

# Unlocking the mysteries to early life on Earth

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Bob Florence More from Bob Florence

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Michael Cuggy likes reading mysteries. He could write one. A true story is happening before his eyes.

Cuggy is a science lab co-ordinator at the University of Saskatchewan. Schooled in zoology, on staff in geology, he brings the blood and buzz of biology to the study of fossils.

For almost a decade he has travelled to north central Manitoba to do field work. Using a hammer and chisel he breaks rock, looking for signs of ancient life.

“It’s very rewarding and very frustrating,” he said. “Some days you find crazy things, some days nothing.”

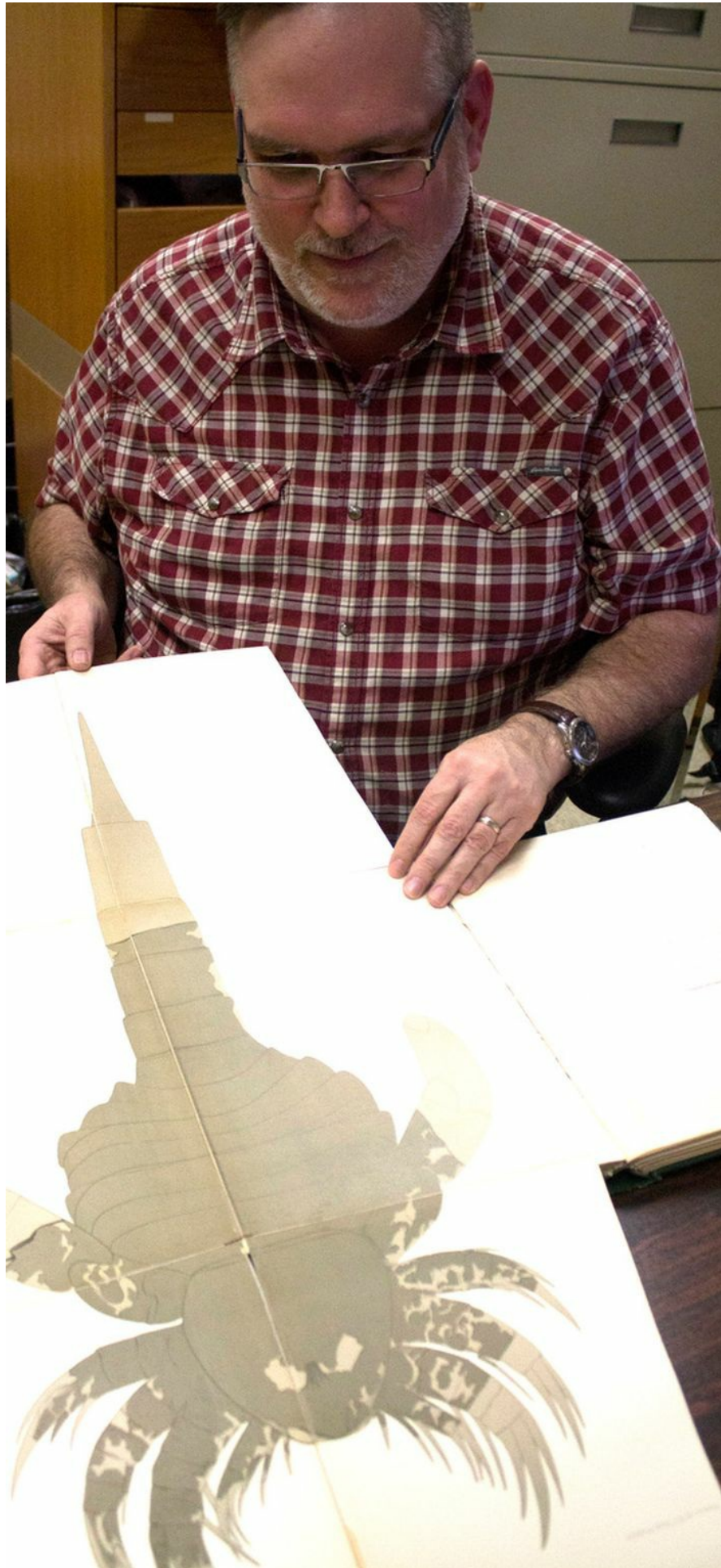
Those are the quirks of doing a cold case half a billion years old.

Before North America was a continent — before animals, before plants and trees, before land plates shifted — the area that is now the Grand Rapids Uplands in Manitoba was located near the equator. The Earth’s temperature was higher. There was less oxygen. Volcanos stewed. The world was different. But as Cuggy is showing, life brewed.

