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Cemetery beach, June 2, 2007

5. Museum sponsored walk/talks

The Gabriola Historical and Museum Society is again planning a series of "walk/talks' on the island this summer. Topics of discussion will be mainly the island's geology and its paleontology, but we'll try to throw in some history, ecology, and archaeology too. Each walk/talk will last around two hours.

The first walk/talk will be on Saturday, June 2, starting at 2:00 p.m. at the cemetery on South Road. We'll look at some of the island's oldest rocks and the fossils they contain, and then gently stroll toward the El Verano boat ramp.

The walk/talks will be open to all at no charge, but becoming a member of the museum, making a small donation, or taking out a subscription to the museum's journal *SHALE* would be appreciated as the society is run entirely by volunteers and receives no government grants. For further information, drop by the museum, leave a message at 247-9987, or e-mail <info@gabriolamuseum.org>.

REVIEW of Cemetery beach walk/talk by Kit Szanto

Walk/talk June 2, 2007 with Nick Doe, beginning at the cemetery

We walked down to the beach, about 2:00 p.m., turned left and headed south a short distance along the beach. Nick gave us a way of trying to comprehend the immense number of years involved in geologic history by thinking of the years in terms of money. We all find it easier to relate to amounts of money than to millions and millions of years..

If the Big Bang was 12 billion years ago, we could think of that as just over a million dollars. On this scale, the sun and solar system was formed about $500,000 ago; the sedimentary rocks that make up Gabriola about $7000 ago (or up on the top of Gabriola only $6500 ago); the glacial till about $1 ago, and people from European stock who arrived in the late-18th century, about 2 cents ago.

The Gulf Islands were formed in the estuary of a very large river, something the size of the Amazon delta. But the river was not always the same river, some of the sedimentation came from a river flowing from Vancouver Island, later from the Cascade Mountains, and then also from the Coast Mountains, eventually building up the layers that today are these islands and the east coast of Vancouver Island.

The oldest rocks on Vancouver Island came originally from near present day Indonesia, brought on a tectonic plate moving eastward, as the North American continent was moving west. The plate moving east slid under the continent, but lighter rocks, like "scum," was left behind at the surface and attached to the continent. Accreted material on the west coast of North America moves north toward Alaska, and Alaska is composed entirely of “scum”. Vancouver Island bumped up against the continent about 90 million years ago, creating the Nanaimo Basin. During the age of the dinosaurs, about 75 million years ago, the basin was wider and shallower than it is now. The climate was considerably warmer, and the water in which the bedrock of our island was formed was stagnant, with little oxygen, and consequently the sandstone that was formed was “immature”, accounting for the ease with which it weathers now.

The fossils we looked at were what remains of the giant clams, inoceramids, (although actually closer to oysters than clams). Some species are as large as two metres, but the ones we have on Gabriola, *Inoceramus vancouverensis* are a bit smaller, but still up to a metre in length.

People looked for samples and several found some very nice shells, some lined with mother-of-pearl. The shells of inoceramids have a characteristic cross-section composed of calcite crystals stacked at right angles to the surfaces as opposed to the inner mother-of-pearl (nacreous) layer where the crystals are stacked parallel to the surface.

Nick pointed out several rills of sandstone sticking up through the shale, rather like sandstone bricks in a wavering row standing on end across the shale surface. This was the result of an earthquake that pushed sand up through the shale layer. Then he showed us fault in the cliff face, a normal fault, where the layers of sandstone and shale (or mudrock) had been shifted so that the contiguous layer was over a metre higher on one side than the other. It was a left-hand fault. A normal fault is one that is an oblique fracture that doesn’t double back on itself, like a Z or its mirror image. A left-hand fault is where the other side of the fault, no matter which side that is chosen to be, appears to have moved to the left. We saw a right-hand fault a little later.

Several people found some rocks that were made of basalt, not part of Gabriola’s bedrock, but erratics, brought by the action of glaciers from elsewhere. Mt. Benson’s rock is basalt (the Karmutsen Formation), formed on the sea floor about 235 million years ago, as an underwater plateau until tectonic action pushed it up to where it is today.

As we walked back toward the north, just before where the path down from the cemetery meets the beach, Nick pointed out a large chunk of Coast Mountain granite, an erratic brought by glacier action to the beach here. The white in the rock is quartz and feldspar; the black flecks are iron-rich minerals, mostly amphiboles and micas.

We noted groundwater trickling out the cliff face, just above a layer of shale. Nick explained fractured sandstone is quite permeable so water seeps down through it but shale is much less so and just above a layer of shale is a good place to find water (useful to know for digging a well, if one knows where the shale layer starts).

Just beyond where the path down from the cemetery meets the beach, Nick pointed out the right-hand fault. He told us that the Rhine Valley is created by a right-hand fault on one side and a left- hand fault on the other, the action of the two raising the sides and leaving the middle bit lower, the term for which in German is "graben" (in English, grave but also dimple - apparently, a sunken area, not necessarily a burial place).

