

## What would you like the Bush Administration to do?

Ideally, I would like to see the Administration paint a vision of where we need to be going. I guess that's what is lacking: the failure of a vision. ... It should be similar to what President Kennedy did for sending a man to the moon, and what President Eisenhower did after Sputnik. Everybody knows what is missing. But you need to explain what this means to the country. Or do you want all the jobs to leave this country, and have China become the dominant world power? The Chinese government is spying against us, and its government is throwing Catholic priests and Protestant clergy in jail and is plundering Tibet. Is that who you want to lead the world in innovation? I think most people would say no. ...

This country needs to do something to make sure that the jobs don't go abroad, that we do something to improve math and science education. We have to pay teachers more and make sure our youngsters have real math and science teachers. You can't stop the opposition. You can't stop a youngster in Romania from wanting to be involved in the American dream. So we have to make sure that we have good students, well-trained teachers, great universities, and the proper tax policy to foster research.

## Speaking of teachers, do you think that the debate about intelligent design ...

I'm not going to go there. I don't think that it's even part of this process. We're talking about funding. ...

## But many scientists are worried that it might affect public attitudes toward science.

No, I don't think so. ... What's going to make a difference is improving science and math education. I think that ID is a news story, and it's something that journalists like to write about. But it's not the real issue.

## Why doesn't the Administration share your vision [on what the U.S. needs to do to remain competitive]? Do they disagree with you, or do other things have a higher priority?

I think they are bogged down with other things. The war against terrorism is very important. Recovering from Katrina and Rita, too. And I don't know that up until earlier in the year, that there were quite the facts [available] to describe the problem. ... But my sense is that now, I'm hopeful that this will become a priority in the [next] budget that's submitted. You can't just do things with words. You need deeds, too. ... Most of what has to be done should be relatively non-controversial. The costs are not large.

—JEFFREY MERVIS AND ELI KINTISCH

## Paleontology



On show. The new fossil of *Archaeopteryx* will join this *Camarasaurus* and other Jurassic dinosaurs in the Wyoming Dinosaur Center.

## Best *Archaeopteryx* Fossil So Far Ruffles a Few Feathers

By acquiring a dream fossil, a privately owned museum hopes to boost its scientific reputation—but some paleontologists remain skeptical

When the first *Archaeopteryx* fossil emerged from Bavaria's Solnhofen limestone in 1861, the slab of rock electrified the scientific world. Sporting birdlike feathers but the teeth and tail of a dinosaur, the magpie-sized creature shed light on the origin of birds and bolstered defenders of Darwin's *Origin of Species*, published just 2 years before. Over the next century, six more skeletons turned up in the same rocks and won pride of place in some of the most prestigious natural history museums of Europe.

Now there is one more in the flock, and it's causing a flap. On page 1483, paleornithologist Gerald Mayr of the Senckenberg Natural History Museum in Frankfurt, Germany, and colleagues describe the best preserved *Archaeopteryx* yet. "By all measures, it is a treasure," says Peter Dodson of the University of Pennsylvania. Unlike its predecessors, however, this one is heading not for a major urban museum but to a small, privately owned museum in Thermopolis, Wyoming (population 2953). And some paleontologists say it deserves better.

The new specimen is undeniably world-class. The skull further links *Archaeopteryx* to its close dinosaur relatives. The foot is also better preserved than that of previous specimens, and it shows a hyperextensible second toe—like the killer claw of *Velociraptor*—

and appears to have been best suited for life on the ground rather than in the trees as some had supposed. Although there's nothing radically new about the specimen, "it's the dream of every paleo-ornithologist to describe an *Archaeopteryx*," Mayr says. "We would have loved to have the specimen in Frankfurt."

Instead, the *rara avis* will alight in the Wyoming Dinosaur Center, founded in 1995 by Burkhard Pohl, an independently wealthy former veterinarian with a lifelong interest in fossils. "There's no guarantee that it will be preserved and curated in perpetuity," says Mark Goodwin of the University of California, Berkeley's, Museum of Paleontology. Goodwin and others are also leery of Pohl's connections to the world of commercial fossil dealing, an activity that they argue undermines scientific research (*Science*, 14 April 2000, p. 238). Both the Society of Vertebrate Paleontology and its journal have policies strongly discouraging the study of privately held fossils.

But Mayr and other scientists say that the specimens at the Wyoming Dinosaur Center are too good to ignore and that Pohl has made efforts to beef up his institution's scientific expertise. "They really are striving to establish a level of credibility," says Brent Breithaupt, who heads the University of Wyoming Geological Museum in Laramie.

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Pohl, 49, grew up with an interest in natural history. After earning a Ph.D. in veterinary medicine at the University of Berne, Switzerland, Pohl worked in a virology lab, but fossils were his real interest. With a sizable inheritance from his family's cosmetics and hair-care company, Pohl began to expand his collection.

