

Digging for dinos

Geography grad unearths lost dinosaur

By Rob Laymon '82

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It's amazing what you can accomplish with a length of pipe and an industrial cement vibrator. Not so very long ago, **Ken Lacovara '84** began a promising geological career with just such tools.

"What I try to do," said Lacovara, now a geology professor at Drexel University, "is piece together the succession of environments through time. The way you do that is by starting at the bottom of the birthday cake and working your way up through each layer, because each layer indicates a different environment at the time those sediments were deposited."

The tool for studying the earth requires taking about 10 feet of aluminum irrigation pipe, attaching a vibrator to one end, then tilting the assembly to vertical, non-vibrator end down, on soft ground. When this pipe buzzes its way down into soft earth and Lacovara brings it back up, it contains a chronological sample of the ground's sediment going back thousands

Their research touched off a storm of publicity that brought Lacovara calls from all over the world. *The New York Times* wrote them up, as well as *The Washington Post*, *Newsweek*, *Time* and *USA Today*. National Public Radio has interviewed him several times and a documentary on their trips to the Sahara, "The Lost Dinosaurs of Egypt," will air in 2002, to be followed by a second film perhaps a year later.

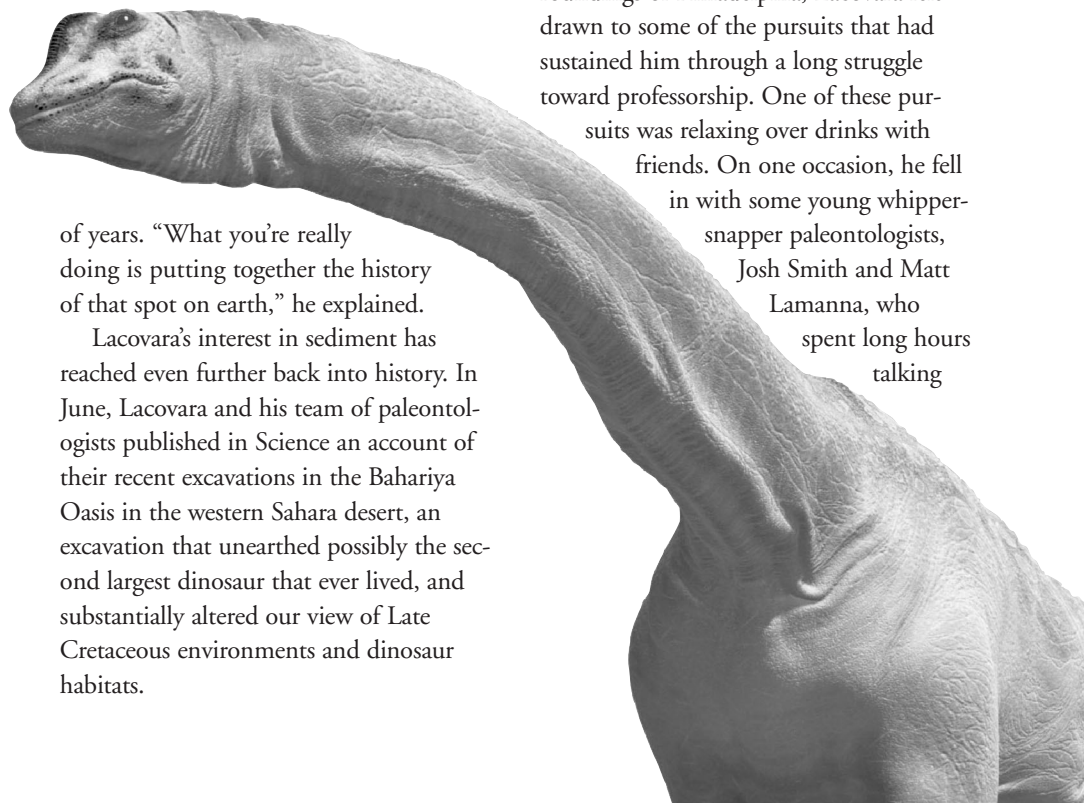
Suddenly Lacovara finds himself one of the leading dino hunters of the world and an expert in dinosaur environments. "I've been trying to keep up with all the publicity and teach class at the same time," Lacovara said. "Still, it's been pretty gratifying." He is also scheduling fieldwork, managing www.egyptdinosaurs.org and seeking funding for the next trip to Egypt.