Nick stood with his back to the cliff, arms flung out, indicating that modern GPS measurements have shown that the northern end of the island is moving clockwise, and the southern end is moving counterclockwise, leaving many of us feeling grateful geologic changes are usually slow enough we won't be here to see the results of the consequent stretching of Gabriola's southern coastline.

Nick had explained earlier that there was a second major "crunch" when more land from the southeast arrived and bumped up against North America and Vancouver Island. If one takes the Malahat to Victoria, the land on the west side of the highway is new terrane which attached itself onto Vancouver Island, and to the east, the older already established terrane that had arrived some 40 million years earlier.

We moved on to look at some examples of sandstone with the many small and larger holes in it, on the southern face of the stone, and some with the cap of stone curving over a shallow cave area rather like a miniature Malaspina Gallery. Those who had been on previous walk/talks with Nick (or who had read *SHALE* 7 and 9) recognized that these holes were caused by weathering by salt within the stone, most visibly on the sunny side of the rock, not by the action of wind and waves as is commonly thought.

After nearly two hours of fascinating explanations and lots of good interaction, on a splendid day, we went back up the path to our cars to return home and try to digest all we had heard.

Brickyard beach, June 10, 2007

6. Brickyard Beach

…The second walk-talk will be on Sunday, June 10, starting at 10:00 am at the brickyard when we'll look at this historic site and then walk along the beach at False Narrows and talk about this important Snuneymuxw village site. …

REVIEW of Brickyard beach walk/talk by Kit Szanto

Walk/Talk June 10, 2007 with Jenni Gehlbach and Nick Doe.

We assembled at Brickyard Beach at 10 a.m. on Sunday morning, and Jenni began by telling us some of the context of her article in *SHALE* 15 on the history of the brickyard, Gabriola's largest and longest industrial enterprise.

Jenni talked about the fact that those of us who arrived on Gabriola in the last few decades have found lovely brick fireplaces, chimneys, walls, and pathways, and have asked where the bricks came from. The response from old timers—the brickyard—has seemed rather baffling. It is easy enough to find the beach with the scattered bits of old brick, but there is no indication now of the once thriving brickyard itself. The kiln, storage sheds, rail tracks, the machines that pressed the bricks—the whole busy industry has vanished, and all one can see now in the space it once occupied are large maple trees, blackberry vines, and daisies.

Although the first dated document about the brickyard is for 1911, it is clear bricks were being made, and a kiln and other buildings existed before then, but the operations were not officially documented. The property around the old brickyard was pre-empted in the 1870s and 80s by Thomas McGuffie. By 1884, the family had 577 acres running along the water from Green Wharf to the far end of El Verano and north up the hill to the ridge near Chernoff Road.

Sometime in the 1890s, the McGuffies sold the property on which the brickyard existed and it ended up being owned by Annie Morgan, who lived in Nanaimo. In 1911, when the Dominion Shale Brick and Sewer Pipe Company operated the brickyard, it was Annie who owned the land it was on; however, in 1914, she sold the land to William Nairn Shaw—and this family continue to hold the subsurface rights of the old McGuffie property, including the present-day El Verano Drive subdivision, up until this very day.

The brickyard was not the only attempt to develop the island's industrial potential. In the late 1880s, there was a deep shaft sunk in the search for coal on the island. Somewhere close to the junction of Ferne and South Roads, a shaft 2000-feet deep was sunk—but no coal was ever found.

The bricks were made four at a time, passed by hand from one man to another, to load onto the flat cart, two at a time—but the productivity was astonishingly high—up to 80,000 a day. They were dried in a drying kiln, then fired in a firing kiln. The bricks made here were shipped to Victoria and Vancouver and had a reputation of being of high quality.

The bricks were all stamped "DOMINION"—even those when the company was bought by another company. The kilns were lined with bricks from the Clayburn brickyard (in the Fraser Valley), and were refractory bricks—bricks designed to withstand high temperatures.

After some fascinating information, questions and answers, we went to the table where Nick had put down some examples of the blue shale that was central to the brick making process as well as some examples of bricks which had fused together under very high heat—something that made the bricks unusable. We walked along the beach in the Nanaimo direction. It was easy to find bits of the Clayburn bricks—their yellowish beige colour distinctly different than the red Dominion bricks. We also found examples of fused bricks and rejects (clinkers) and Jenni talked about the possibility that there had been an earlier brickyard back of the beach in this area, but there is no information to verify this.

We then walked back down toward False Narrows, and just before we got to where the large trees seem to hang over the beach, Nick stopped to point out how the bedding planes of the shale and a layer of sandstone are tilted, pointing at Mudge and away from the centre of Gabriola. On the north side of Gabriola, the bedding planes also point upward away from the centre of the island, so Gabriola sits in a U-shaped fold. This folding is a consequence of the collision of the Pacific Rim and Crescent terranes with Vancouver Island about 55 and 42 million years ago. The crests of the fold have been largely eroded away by the movement of giant glaciers during the ice age, which began about two million years ago and only ended about 13,000 years ago.