Cuggy does field work in the Uplands with Dave Rudkin, who is the assistant curator of paleontology at the Royal Ontario Museum in Toronto, and Graham Young, the fossil foreman at the Manitoba Museum in Winnipeg. They scrape rock. They clean rock. By finding bits and pieces of organisms embossed in stone, they fill in the blanks from Earth’s past. History has currency.

The rarer the fossil, the deeper the intrigue. The more that is answered, the more they ask.

They’ve found a lot.



Rudkin, Young and Cuggy found jellyfish near the North Basin of Lake Winnipeg. They found marine worm fossils close to the town of Churchill.

At William Lake, which is more than five hours north of Winnipeg, they struck it big. Twice. They found horseshoe crab fossils and sea spider fossils. Science says a horseshoe crab isn't really a crab and a sea spider isn't really a spider. They look like it, though. The crab has a helmet-sized shell, the spider a package of legs. The fossils are a link with the past, telling us not only about yesterday's world, but life today.

A horseshoe crab fossil found by Young and crew was the oldest specimen of the species found in the world, dating back 445 million years. The record has since been broken by a horseshoe crab fossil found in the African desert in Morocco. It's a wonder the fossils were found at all.

A horseshoe crab's shell is made of chitin, the same compound as your fingernail. Chitin is not fossil friendly. But because the William Lake site was a marine coast millions of years ago — with shallow water and abundant mud — the crab's shell was preserved.

Here's how it was found.

In the 1990s, geologist Jean-Denis Fournier was in the Uplands. He saved a few slabs of rock he could paint on. He took the slabs home. He happened to notice a fossil on a rock's reverse side. Young, at the Manitoba Museum, entered the picture. Young looked at the fossil. He knew what it wasn't. Young went to the Uplands and collected more samples. He worked with a research team. They wrote a technical paper, identifying the fossil.

It's horseshoe crab.

Horseshoe crabs back then were smaller than horseshoe crabs are now. Aside from size, most of us can't see much difference.

"Horseshoe crabs are well adapted," Cuggy said. "There's no evolutionary need to change."

Horseshoe crabs have survived five mass extinctions that wiped out everything on Earth from corals to dinosaurs. Today, their blue blood is harvested by humans for health science. On the east coast of the U.S., horseshoe crabs crowd the beach. So do shorebirds such as red knots.

Red knots make one of the longest migrations in the world, flying from wintering grounds in Argentina to summer breeding grounds in the Canadian Arctic, including a stopover in Saskatchewan. During the trip, red knots refuel in the States, eating horseshoe crabs.

Horseshoe crabs are plain. They're not ordinary.

"I just think they're neat. I want to know more about them," said Cuggy. "I always ask why, how."

In a tic of the paleontology trade, Cuggy has fossil fever, which means time for him is relative, measured not in days and weeks, but in the hundreds of thousands of years.

He enjoys a mystery. Fossils are riveting.

"With field work, the joy is splitting a rock," he said. "We never know what we'll find. It's fun if you don't mind the cold and the wet and hitting yourself in the hand with a hammer. We've all done that."

Cuggy grew up in a suburb of Toronto. By age two he was already into dinosaurs. His mother read to him about dinosaurs at bedtime from a Collier's encyclopedia. In kindergarten — or was it was Grade 1 — he found a fossil of a marine mollusc in the park near school. When his family went on vacation to Florida and took a walk on the beach, Michael saw his first, live horseshoe crabs. He wanted to keep a dead one, a leftover. No, he parents said, too

smelly.

His interest in dinosaurs continued into university, then faded. Too much teeth talk, he said. Slicers and shearers, chisellers and chompers were not for him. He volunteered at the Royal Ontario Museum and met Ron Tripp, a British chap who was an authority on extinct marine crawlies known as trilobites.

Cuggy's focus changed to arthropods, a branch of animals that includes trilobites and crabs, spiders and scorpions. He completed a bachelor of science at the University of Toronto. He added a master's degree at Brock University in Hamilton. Since 1999 he's been working at the University of Saskatchewan.

"My best skill is spotting patterns," he said. "That could be between events or within individual fossils. I can find continuity or differences."

Lining a wall in his university office are books with a common theme. Fossils At A Glance. Biology of Spiders. The Quest For Life In Amber. Principles of Paleontology.

On a shelf right across from his desk is a two-volume edition of The Eurypterids of New York. Published in 1912, the book has full-page pullouts of extinct arthropods. Cuggy was given the books as a gift by Peter von Bitter, a friend of his at the Royal Ontario Museum.

For Cuggy research continues.

He and Young and Rudkin have a grant from the National Geographic Society to return to William Lake, a black fly combat zone. They have bedrock to clear, samples to collect, mysteries to answer. In their latest work in the Uplands, they scraped away layers of rock and left the slabs out in the open, hoping rain and snow will bring fossils to light. That process might take 10 years.

Cuggy can wait. Time is on his side.