To tell the truth, it all began at a local pub. Two years ago, with a new teaching post at Drexel and the unfamiliar surroundings of Philadelphia, Lacovara felt drawn to some of the pursuits that had sustained him through a long struggle toward professorship. One of these pursuits was relaxing over drinks with

friends. On one occasion, he fell in with some young whipper-snapper paleontologists, Josh Smith and Matt Lamanna, who spent long hours talking

of years. "What you're really doing is putting together the history of that spot on earth," he explained.

Lacovara's interest in sediment has reached even further back into history. In June, Lacovara and his team of paleontologists published in *Science* an account of their recent excavations in the Bahariya Oasis in the western Sahara desert, an excavation that unearthed possibly the second largest dinosaur that ever lived, and substantially altered our view of Late Cretaceous environments and dinosaur habitats.



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about reopening digging on the Bahariya Oasis.

This was a site famous in dinosaur lore, a site untouched since the great German paleontologist Ernst Stromer gathered his tools and left it for the last time in 1918. Smith and Lamanna asked Lacovara to join them and he did. It was a compelling idea for several reasons.

Ernst Stromer had visited the

ture, 45 feet long, with a six-foot sail running down its back.

But bad luck attended Stromer. He fought for 15 years to get his specimens back to Germany to the Munich Museum of Paleontology—which, unfortunately, sat across the street from the local Nazi headquarters. When World War II began, and Stromer tried to move the collection out of the muse-

entire collection was wiped out, and about 10 years later he died.

When Lacovara's team faced the prospect of going back to Egypt, they felt they did it at least partly in tribute to Stromer. Yet exploration in Egypt would prove no easier for the 21st century team than it did for the earlier scientist. Egypt is notorious for letting dig requests fall through its bureaucratic cracks.

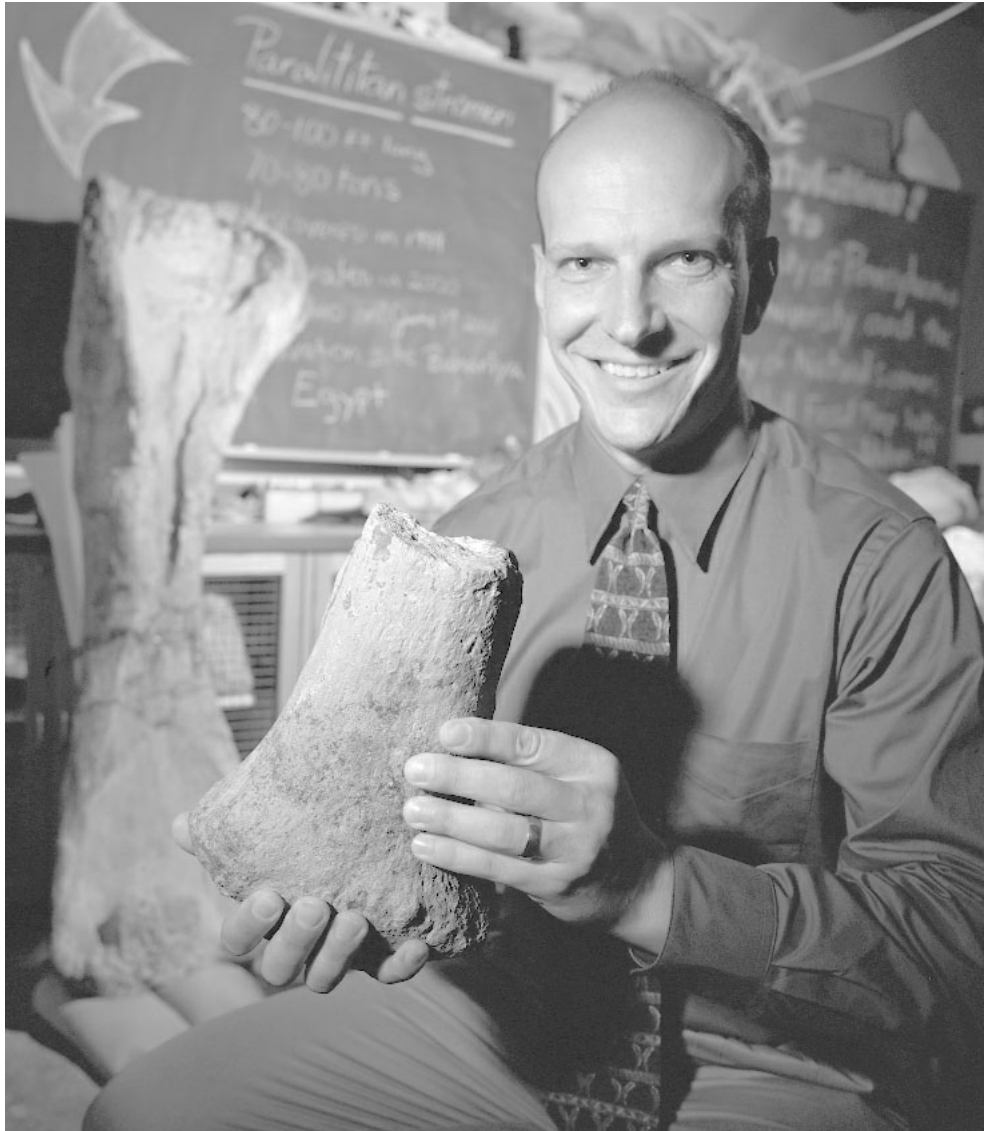
Even with official permission granted, the bureaucracy still put brakes on their progress. Lacovara said they all sat smiling and polite in some official office, waiting for a permit, while no one said anything for 30 minutes. Waiting and smiling politely turned out to be a major talent of the team.