A bit further along, Nick stopped to point out the midden, the layer above the glacial till left by the retreat of the last glaciers here. The glacial till is recognizable as such because it contains widely varying sizes of rock particles, from boulders and small pebbles down to the finest clay. Deposits laid down by water are always much more thoroughly sorted. The fact that there is pretty well no soil between the glacial till and the midden is a puzzle. It suggests that the climate was very warm for a while—too warm and dry for trees and grasses to grow and create organic-rich soil.

The midden belongs to the mid-Marpole era, which flourished from about 100 BC to 500 AD. This was a period of considerable cooling and the cooler temperatures brought the salmon, which helped to make this a prosperous era for the First Nations people here.

In *SHALE* 1, Doctor Lorraine Littlefield says that it is difficult to estimate how many people lived in the False Narrows village at any given time, especially in pre-contact times. However, she says, in 1775, a reasonable estimate of the population of this village would be about 5000 Snuneymuxw. By 1839, the population of the Snuneymuxw had declined to about 1000 people, according to a Hudson's Bay Company census. And in 1876, it seems to have been only 223 people. The midden is the largest in British Columbia, but it has been eroded over the years, as the bank is continually being washed back into the sea. The great pity is that the province apparently cares so little about the history of the original settlers of the land that scarcely any funds are put into research of this or any other First Nations sites.

Nick spoke about the immature nature of the Gabriola sandstone; the fact it was created in a warm, stagnant, low-in-oxygen sea means that the sandstone weathers readily. Nick pointed out some examples of very different colouring in several large chunks of sandstone, a warm beige layer covering a grey mass below it. The warm beige colour indicates the presence of iron in the cement bonding the sandstone, and this case hardened cement, the kind that forms the cap on the Malaspina Galleries, is much more resistant to weathering than the grey stone beneath it. As these rocks erode, the beige layer will remain much longer than the grey stone below it.

We then saw some examples of earthquake action on Gabriola—an earthquake that took place millions of years ago. Very fine-grained sand had been pushed up through the shale, a result of

liquefaction during a quake. Originally, the sand would have formed a roughly straight line but because sandstone is less compliant than the host mudrock, subsequent pressure has crumpled it into a rather wobbly line.

Just beyond there, Nick showed us fossilized brachiopods, a kind of bivalve that lived here in abundance during the late-Cretaceous period. Some species of brachiopod still exist, but of these, those that lived here are only found now in the high Arctic deep under the water below the ice. Nick showed us samples he had, not from here, so we could see their general shape since the fossils here have been so weathered chemically that they now are unrecognizable. Some are unusual in that their shells are formed of calcium phosphate, not calcium carbonate as most shells are, and it was the presence of phosphorus that alerted Nick to the fact that these were a particular species of brachiopods.

We had a wonderfully full tour, early 20th-century industry, then some prehistory, and geology with tales of collisions of mini-continents, earthquakes, fossils, ice ages, and the effects of climate change. And we had a beautiful day, sunny and breezy—instead of the rain and wind that had been forecast and which we had had yesterday. Lucky us!

Whalebone beach, September 1, 2007

7. Walk/talk along Whalebone Beach

Rufus Churcher, a retired (but still very active) palaeontologist, will lead a group along Whalebone beach on Saturday, September 1, beginning at 2 pm. The walk should take between 2 and 3 hours.

We will start at Bell's Landing on the west end of The Strand and walk along the beach, possibly as far as the Killerwhale Lookout access. Rufus will talk about the geology of the Strait of Georgia and Gulf Islands, and we will look at features of this shale formation. Late-Cretaceous-age fossil wood, fragments of ammonites, giant oysters, and animal tunnel casts are all to be found on this beach. There is in addition, a large variety of igneous and volcanic cobblestones brought over from the Coast Mountains by the glaciers of the last Ice Age. There will be an opportunity in September for you to bring along to the Museum for identification any interesting-looking pebbles that you pick up and pocket along the way.

The walk will be free to all comers, so tell your friends and neighbours, but donations to the Gabriola Museum, or to its journal *SHALE*, will be gratefully accepted. The walk is "at your own risk" and your footwear should be suitable for walking a stony beach.

For last-minute information and to leave enquiries, please call the Museum at 247-9987.

Antique Rock Show, September 8, 2007

8. Antique Rock Show

On Saturday, September 8, the Gabriola Museum will be hosting an ANTIQUE ROCK SHOW. All are welcome to visit the museum and bring with them any unusual, attractive, or even mundane pebbles or samples of rock they've picked up on Gabriola and would like to know more about. Two geologists (Owen Peer of Malaspina University-College and *SHALE* editor Nick Doe) will be on hand to hopefully say what you have, how old it is, and how it came to be where you found it. We'll also have a petrographic polarizing microscope and some other geologists' tools available for you to look at. We may have to hit your rock very hard with a hammer so it will be best to leave Grandma's diamond engagement ring at home. It should be fun tho' if you like rocks. There's no guarantee we'll know what everything is. We will be doing this from 2 to 4 in the afternoon. Again, that's on Saturday, September 8, so see you then.
For more information contact the museum at 247 9987.