

Nesting dinosaur discovered in Mongolia

In the remote reaches of the Gobi Desert, paleontologists have discovered the fossil of a carnivorous dinosaur sitting upon a nest of eggs, a find that provides a rare glimpse into the behavior of these long-extinct animals.

"The position of this animal is really definitive. It looks just like a giant chicken with big claws on its feet sitting on a nest," says Mark A. Norell of the American Museum of Natural History in New York City.

The 8-foot-long ostrichlike dinosaur belongs to the genus *Oviraptor* and apparently died suddenly some 80 million years ago, when a large dust storm entombed it.

Norell unearthed the fossil during an expedition conducted by the museum and the Mongolian Academy of Sciences. The researchers reported their find in the Dec. 21/28, 1995 *NATURE*.

Although scientists have long suspected that some dinosaurs tended their nests and cared for their young, this is the strongest evidence yet that any dinosaur actually sat on its nest much as modern birds do. The *Oviraptor* fossil has its legs folded beneath its body, and its forelimbs surround a clutch of at least 15 eggs arranged in a circle.

"It's a wonderful find," comments Kevin Padian of the University of California, Berkeley. "It is probably the most spectacular discovery in terms of behavior since the fighting dinosaurs were discovered in the 1970s," he says, referring to another Gobi find—the fossil of a

predatory *Velociraptor* with its front claws locked around the skull of a *Protoceratops* skeleton.

Finding a dinosaur in a brooding position bolsters the widely held idea that birds descended from so-called theropod dinosaurs such as *Oviraptor*, say proponents of the theory.

"It fosters the very close link between dinosaurs like *Oviraptor* and *Velociraptor* and birds," says Norell. He suggests that brooding behavior evolved first in dinosaurs and was inherited by their avian descendants.

Dissenters from this theory brush aside such an interpretation, pointing out that pythons also sit on their eggs.

The Gobi fossil also heats up a long-simmering debate over dinosaur physiology: Were these ancient reptiles warm-blooded or cold-blooded? If *Oviraptor* sat on its eggs to keep them warm, the



Fossil shows animal's bones atop eggs.

D. Firmin and M. Ellison/Amer. Mus. Nat. Hist.



Artist's view of *Oviraptor* in life.

action would suggest that dinosaurs were warm-blooded, like modern birds.

While Norell finds the new specimen "suggestive of incubation," he does not rule out other possible explanations for the brooding behavior. The dinosaur may have sat on its nest to protect it from predators or to shield it from the sun or dust storms.

In any case, the discovery of a doting *Oviraptor* parent further vindicates this dinosaur, whose name means "egg stealer." The label stems from a misinterpretation on the part of American Museum scientists when they first visited the Gobi in 1923. The researchers found the fossil of an unknown animal with eggs presumed to belong to *Protoceratops*, so they reasoned that the new species had died while plundering the nest.

Norell cleared up the misconception last year. He discovered an *Oviraptor* embryo inside the same type of egg, suggesting that the original specimen had been tending its own nest. The new discovery of an *Oviraptor* in a brooding position demonstrates explicitly how this dinosaur cared for its eggs.

— R. Monastersky

Closing of bureau trims mining research

The imminent closing of the U. S. Bureau of Mines (USBM) as a cost-cutting measure will curtail research in mine safety and put a stop to some environmentally oriented studies, agency officials say.

"We worry that the science that goes to make a sound base for government regulation may not be there or be sufficient when it's needed," says Dave Brown of USBM in Washington, D. C.

As the 3 months that Congress set for dismantling USBM draw to a close on Jan. 8, some of the agency's research functions are resurfacing elsewhere. These functions have been trimmed to fit a \$40 million allotment, a far cry from USBM's original \$84 million research request.

The Department of Energy (DOE) plans to carry on with USBM studies to ensure the health and safety of miners, though with considerably reduced funding. Safety studies include examinations of how the geology of a site affects earth movement. DOE also intends to pick up the studies on rock characteristics. Such work led in the past to robotic rock sensors that keep drills centered in coal

seams and reduce the need for workers in dangerous drilling areas.

A program in materials research, with funding reduced from \$8 million to \$3 million, is also transferring to DOE. The program's aims include ways to improve the durability of steel and concrete.

The U. S. Geological Survey plans to take over about half of a USBM information program on the supply of 100 minerals worldwide, while a remnant of an ongoing inventory of minerals on public lands continues in Alaska under the Bureau of Land Management.

No agency is assuming the research aimed at developing cost-effective techniques for extracting small amounts of metal—methods useful both in mining operation and environmental cleanup.

"For years," Brown says, "we've been looking at ways to restore lands damaged by old mines, mills, and refineries." USBM researchers have devised ways to clear lead from soils, oil from riverbeds, and arsenic from water. Their botanical studies targeted species that stabilize iron and lead wastes or can blunt the

damage from acidic mine drainage. Says Brown, "all that's gone."

Such programs do not necessarily protect the environment, says Jim Lyon of the Mineral Policy Center in Washington, D. C., a nonprofit organization that tries to reconcile mining and environmental concerns. Lyon cites USBM's work on developing chemical methods to leach metals out of the ground.

"There's an irony here," he says. A process used to avoid moving so much earth "seriously jeopardizes groundwater quality." USBM's technique for recovering gold from low-grade ore by allowing cyanide to percolate through rock, Lyon says, "causes environmental problems every year." Acknowledging such problems, a recent USBM pamphlet describes how new research on a leaching agent that substitutes for cyanide "may give gold-mining companies some new options."

Despite the criticisms, USBM director Rhea L. Graham argues that the agency's research has been valuable. "It seems senseless to reject that kind of impartial knowledge and cut the science out of the solutions to our national problems."

— M. Centofanti