The Dinosaur Detective - BP Magazine January 2003

Entering into Dinosaur Provincial Park in southeastern Alberta, Canada is like slipping through a cosmic portal into a strange new world, a land that time forgot.

The terrain is studded with formations of hoodoos – brown and gray sandstone sentinels shaped by wind and water. Sparse green clumps of vegetation are scattered through a stark landscape of mesas, buttes and coulees. The sun-baked valley of the Red Deer River can reach nearly unbearable temperatures of up to 51 degrees Celsius (124 degrees Fahrenheit) in mid summer. It is home to scorpions, black widow spiders and prairie rattlesnakes.

The valley looks a little different than it did 75 million years ago, when lush forests covered a coastal plain, rivers flowed into an inland sea and dinosaurs roamed in warm swamps. They may not have lived here for the past 63 million years, but dinosaurs continue to be a big draw to the park's 70,000 annual visitors.

In the last 100 years, more than 150 complete skeletons have been found, representing almost 40 different dinosaur species.

Dr. Philip Currie, Canada's leading paleontologist and curator of dinosaurs at the world-class Royal Tyrrell Museum of Paleontology near Drumheller, Alberta, has found many of them.

Currie, a young-looking 53, has conducted dinosaur "digs" in Western Canada, the Arctic, Argentina and China. He has explored the social patterns of huge meat-eating dinosaurs, identified two duck-billed dinosaurs, investigated flying reptiles and discovered some of the first dinosaur eggs. The media has variously dubbed him Indiana Bones, The Bonehunter, Mr. Lucky and the Dinosaur Detective. With his square-jawed good looks, lanky frame and long tousled hair, Currie was one of the models for Sam Neill's character, paleontologist Alan Grant, in the movie Jurassic Park.

Currie may have a profile worthy of Hollywood but, first and foremost, he is a scientist of international repute; a man whose passion with dinosaurs started at age six, when he pulled a dinosaur toy from a cereal box at home in Ontario. Ever since, he's made it his life's mission to learn more about dinosaurs and to share that knowledge with the world.

"I'm trying to bring dinosaurs back to life by determining their behaviour and physiology," Currie explains in an interview.

"It really is exciting to see something nobody's seen before, like finding buried treasure."

Currie made international headlines in 1998 when he co-authored a report in the respected London-based journal *Nature*, claiming birds evolved from dinosaurs. The report was based on research in China, where he was a driving force behind a scientific exchange called the Canada-China Dinosaur Project. In 1997, farmers in the northern province of Liaoning found two dinosaur fossils, clearly showing feather impressions on their tails and forearms. The only non-Asian on the find, Currie made the bird-dinosaur link, rationalizing that feathers are too complex to evolve more than once and therefore can appear only in related species.

For 22 years, Currie has spent three months each summer solving prehistoric mysteries in Dinosaur Provincial Park, which the United Nations designated a World

Heritage Site in 1979, giving it historical status equal to the Egyptian Pyramids and the Grand Canyon. The Geological Survey of Canada proclaimed the area a significant dinosaur field as early as 1898. Formally preserved as a park in 1955, it hosts the field station for the Tyrrell Museum, established with Currie's support in 1985.

Rivers shaped the valley walls, hills and hoodoo formations, creating the unique terrain of the 26-square-kilometre park. About 14,000 years ago, at the end of the Ice Age, glacial meltwater carved the Red Deer River Valley. The badlands continue to be sculpted by water, frost and wind, constant erosion revealing new fossils every year. Hence the park's unofficial slogan: Ever changing, but never changed.

"With paleontology, people think it's pretty static," Currie notes. "But, in reality, it's changing so much over the years."

Searching in the park in 1995, he and other fossil hunters discovered the full skeleton of a 75-million-year-old ostrich-like carnivorous dinosaur *Ornithomimus*. At another site a few years later, Currie used a faded photograph taken by American fossil hunter Barnum Brown in 1910 to discover a bone bed containing remnants of another giant meat-eater, *Albertosaurus libratis* – Alberta lizard – a 2,500-kilogram, 8.5-metre-long beast that lived in the Cretaceous period 75 to 84 million years ago. Currie again made news by presenting a new theory that *Albertosaurus* lived and hunted in packs rather than alone as was long believed.

Working alongside his wife and research associate, Danish-born paleobotanist Eva Koppelhus, Currie and his team of university students and volunteers use jackhammers, pickaxes, shovels and brushes to unearth fossils and skeletons from their sandstone tombs. Until a few years ago, the process of mapping each dig site – called a quarry – and each "find" was complex and time-consuming.

Using a topographic map taken from aerial photographs, Currie would generally locate individual sites. Identifying them took one hour each and accuracy was limited to within 10 metres – which seemed like a mile when trying to relocate a bone or fossil covered by mud or grass since it was first found.

"Trying to pin it down sometimes was an absolute nightmare," he recalls. "It used to drive me squirrelly."

That challenge was remedied in the late 1990's after Currie encountered Bill Spencer, business development manager of Calgary-based BP Canada Energy Company's natural gas liquids business unit. After a propitious meeting, the two men developed a personal friendship and professional bond, which led to BP generously assisting Currie in his historic work.

Bill Spencer grew up near the town of Hanna, about 110 kilometres north of Dinosaur Provincial Park. He loved to hunt for arrowheads, tipi rings, buffalo kill sites and other aboriginal remnants in the grass and sagebrush-covered hills and coulees on his family's farm and near a family-owned cabin at a nearby lake. His father, Art, was a history buff and developed the Spencer Historical Society.

