



PALEONTOLOGY

Florida Meeting Shows Perils, Promise of Dealing for Dinos

FORT LAUDERDALE, FLORIDA—It was one of the most unusual coming-out parties Florida had ever seen. By day, some of North America's top dinosaur experts debated fine points of the evolution of birds and dinosaurs. After dark, they mingled with the cream of Fort Lauderdale society, supping, dancing, and drinking cocktails around a live alligator, assorted skeletons, and a dinosaur carved in ice.*

The debutante was *Bambiraptor feinbergi*, a nearly complete specimen of an unusually birdlike dinosaur, which will make its home in Fort Lauderdale as Florida's first "real bone" dino fossil. The meeting was in part a tribute to the contributions of amateurs to paleontology. But it also held some cautionary notes about the problems that arise from the increasingly wild and woolly world of commercial fossil dealing: Conspicuously absent from the party was a key player in the not-so-happy story of another fossil—a doctored specimen called *Archaeoraptor* that was also on display at the meeting.

Bambiraptor is the success story. Bambi was found in 1993 by the fossil-hunting Linster family at their private dinosaur plot in

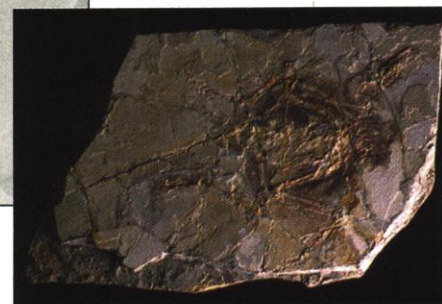


Party animal. While *Bambiraptor* (above) boogied, *Archaeoraptor* went to pieces.

Montana. Aware of the significance of their find, they contacted professionals and eventually found a supporter in Michael Feinberg of Hollywood, Florida. Feinberg bought the fossil for a reported \$600,000 and financed its reconstruction at the University of Kansas, Lawrence. Bambi is now the crown jewel of the newly created Florida Institute of Paleontology, the dinosaur branch of Fort

Lauderdale's Graves Museum of Archaeology and Natural History.

But the symposium, which drew 150 or so scientists, collectors, dealers, and grad students, also marked the end of a chapter in a less cheery saga: that of *Archaeoraptor*, a 124-million-year-old fossil found in the rich fossil beds of China's Liaoning province. Three days before the meeting, in Washington, D.C., scientists summoned by the National Geographic Society announced that *Archaeoraptor* is in fact a composite containing the remains of at least two animals—the body of a flying bird and the tail of a birdlike predator called a dromaeosaur.



The *Archaeoraptor* story has been a major embarrassment for *National Geographic*, which last fall touted it as embodying "a dramatic combination" of bird and dromaeosaur characteristics. The glued-together slab of stone holding the fossil was purchased last year—reportedly for \$80,000—at the Tucson

* The Florida Symposium on Dinosaur Bird Evolution, 7 and 8 April.

Dinos and Turkeys: Connected by DNA?

They said it couldn't be done. But a team at the University of Alabama just may have succeeded in extracting some DNA from a dinosaur. And guess what it resembles: a turkey. If the work pans out, the scientists say, it will be the "first direct genetic evidence to indicate that birds represent the closest living relatives of the dinosaurs."

Last week at the Florida Symposium on Dinosaur Bird

Evolution in Fort Lauderdale, biologist William Garstka of the University of Alabama in Huntsville reported that—with expertise from NASA and scientists from the Russian Academy of Sciences who have been probing for DNA in permafrost—he and colleagues may have isolated a stretch of mitochondrial DNA from 65-million-year-old *Triceratops* bones found in North Dakota.

Because the bones were poorly mineralized, he says, the researchers think they were able to get a 130-base pair se-

quence from two vertebrae and a rib fragment. Matching the sequence against DNA samples from 28 animals, including 13 bird species, they found that it made a 100% match with the turkey and at least a 94.5% match with other birds. Naturally, says Garstka, "we thought of turkey sandwiches" that had probably been consumed both in the lab and in the field. But when the team checked for turkey DNA in turtle bones, dirt, and burlap from the same site, none tested positive.

DNA from dinos is "for most

people a truly heretical idea," Garstka says, because many experts believe nucleic acid is unlikely to survive more than 100,000 years. Zoologist John Ruben of Oregon State University in Corvallis says, "The fact that turkey DNA was so similar to that of *Triceratops* was very suspicious." Garstka himself says that "at this point, I remain quite skeptical of our own work. We would expect this kind of result from a theropod [a birdlike dinosaur], but here we're talking *Triceratops*."

—C.H.

Site of the first Americans?



The mouse business: a special report



Gem, Mineral, and Fossil Show by Stephen Czerkas, an artist who with his wife Sylvia operates a dinosaur museum in Blanding, Utah. Czerkas enlisted the help of paleontologists Philip Currie of the Royal Tyrrell Museum of Paleontology in Drumheller, Alberta, and Xu Xing of the Institute for Vertebrate Paleontology and Paleoanthropology in Beijing. He planned to publish a scientific paper about the animal, to coincide with a dinosaur story in the November 1999 issue of *National Geographic*. In August, Czerkas and Currie hired paleontologist Tim Rowe of the University of Texas, Austin, to perform a computed tomography (CT) scan of the fossil.