Funding proved another challenge. Failing to get academic or science grants, the team turned to a young TV production company whose three principals gave them \$60,000 from their personal checking accounts. In exchange, they got to film the dig team. "This kind of research is among the least expensive that can produce top-level science," Lacovara said. "We don't need fancy lasers or rocket boosters. We basically need plane tickets and a Jeep."

And so they all set off, first in 2000 and again in 2001. On the second trip, whirling around the Sahara in a Toyota Land Cruiser trying to piece together clues to the location of Stromer's last dig, they almost ran over what turned out to be the largest dinosaur bone anyone had ever seen.

This bone marked the spot of a kind of dinosaur El Dorado and the team got to work. Day after day they dug bones out of that site, some of them quite large. Lacovara describes a moment when two of the workers, each working on a bone four feet apart, discovered together they had the same bone between them. Little by little they collected their bones and shipped the whole lot home.

What they found was nothing less than the second largest dinosaur yet discovered in the world. *Paralititan stromeri*, a long-necked, plant-eating 80-



Back at home, Lacovara, shown here holding a single Paralititan toe bone, teaches and conducts research at Drexel University. The nearby Academy of Natural Sciences in Philadelphia is the temporary home of this new colossal beast.

Bahariya Oasis numerous times in the early 20th century, and had discovered several new dinosaur species. He had found, in fact, the world's only skeleton of a *Spinosaurus*, a strange-looking crea-

um, he learned it was dangerous to suggest the fatherland could suffer at the hands of the enemy. In 1944, the Royal Air Force bombed both the headquarters and the museum to cinders. Stromer's

ton colossus, lay down and died on the meadow bottom of what is now the Bahariya Oasis, some 93 million years ago. Lacovara suggested the creature's name, "paralititan," meaning "tidal giant," and "stromeri" in honor of Ernst Stromer.

Paralititan stromeri is closely related to *Argentinosaurus*, a 100-ton herbivore found in Argentina. Its presence in Africa shows that similar animals existed at the same time in North Africa, and may have had a common ancestor, who moved from one continent to another when South America and Africa were a single land mass. The team also found bones from several carnivores at least as large as *Tyrannosaurus Rex*, and a species of crab found elsewhere only in the Antarctic.

