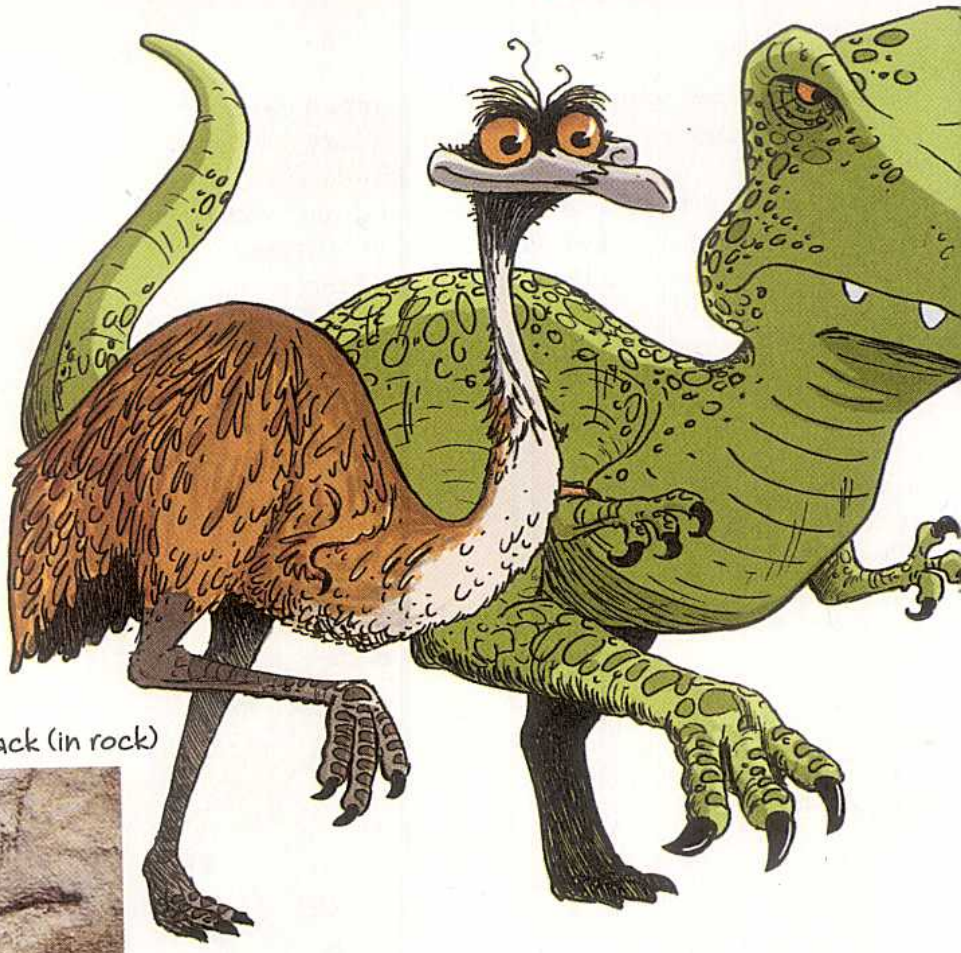
Walking

By Cheryl M. Reifsnyder, Ph.D. Ai

How much can we learn from old footprints? Professor Brent Breithaupt has learned quite a bit.

This dinosaur detective is on the trail of creatures that lived 165 million years ago. What kinds of dinosaurs were they? What were they doing?

Like any good detective, Breithaupt began with a thorough study of the scene: the Red Gulch Dinosaur Tracksite in northern Wyoming. He is director of the University of Wyoming Geological Museum, and he knew that fossils of dinosaur footprints had been spotted there in a dry streambed.



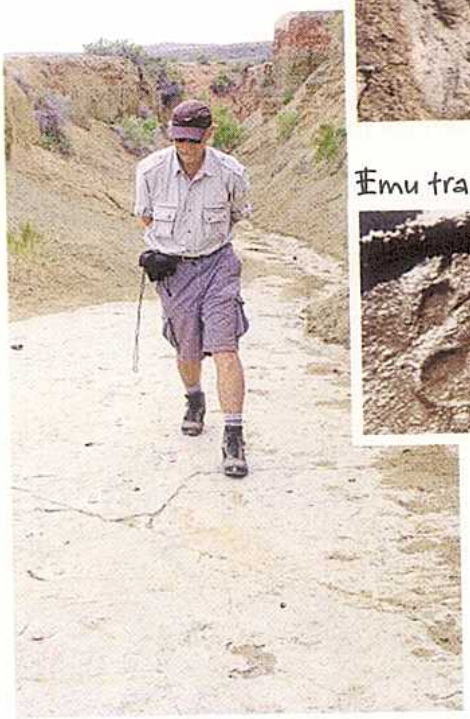
Studying Dinosaur Tracks

On hands and knees, Breithaupt and his team searched for dinosaur tracks. They mapped, measured, and photographed the footprints.

"As we started sweeping off the site and looked closer, we noticed that we had more than just a few footprints," he said. "We realized we had dozens, and then we realized that we had hundreds, and now we realize we have thousands of footprints up there."

