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Unearthing ❁ the ❁ Past

Finds from local paleontologists and amateur fossil hunters reveal much about the Valley's origins

Three kilometers south of the Cumberland Interchange is the Trent River. A trail leads from the highway, down beneath the bridge, past its giant, concrete pillars, through firs and ferns, and ends at the river's north side. Flush with the water, the north side is bathed in sunbeams from the south.

The south bank, however, is perpetually in shade. A 30-foot cliff of dark grey and brown rock shadows the water, which flows over a smooth, sculpted bed of the same material.

Rock is a term used loosely. The bank is made of marine shale, clay sized particles that, although they have sat and solidified for 80 million years, are easily eroded into piles of shards and dust. A strong pair of hands can pick apart a good-sized chunk, and a strong shake could crumble it to pieces. Echoes of pebble-sized avalanches resonate around every bend.

The Trent River has easily cut a deep gouge into this ancient rock bed that stretches from Campbell River to Duncan, revealing a cross section of its sedimentary layers. It continues to do so even today. Most of the Comox Valley's rivers, at some point in their course, dip into this same deposit of marine shale. These are special places in the Valley. The crumbling pebbles, the piles of shards beside the river, and the boulders wearing away beneath the water, all read like a textbook describing the life and land of Vancouver Island.

'To understand this place,' it says, 'you must first understand where it came from.'

On a blazing hot morning, Pat Trask stands beside a slide projector, protected by the Courtenay and District Museum and Paleontology Centre's air-conditioning. He draws his audience's attention to the slide projector's remote.

"Let's say you're the first person to discover this fossil. We'll call it the clickasaurus. It's the only clickasaurus in the world. Most of the fossils you find today can go home with you, but if you find something like a clickasaurus I might ask you to donate it to the museum."

Trask is the Assistant Curator of Science at the museum, and his fossil tours are a popular summer activity for tourists and locals alike. The Trent River is an obvious site for the tours, as its banks and piles of eroded rocks are littered with fossilized shells, guaranteeing everyone will have a treasure to bring home with them. Although his groups usually dive in with hammers, banging away at every chunk of shale they can, Trask rarely bothers.

"Just keep your eyes to the ground," he says, "and know what you're looking for."

Proving his point, Trask will simply wander the riverside, occasionally bending down and picking up a fossilized shell, or a section of an ammonite. Of course, Trask has decades of experience in fossils.

Before each tour Trask shares a bit of his wisdom through a one-hour talk on the basics of paleontology in the Comox Valley. "If you bring a fossil to a scientist," he makes sure to note, "the first thing they'll ask you is where it came from."

Paleontology isn't so much about the fossils themselves, but the places they were found.

If Vancouver Island were cut in half opening up its cross section, it would reveal a series of layers, some made of the same marine shale found at the Trent River, and some made of metamorphic, igneous, and other kinds of sedimentary rock. Layers aren't uni-

form all across the Island, though. The cross section would contain a different set depending on where the cut was made. It's the nature of these layers that Paleontologists are most interested in.

Layers that contain fossils are called formations, each one with its own name. The layer of dark grey rock exposed by Comox Valley's rivers is known as the Haslam Formation. Eighty-five million years ago the Haslam Formation was just beginning, its first clay-sized particles slowly accumulating into layers of mud. During this ancient time, known as the Upper-Cretaceous, the formation was, in fact, a flat, muddy surface, home to a complex community of pre-historic life.

Understanding how this pre-historic life fits into the ancestral line of Vancouver Island's contemporary creatures is a major part of what paleontologists try to learn from our rivers. The evolution of life on the West Coast, however, is a story that makes no sense without understanding its geological history. As the text book of our rivers say, we must first understand where this place came from. Eighty-five million years ago the Trent River Formation wasn't anywhere close to where the Trent River is now.

"The more you learn, the more questions it raises in life," Trask says.