Bill Spencer was working with BP in 1997 when he spotted an item on television featuring Currie's groundbreaking – literally and figuratively - work in Dinosaur Provincial Park. Spencer saw it as a chance to extend his boyhood hobby and explore the place where dinosaurs once roamed not far from where he grew up.

His heart started beating faster as he contemplated digging for fossils and bones alongside such a respected paleontologist. Spencer phoned the Tyrrell Museum and volunteered to help.

That's how he found himself one Saturday in August 1997 laboring on his first dig – "prospecting for dinosaurs," he called it - in sweltering heat in Dinosaur Provincial Park. Bill was impressed upon meeting Currie.

"Here was a world-renowned paleontologist who was really easy to talk to about dinosaurs and who would take the time to explain things to a person who knew very little about them," recalls Spencer, 44.

On that first day, he was overwhelmed at the number of dinosaur bones he saw. His group found a number of dinosaur bones and bone pieces, including dinosaur and prehistoric fish teeth, one from a juvenile *tyrannosaur*. They later discovered a skeleton of a *hadrosaur*, a gargantuan plant eating, duck-billed dinosaur with a long tapering tail, plus an *ankylosaur* skull and the intact skeleton of a rare *myledaphus* fish. At that point, Spencer says, "I was hooked."

He was so impressed with Currie's passion and professionalism that he started thinking of ways that BP Canada could help. BP has a history in the region, operating its NGL Empress straddle plant just 80 kilometres east of the park.

In 1998, Currie uncovered an intact juvenile *hydrosaur* skeleton imbedded in sandstone and indicated a desire to move it whole back to the Tyrrell Museum. Spencer asked him how he planned to do that. Currie wasn't sure. Spencer spoke to a local oilfields trucking company – Jo-Ann Trucking Ltd. - in the nearby town of Brooks.

They hatched a plan to use a low-impact Foremost Commander, an 80-tonne, fat-wheeled vehicle used to move drilling rig equipment in soft muskeg. The three-tonne, plaster-encased fossil was removed from the environmentally sensitive area without leaving a trace. The following year, using the same process, a six-tonne juvenile *Albertosaurus* was excavated and moved onto a waiting truck for delivery to the Tyrrell Museum. Both dinosaurs are on public display.

For each job, Jo-Ann Trucking donated considerable manpower time and equipment, and BP Canada picked up the $6,700 US total tab for the use of the Commander.

Spencer then set out to help Currie improve his outdated, time-consuming and imprecise method of mapping "finds."

He approached colleague Jason Humber, a senior petroleum engineer, and asked whether sophisticated global positioning system (GPS) technology the company used in its fieldwork could be applied to paleontology. Humber adapted GPS survey technology based on Arc-View software to suit Currie's needs.

Since 1999, it's been used to help trace the evolutionary history of Dinosaur Provincial Park, mapping key geological areas and pinpointing more than 800 dinosaur and bone bed sites. The system is accurate within 10 centimetres – compared to 10 metres with the former process – and takes just five minutes to pinpoint the location of each quarry, as opposed to one hour before. The project continues this year.

Spencer also arranged BP sponsorship of Currie's dig at the Dry Island Buffalo Jump, near Three Hills, Alberta. It's one of only two sites in the world – Argentina's the other – where Currie has found evidence of the *Albertosaurus* meat-eating dinosaurs living and hunting in packs. The remains of at least 13 different specimens have been

identified. The company has donated helicopter services to transport equipment, fossils and people.

Not content to stop there, Spencer also spearheaded an innovative program in which about 20 BP employees – sometimes with their families - have volunteered to help with summer digs on their own time. The volunteers consider it an opportunity of a lifetime to spend a week on site, often working 10 hour days in stifling heat while uncovering fossils and other prehistoric pieces.

It is a painstaking, exhausting process. In six long days in August 2002, the combined BP-museum crew used jackhammers, air compressors, electric generators and conveyor belts to remove 60 tonnes of sandstone bedrock from a 12 metre-by-12 metre area. The museum team working alone with pickaxes and wheelbarrows would have taken two years to remove the same amount of rock.

A grateful Currie said BP employees are ideally suited to dinosaur digging because oil and gas exploration also requires knowledge of geology and paleontology.

By the end of 2003, BP will have contributed $72,275 US towards sponsorship of Currie's research. Used to working with tight budgets at the museum and universities, he considers himself very fortunate to have the corporate support. "The partnership is extremely important," Currie says. "Bill Spencer kind of opened up the world for me."

Just as Currie has welcomed BP into his work environment, so have company officials invited him to their – decidedly different – corporate home.

One day in November 2002, Currie, wife Eva, Spencer and other company officials gathered in a room full of computerized visual equipment on the 19th floor of the BP office tower in Calgary.

The room is called the HIVE, which stands for Highly Immersive Visualization Environment. At the controls, technician Richard Spiteri, who had introduced himself as "Your pilot today," presents a dazzling, multi-coloured array of 3-D models of Currie's quarries on a floor-to-ceiling wraparound screen covering the front wall.

The models show the general location of the digs on surface grids, and also their depth and surrounding geology. At the controls, Spiteri zooms in and out, turning images on their sides, reversing models and showing views from every conceivable side.

Currie, who still remembers the days of hand-drawn maps and educated guesses, smiles and shakes his head as he sat in faded jeans, sweater and leather loafers. He is at once impressed and thankful for advances in technology that help him unravel the mystery of beasts that roamed the Earth millions of years ago.

Currie still retains the same passionate curiosity as that six-year-old who excavated a plastic t-rex from a cereal box so many years ago. He's never stopped wondering, and he's never stopped looking and learning.

"It's an incredible feeling," Currie says with his trademark grin.

"It's very hard to believe anybody could have a job as good as mine."