In the early 1990s, while traveling through the Big Horn Basin of Wyoming, Pohl heard about a ranch near Thermopolis with dinosaur-rich outcrops. Pohl and his then-business partner, a German fossil preparator and dealer, negotiated a lease to dig for fossils. When the 3035-hectare property came on the market in 1993, Pohl bought it for \$800,000.

Their company, Big Horn Prospecting Inc., was set up as a for-profit business to excavate dinosaurs. The partners soon split up, and Pohl decided to set up a museum that would show fossils being dug up and prepared, as well as exhibits of casts and real skeletons. In July 1995, he opened the Dinosaur Center, a 1500-square-meter steel building. "It's not the prettiest structure," he admits. Pohl also set up the nonprofit Big Horn Basin Foundation to help care for the fossils, run the exhibits, and take tourists, for \$125 a head, out to dig at some of the sites.

As museums go, the center is a shoestring operation. About a dozen people, including three or four preparators, work there year-round. Pohl holds the only Ph.D. In May, he hired Scott Hartman as science director. Hartman has a bachelor's degree in zoology, training in scientific illustration, and several years of museum experience. This year, Hartman and his colleagues presented findings at the Society of Vertebrate Paleontology's annual meeting, including the oldest known specimen of a troodontid (see *ScienceNOW*, [sciencemag.org/cgi/content/full/2005/1021/1](http://sciencemag.org/cgi/content/full/2005/1021/1)).

Pohl also makes specimens in his collections available to outside scientists. In July 2004, Eric Buffetaut of CNRS in Paris and David Martill of the University of Portsmouth, U.K., published a paper in *Nature* that showed that a fish-eating dinosaur called *Spinosaurus* ate pterosaurs too. The Brazilian specimen—a tooth embedded in a pterosaur vertebra—is housed at the center. "I do not describe fossils in private collections, if I can help it," says Buffetaut, but he says he has no misgivings about fossils in the Wyoming Dinosaur Center. "I know who's in charge, and I trust him to behave in a scientifically acceptable way."

But some paleontologists remain uncomfortable about

working with Pohl. They want to be absolutely certain that fossils, particularly foreign ones, were legally excavated. China and Mongolia, for example, have spectacular vertebrate fossils—and laws against exporting them. Pohl says that the center has never bought anything from these countries, but he himself has purchased specimens with an unclear history, because they looked scientifically significant. "If I know something is stolen, I won't touch it," he says. But he acknowledges, "it's really gray lots of times."

Scientists also worry about whether the center can guarantee them future access to scientific specimens, as mainstream museums can. Privately owned specimens can be sold. Although some of the center's fossils, including the *Spinosaurus* tooth, are officially owned by the Big Horn Basin Foundation, others belong to Big Horn Prospecting or to Pohl himself. Hartmann says he doesn't know exactly how many of the collection's 10,000 bones fall in each category. The center is overhauling its collections database and management system, he says, to make curatorial information more accessible and track issues of ownership.

The origins of the *Archaeopteryx*, however, remain hazy. Pohl says he "found a donor" to buy it from a private collector after the Senckenberg failed to raise enough money. (Mayr declines to reveal the asking price, but the Paläontologische Museum München paid DM 2 million—about \$1.3 million—for a less spectacular specimen in 1999.) The *Archaeopteryx* appears to be legal, because Bavaria allows the export of fossils.



**Prize bird.** This new specimen of *Archaeopteryx* is one of the best preserved and the first to go to a museum outside Europe.

Pohl won't say who legally owns it, but he says that it's "guaranteed that it will stay in a public collection."

That's not good enough for some paleontologists, who recall ruefully how another privately owned *Archaeopteryx* went missing after its owner died in 1992. They worry most about so-called type specimens—the original reference fossils for new species. Pohl himself owns the type specimen for a new species of crane, *Parvigrus pohli*, which Mayr described in the 29 July online issue of *Naturwissenschaften*. "Having a holotype in a private collection is quite questionable," says Luis Chiappe of the Natural History Museum of Los Angeles County in California. Kevin Padian of the University of California, Berkeley, goes further: "No respectable journal would publish a specimen that was not in a permanent public repository."

The critics say their fears would be eased if the center were officially accredited by the state or federal government. Pohl and Hartmann say that the center already abides by many guidelines. "The policy that we have is that the first and best of every specimen should stay in the collection," Pohl says. After he dies, Pohl says, he wants the collection to stay together, but he hasn't worked out the details yet. If his family is any indication, there's reason to believe. Last year, Pohl's mother, a Ph.D. biologist and lifelong mineral collector, donated her collection of more than 80,000 minerals to the Technische Universität Bergakademie in Freiberg, Germany—making its collection the largest in the world.

—ERIK STOKSTAD



**Digging in.** Burkhard Pohl, owner of the Wyoming Dinosaur Center, helps out with an excavation on his ranch.