But what intrigued Lacovara most, and what may count on par with the discovery of the world's second largest dinosaur, was the new intelligence gathered on the animal's surroundings. Lacovara discovered that what we now call the western Sahara consisted in the Late Cretaceous period of lagoons, tidal channels, islands and barrier beaches—a low-energy coastal system. In short, it was a mangrove, a marshy land thick with durable trees and carpeted with swamp vegetation. It was a place very much like the 10,000 Islands section of the Florida Everglades.

The existence of mangroves in the late Cretaceous age puzzled researchers. Lacovara established for a certainty that they did. "No one really knew that mangroves served as a habitat for dinosaurs," he said. "But it makes sense that they did. Mangroves are an extremely productive environment, and big herbivores need a lot to eat. To have big carnivores, you have to have big herbivores. And we found three big carnivores, each about 45 feet long."

This discovery brought several others in tow. "We demonstrated that this animal walked out into the mangrove before it died. The mud flat and tidal

channels that it came to rest on would have been too shallow for it to have floated there," Lacovara said. "And not only that, it appears to have been scavenged by a predator dinosaur, because we found bite marks in one of its legs, and teeth in the quarry. So it shows that not only did *Paralititan* go out there, but at least one other dinosaur did, too."

Coastal geology is something Lacovara is familiar with. Now a resident of Lafayette Hill, Pa., he still visits family in Cape May County. He grew up in Linwood, near the southern New Jersey shore. From a fairly early age, he recognized that his hometown was the remains of a barrier island tens of thousands of years old. In the very shape of the town he saw the monuments of geological evolution. The main highway had once been a dune ridge, the parallel railroad tracks the swale inland of it.

For his master's thesis at the University of Delaware Lacovara wrote about the development of Little Beach Island, now part of the Edwin Forsythe Wildlife Refuge, just north of Atlantic City. For his doctoral dissertation he studied the coastal history of southern New Jersey over the last two million years.

Lacovara names two Rowan professors as influencing his career. When he had the opportunity to go to California as a member of the drum and bugle corps, Lacovara was unsure if he should go or not. "Professor Chet Zimolzak said I should go. He wanted me to have that experience. College would be here, he told me," recalled Lacovara. "And it was great advice. Before that I was a mediocre student. When I got back, I got straight A's."

He also credits Professor Emeritus Jerry Lint for introducing him to coastal geology. "His lectures on the topic were so fascinating that I pursued a senior thesis on it and went on to study it in grad school."

Most recently Lacovara has conducted research in an area just west of

Denver, to study the remains of dinosaurs very much like those he helped find in Egypt. He hopes to learn if a mangrove existed there, as well. And other dino hunting trips glimmer on the horizon. "It's not unusual for a geologist to go on a dinosaur dig and, in fact, it's becoming more common," Lacovara said. "Paleontologists realize that, by collecting dinosaur bones out of context, you are missing a lot of the science at the site. You are learning about the animal with no regard to its habitat. If someone 50 million years from now finds a lion and doesn't know anything about the savannas of Africa, they don't understand what it is to be a lion. The savanna has much to do with lion-ness."

Ironically, the place he knows best, South Jersey, contains untold troves of dinosaur bones that he may never get to excavate. The first dinosaur found in North America was found in Haddonfield, he notes, and it was the first nearly complete skeleton ever found in the world.

"All around Glassboro, there are dinosaurs. They have been found in Swedesboro and Mullica Hill. There are dinosaurs probably less than 10 miles from my office," Lacovara said, "but we can't get to them because of the climate here. The bones have a bunch of pesky plants and trees on top of them, and housing developments. That's why we have to go to Egypt and Argentina and Montana. We have to go to places that are dry."

The man who found wetlands in the Sahara now happily confronts a future of more expansive research and deeper insights into the nature and location of coastal systems. Already he has visited Colorado to collect evidence of long-vanished shorelines, and more such projects beckon. As human time carries forward, one cannot doubt that Lacovara will find, in yet farther and more ancient places of the world, the deep contours of home. ■