Things started to go awry when both *Science* and *Nature* turned the paper down. *National Geographic* went ahead with publicizing the creature. But in December, Xu Xing, back in China, located a piece of rock containing most of a fossil dromaeosaur in possession of a farmer in Liaoning. Studying the tail, Xu says he became "100% sure" that it was the counterpart piece from the other half of the rock sandwich that held the tail of *Archaeoraptor*.

On 4 April, Xu brought the fossil to Washington, D.C., where scientists meeting at the National Geographic Society examined the two specimens side by side and then issued a press statement saying that the specimen is "a composite of at least two different animals." Rowe says his CT scans show that *Archaeoraptor*'s legs may come from a third, unidentified animal.

From a paleontological standpoint, *Archaeoraptor* has now split like stock—creating two new publishable specimens instead of one. Czerkas and Xu plan to co-author a paper about the bird part, which Czerkas presented at the Florida meeting as "a new toothed bird from China." (Czerkas is still calling the bird *Archaeoraptor*, although Xu says it's time for a new name.) And Xu plans to write up the still-unnamed new dromaeosaur.

Rowe and his CT scans, meanwhile, were nowhere near Fort Lauderdale. Rowe says he called the organizers of the symposium in late February, offering to present a talk on his results, but was turned down. One of the organizers, Wyoming paleontologist Robert Bakker, claims there wasn't room on the schedule to accommodate Rowe's "11th hour" request. Other sources, though, say Czerkas vetoed Rowe's participation. Rowe had recently submitted a paper on his results to *Nature*. In late March, Czerkas wrote to *Nature* and to the University of Texas threat-

ening legal action if *Nature* publishes the paper without his permission. Rowe says the collaborative agreement he entered with Czerkas and Currie clearly allows him to publish his results. Czerkas, however, says of Rowe: "He was hired help. It's my right to publish first."

Rowe says the *Archaeoraptor* fiasco is typical of what can happen when paleontology and profits mix: "All the fossils that have come through commercial hands that I look at with my new eyes have been severely tampered with." He says he warned Currie and Czerkas that preliminary scans indicated the specimen was "compromised" and might be a composite, but that Czerkas went ahead with the "publicity circus" at the National Geographic anyway. Czerkas responds that Rowe is operating from "20/20 hindsight." He says, "We all agreed at the SVP meeting [the Society of Vertebrate Paleontology, which met in Denver in October] that the most parsimonious interpretation was the tail belonged." It could not be determined from Rowe's CT scans whether the tail belonged with the bird body, Czerkas says; it was only Xu who came up with definitive evidence.

Anyone who wants more evidence had better work fast; Czerkas agreed to return the *Archaeoraptor* composite fossil to China on 25 May.

—CONSTANCE HOLDEN

PLANT SCIENCE

Stealth Genome Rocks Rice Researchers

For the past 3 years, researchers from 10 countries, led by Japan, have been working on an ambitious effort to sequence the rice genome. Last week, many of the participants were stunned to learn that the biotech giant Monsanto is well ahead of them. Monsanto and collaborators at the University of Washington (UW), Seattle, announced on 3 April that they had almost completed a rough draft of the entire rice genome. Equally surprising, the company said it would turn its data over to the international consortium. "This is very big

news," said Takuji Sasaki, director of Japan's Rice Genome Research Program, with more than a touch of understatement.

Monsanto's clandestine achievement is impressive. Not only is rice the first plant to be sequenced in rough form, but at 430 million bases it is also the largest genome ever sequenced—more than twice the size of the recently published *Drosophila* genome (*Science*, 24 March, p. 2185). If the company lives up to its promise to make the sequence public, the International Rice Genome Sequencing Project could complete its work in just 2 or 3 years—and for half the estimated cost of \$200 million. As a result, "public institutions committed to doing crop science research for developing countries' crops will have access [to the genome] much sooner, and without restrictions," says microbiologist Gary Toenniessen, director of the Rockefeller Foundation's food security program.

But because Monsanto (now a division of Pharmacia Corp.) kept the project secret—presumably to keep competitors in the dark while it got a first look at the sequence—few outsiders have seen the data, so it's hard to judge their quality or utility. And because there are few precedents for free public use of corporate data, some scientists are wondering whether the offer might be too good to be true.

The rice sequence is the fruit of a collaboration between Monsanto and Leroy Hood, now president of the Institute for Systems Biology. The company gambled that a sequencing approach developed in part by Hood would quickly decode the rice genome. If so, the results could be useful for engineering rice, and they may also help in understanding corn and other crops in which Monsanto is interested. Hood's approach is a refinement of the strategy being used by the publicly

funded Human Genome Project. It entails fragmenting the genome, putting the pieces in bacterial artificial chromosomes for copying, and working out the nucleotide sequence of each BAC one at a time. The refinement developed by the Hood team, led by UW's Gregory Mahairas, is a "very ef-



Instant rice. The sequencing effort by Mahairas (left) and Hood should lead to a completed rice genome years earlier than expected.