Dinosaur track (in rock)

Emu track (in mud)



Professor Breithaupt follows the dinosaur tracks.

The prints were all three-toed, the sort made by *theropods*, meat-eating dinosaurs that walked on two feet.

Connecting the Footprints

Professor Breithaupt wanted to see the paths of individual dinosaurs, but it was hard to make sense of so many footprints. He marked the prints with plastic chips, using a different color for each dinosaur. "It was kind of like a bad game of connect-the-dots," he said.

The result: lines of colored chips that showed the dinosaurs' paths. In some places, the lines seemed to move and turn together. In other places, the footprints showed that the feet of a single dinosaur had crossed in front of each other, as if the dinosaur had been staggering.

Professor Breithaupt needed something more to help interpret the tracks. "I knew that I needed to get a better understanding of an animal that made footprints about the size of the ones we had

Photos courtesy of Professor Brent H. Breithaupt, except page 32 (left) courtesy of Neffra Matthews.

Dinosaur

Who struts like a dinosaur? An emu does!

at the Red Gulch Dinosaur Tracksite," he said. He needed to observe a "substitute dinosaur."

Enter the Emu

Since birds are closely related to dinosaurs, he tried flightless birds. He discovered that ostriches are too aggressive and that rheas have a bad habit of stealing his tools. But emus are gentle and cooperative—and their three-toed feet are a nearly perfect match to the dinosaur footprints.

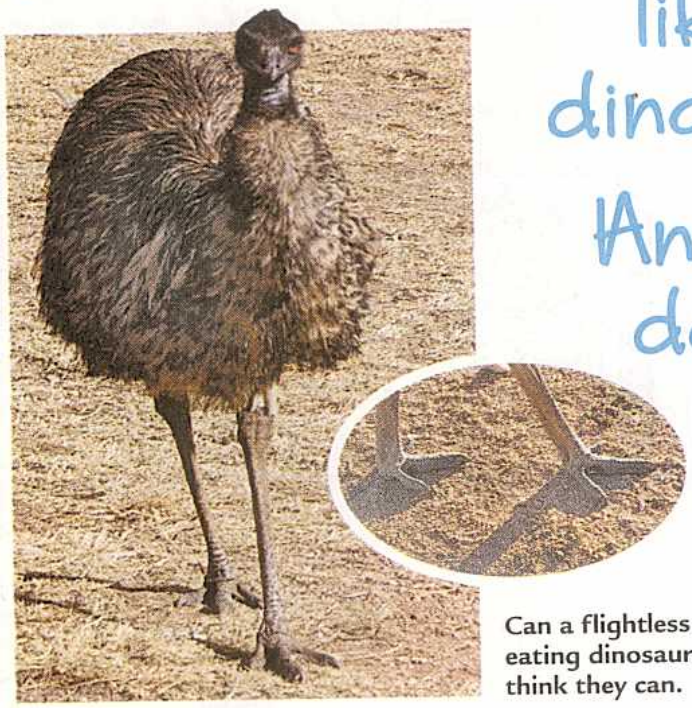
Professor Breithaupt began to spend time with emus at the Rabbit Creek Emu Ranch, in Livermore, Colorado.

His first question was, What different types of footprints could emus make? He studied emu prints in different kinds of soil. In thick mud and some kinds of sand, an emu's footprint might be deep and wide. But in softer mud, the same foot might leave a thin, shallow print if the soft edges around the print fell in.

At the tracksite, Breithaupt had seen wide-toed tracks and thin-toed tracks. He wondered if they might both be from the same dinosaur. Now he knew: the same foot could form wide marks or thin marks.

His second question was, What kinds of tracks did emus make when they were doing different things? He hoped to answer the question by watching what emus did—and recording the tracks that went with different behaviors.

He and his team spent weeks and months watching the birds.



Can a flightless bird show how meat-eating dinosaurs walked? Scientists think they can.

"Looking at how animals move, how they position their feet, how they start and stop—that's been useful," Breithaupt said.

He saw that emus often walk side by side in small groups. They turn at the same time, stop at the same time, and pause to look around at the same time. Their footprints were similar to some of the footprint patterns he'd seen at the tracksite.

Breithaupt realized the emus' behavior could explain why these dinosaur footprints didn't overlap and why their tracks turned at the same places. Like the emus, they might have walked in small groups within a larger herd.

Breithaupt also observed emus crossing one foot in front of the other as they walked—just as the dinosaur tracks had crossed. "They cross over when they're walking very, very slowly," he said. "The left foot will cross over in front of the right, and the right foot will cross over in front of the left. That usually indicates some level of observing the environment around them."

The dinosaurs might have been doing the same thing—walking slowly, looking from side to side to check for danger. The emus helped solve the mystery of the crisscrossing footprints.

The Best Part

Like other dinosaur detectives before him, Breithaupt has shown that studying today's world can help solve mysteries of the past.

What's his favorite part of his job? "Everything!" he exclaims. "Well, my *favorite* part is actually being able to put together the story the footprints tell us."

He expects to learn more from emus, perhaps when he travels to Australia, where he can observe them in the wild. Like all dinosaur detectives, he will continue to search for clues.