The first geologists and paleontologists that studied the landforms of BC would have considered that the understatement of the century. Most of North America is made of giant rocks – such as the Canadian Shield – that have called our ancient continent home for billions of years. In BC, however, geologists found a patchwork of rock types in small pockets throughout its mountain ranges. Not only did they not seem to fit with the landscape of the rest of the country, it seemed impossible that such drastically different rocks could have formed side by side.

The fossils of each patch in BC's crazy geological quilt only confused the matter further. They didn't match fossils from neighboring Alberta, or even from each other. In fact, the fossils didn't even come from our hemisphere, but were actually those of tropical animals that lived just south of the equator.

Not until the early 1970s did West Coast geologists Jim Monger and Charlie Ross manage to solve the mystery. What appeared to be a province made up of small islands of different rock types where, in fact, at one time islands. They emerged in the tropics and were carried across the Pacific Ocean by plate techtonics.

The Pacific Plate is constantly expanding as a volcanic ridge deep beneath the ocean adds rock to its trailing edge. The expansion pushes the Pacific Plate into the North American Plate, where it subducts beneath our continent and melts back into the earth. Our tropical hitchhikers, however, would get snagged on the edge of North America as the Pacific Plate disappeared beneath it. One after the other they piled up until they created our country's most Western Province.

Vancouver Island, Haida Gwaii, and parts of Alaska were once joined together as their own mini-continent, which geologists have named Wrangellia. The history of Wrangellia's tropical origins, journey across the Pacific, collision with North America, and eventual break-up into our Coast Islands, and the history of the life it supported over that expanse of time, is the story geologists and paleontologists read in the riverbanks of the Comox Valley. "Vancouver Island used to be under the ocean," Trask tells his audience. "It was a rock born from a volcano. Slowly, mud built up over the rock until plate techtonics lifted it above sea level."

The sedimentary layers and fossils revealed along Comox Valley's rivers were originally deposited beneath the ocean and then along the shorelines of once tropical islands. This is why seashells are still the most abundant fossils, even on Forbidden Plateau.

The fossil deposits weren't made all at once, though. The Haslam Formation is a snapshot in time, just one chapter from the story of Wrangellia. The fossils from those dark grey banks are the remains of

animals that lived before the extinction of dinosaurs, but after Wrangellia's collision with North America.

Trask leads his group from the slide show to the museum's fossil displays, telling stories along the way. "When you say the name of a dinosaur you're not speaking English, you're speaking Latin or Greek. A Japanese Paleontologist was here the other day. I don't speak any Japanese, and he didn't speak any English, but when he said *Capulus corrugatus* I knew exactly what he was looking for – a snail shell. That's the beauty of scientific names."

He stops in front of the museum's model of the elasmosaur, hanging triumphantly from the roof. "So…you guys are from Ottawa?" he asks a family from the group. "Have you been to the Museum of Nature? You know the elasmosaur there? That's our elasmosaur…how's it lookin'?"

Display cases line the museum, full of ammonites, ridged and swirling with iridescent colours, shark teeth that look like shards of broken beer bottle glass, fossilized shells, crabs, and the impressions of prehistoric plants. To the casual observer, these are cases filled with treasures. For a paleontologist, however, each one is a story of the life-long dedication and hard work that went into revealing that single clue to the origins of life.

For every discovery, someone has spent countless years searching for bones in the cracks of our continent. For every fossil, someone spent countless days grinding their knees into rocks, chipping away at microscopic pebbles. Each one was cleaned of every spec of sand; laboured over until the contours, colors, and details became as apparent as possible. Every fossil is identified, sometimes requiring a specialist from halfway around the world, and sometimes requiring a scientist to describe and declare it as a new species, a tedious process in itself.

Two researchers from Japan have recently discovered new species of giant squid and octopus in Comox Valley's fossil deposits. Not until March 2008, however, will they be named and welcomed into the scientific world. First, those researchers must publish a peer-reviewed paper describing every detail of the species possible. The paper must also declare a name, which is more complicated than simply finding the most appropriate Greek or Latin words.

