using the same method for other related bird groups, Cooper and Penny concluded that most modern birds also had origins before the extinction, in the mid-Cretaceous period. The twenty-two bird lineages that Cooper and Penny traced past the extinction, is "probably a drastic under-estimate," Cooper says. "The bird group is very large, and we have only started in one small corner."

Cooper and Penny aren't the first to propose that modern birds existed well before the K-T extinction. An earlier study by evolutionary biologists S. Blair Hedges of Pennsylvania State University and his colleagues arrived at a similar timetable for several birds and most mammals (see *Rise of the Mammals Earth Magazine October 1996*).

Some researches say the idea shouldn't come as much of a shock. "it is perhaps surprising that so many birds survived the K-T, but the world is full of organisms that survived the mass extinction," says paleontologist Charles Marshall of the University of California, Los Angeles. "I think there was a really big disaster, but even with a big one, complete annihilation of a species is really hard to accomplish." And why haven't the bones of these boundary-crossers been found? "The fossil record for birds is not very good," says Marshall. "Small, hollow-boned birds don't make the best fossils."

Other scientists, however, question Cooper and Penny's methods. Hedges, though his own study supports avian antiquity, thinks Cooper and Penny didn't look at enough genes to say anything about mass survivals. "They used a very small data set to reach the conclusions they did."

Louder objections come from scientists who do believe in the accuracy of fossils. "There is not a single example of a living order of birds for which there is a reasonably identified fossil before the K-T boundary," says University of North Carolina ornithologist Alan Feduccia. "Then by about fifty-four million years ago, we find virtually every modern order of birds, called "opposite" birds (some of their bones are fused in the opposite direction from those of modern birds), all went extinct, he points out, as did many other bird groups.

The way out of this impasse may be to find better fossils. A number of recently discovered fossil have been of birds that never made it out of the Cretaceous. Yet University of Chicago paleontologist Paul Sereno, who made some of these discoveries, says that's not the end of the story. "I

anticipate that new fossil finds will reinforce the molecular evidence that more bird families did survive the K-T extinctions," he says. So the search continues. At the very least, Cooper says, "we've certainly got evidence that is was not a complete wipeout."

Curious About What Creatures Wandered Texas During the Permian Period??

Science, Vol. 304, Issue 5672, 803, 7 May 2004

Looking for advice on paleontology careers or a good online paleobotany lab?

Step into the Paleontology Portal, a new collection of links, photos, teaching materials, and more aimed at everyone from fossil enthusiasts to professional scientists.

The site from the University of California Museum of Paleontology, the Paleontological Society, and other organizations is still under construction, but it already offers some nice features. You can read up on nine famous fossil locales, such as the 500-million-year-old Burgess Shale of British Columbia, which boasts one of the richest assortments of early animals. Browse the "Exploring Time and Space" section to see representative finds for different U.S. states and time periods. A 12-centimeter-long shark's tooth, for example, comes from Tertiary rock (65 million to 1.8 million years old) in California. You can also get info on careers, laws regulating fossil collection, and upcoming conferences. Or help build the collection by submitting materials.
www.paleoportal.org

Fish Fingers

From Earth Magazine August 1998

Ted Daeschler thinks he has found a fish with fingers. Daeschler, a paloeontologists at the Academy of Natural Sciences of Philadelphia, was on a fossil hunt in the Catskill Mountains with fellow paleontologist Neil Shubin from the University of Pennsylvania in Philedelphia. The bones Daeschler saw poking out of sandstone turned out to be the tip of a beautifully preserved fin. About 370 million years ago, that fin was attached to a six-foot-long predatory fish called Sauripterus. And it's giving paleontologists a rare look at how different animals used genes that build limbs to evolve surprisingly similar structures for different purposes.

Daeschler and Shubin were amazed to see the fin contained a row of eight small bones arrayed in parallel, like the tines of a garden rake or fingers on a hand. Apparently, while sauripterus ruled its aquatic abode with the help of fingerlike bones in its fins, other fish were making digits to begin the big move to dry land.

In the late Devonian Period, 377 million to 362 million years ago, bones inside the swimming fins of certain fish began to morph into the weight-bearing toes of four-footed beasts called tetrapods-the ancestors of land animals with paired limbs, including us. The most primitive early tetrapod known, Acanthostega, sported a row of eight digits-just like Sauripterus-on each stubby foot. Paleontologists used to think that toes were to early tetrapods what tires are to automobiles: they were exclusively for locomotion on terra firma. But a few years aog, clues in Acanthostega'a anatomy-a weak frame that couldn't support its own weight on land, for one thing-revelaed that tetrapods were still water-dwelling creatures when they went digital. And now Sauripterus's fin confirms that fingers and toes were not necessarily for landlubbers only. "It shows that digitlike structures can develop in an aquatic animal," Daeschler says. "Hence, they weren't specializations for coming on land."

So what did the fish do with its fingers? They might have helped the predator maneuver in the shallow streams, lagoons, and marshes that began to offer a rich feast in the Devonian. The arrangement of the bones suggests that Sauripterus could bend the leading edge of its fins slightly downward like the flaps on airplane wings. "I think it had a lot to do with pushing and supporting the animal on the bottom," Shubin says. That allowed a sit and wait hunting strategy, adds Deaschler. "The first pulse of movement as they took after a prey animal may have involved pushing off with these fins."

Its Acanthostega cousins may have used their limbs for similar tasks in the lagoons they called home. But they were a little more impatient. They buttressed their legs and bodies and gradually made their way onto land. And Sayruoterys, grew to enormous sizes-up to thirty feet. They were big slobbering fish but even their tools couldn't save them in the end. They went extinct by the end of the Devonian.

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Club Information

The Central Texas Paleontological Society is a scientific, non-profit, community-based organization devoted to the study of fossils, advancing the state of the science, educating the public, and collecting fossil specimens. Most of us are amateurs, fascinated by fossils, who love to collect.

Meetings are held on the second Tuesday of each month at the LCRA building, 3700 Lake Austin Blvd. (between Redbud Trail and Enfield Ave.) at 7:00 PM in the LCRA Offices Board Room of the Hancock Bldg. **The public is cordially invited** to attend these meetings as well as our field trips held throughout the year.

Annual dues are: $15 per person or $18 per family, which includes a subscription to this newsletter, membership in the South Central Federation of Mineral Societies, and liability insurance coverage for club activities. Associate membership is $10 per year and includes a subscription to this newsletter.

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About the Newsletter

Fossil Footnotes is distributed once a month prior to each meeting. Contact the Membership Chair to subscribe or obtain a sample-issue. If your mailing-label has a date marked with a colored pen, it means your membership has or is about to expire. Please send your check to the club Membership officer or bring it to a meeting.

We accept material from club members (and non-members at our discretion) including, but not limited to, information relevant to club activities, fossil collecting, paleontology & geology, and science education. Feel free to reproduce original material contained in this newsletter for educational purposes (including other club newsletters), so long as you credit the newsletter issue and author, if applicable. Send submissions by e-mail or hardcopies to the Editor (see above) at least two weeks before the meeting. Expect some publication delays for exotic formats.

FOSSIL FOOTNOTES
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