Scientific names are meant to represent the evolutionary tree of life. In full form, a scientific name has seven words. Only one species can have the final word – that's its species name. Different species can share the same name for the preceding six words, however. If a scientist decides to give their discovery a name that is shared with another species, though, that means they're suggesting those two species have a common ancestor.

When the Japanese researchers first discovered an oversized beak in the rocks, they would have instantly known that fossil's name would include the word cephalopoda – a word that all squids, octopuses, and cuttlefish share, although the common ancestor these animals come from is unclear – and the word oegopseda, shared by all squid. Applying a name that relates their find to other giant squid, however, is incredibly difficult. Most species of squid went extinct with the dinosaurs. The giant squid of today are so elusive that scientists don't know much more about them than they do about their extinct counterparts.

Which species have common ancestors? And which ones are the ancestors that gave rise to the great diversity of giant squid? These are the questions researchers must face. If the species is on a branch of its own, though, only the scientist's imagination (and the accepted Latin or Greek suffix) is the limit. "If you discover a new species," Trask tells his audiences, "you may be able to help the scientist name it."

An exciting discovery, published in 2006, was named after one of Vancouver Island's most respected amateur paleontologists, Graham Beard. Beard runs the Vancouver Island Museum of Paleontology in Qualicum Beach, and has co-authored, along with Rolf Ludvigsen, the entertaining and comprehensive field guide, West Coast Fossils.

Beard often works with fossilized seeds, which, although rare in our area, are proving incredibly significant in evolutionary studies. The seeds are sliced into thin cross-sections and then polished until translucent. Beneath a microscope, the cross-section will glow with the seed's internal anatomy.

Dr. Ruth Stockey, a paleobotanist from the University of Alberta, uses these specimens to determine what species of plant they come from. In 2005, she identified a new species from the family juglandaceae (the walnut family). Stockey believes the species is the most primitive walnut tree discovered yet, supporting a theory that walnut trees evolved in North America, and possibly right in our own backyard.

In honor of Graham Beard's work, she named the species *Beardia vancouverensis*.

Trask hopes that more amateur paleontologists and naturalists will bring their discoveries to the museum. Although fossils are often sought after for their aesthetic value, fossils of the Comox Valley are proving to have far greater scientific value. "Our fossils come from rivers, lakes, and shorelines, which nobody can own," Trask reminds us.

Sometimes the most significant finds are the smallest, such as a seed that doesn't look like much more than an irregular spot in a rock. The only way to find out is to bring the fossil to a professional paleontologist or a museum, and thus the public domain.

Every year, more papers based on fossils found in the Comox Valley are published, bringing us closer to understanding the geological and evolutionary history of life. As the Trent River washes away old layers of dark grey rock, there's no telling what chapter in Vancouver Island's story it will reveal. There's an inestimable number of undiscovered species still sitting in our rocks, waiting to reveal their piece of the puzzle.

"Fossils teach us about ourselves," Trask says. "They show us that we come from a long line of animals, and remind us that the animals of the forest deserve as much respect as we expect for ourselves."

From the museum Trask leads the group to the Trent River. Down the path and past the concrete pillars, Sunshine bounces of the water and filters into the trees of the north side. Before anyone can enjoy the rays, though, Trask beckons everyone to follow as he splashes his way across to the shadows of the South Bank. It may not be the sunny side, but with a keen eye and a little digging around, the banks can shed a lot of light.

"People often come back a few weeks after the tour and say they're doing a family trip to the Trent every week, now," Trask says. "Isn't that great? Exploring their world instead of sitting inside watching TV."

Trask enjoys the science education side of paleontology as much as the science itself. In some ways, he's the jack-of-all-trades in the research world: educator, collector, curator, naturalist, geologist, biologist, paleontologist. He's also an inspiration to everyone who joins the tour – an inspiration not just to discover fossils, but also to discover pieces of the bigger puzzle. Paleontology, after all, is everybody's science.