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Cemetery Beach, June 8, 2008

# 9. Museum sponsored walk/talk at Cemetery Beach

The first Gabriola Museum/*SHALE* Walk/Talk of the season is being planned for Sunday, June 8 [originally June 7], at the beach below the Community Cemetery at 2:00 pm. We'll be talking about the geology of Gabriola and Vancouver Island, looking at fossils, and pondering the origin and history of whatever else we find as we stroll along. Nick Doe, editor of *SHALE* will be the leader plus whoever else cares to come along and offer us the benefit of their geological, paleontological, or ecological expertise.

The tide will be low, but the beach may still be slippery so wear good shoes and leave your lawyer's cell phone number at home, as the event will be at your own risk. The walks usually last a couple of hours and are for free, though the Museum and *SHALE* do appreciate donations.

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

REVIEW of Cemetery beach walk/talk by Nick Doe

Walk/Talk June 8, 2008.

The afternoon was overcast but dry. This spring has been especially cool. About 15-20 people spent the time enthusiastically looking at fossils, mostly inoceramids, but with a few brachiopods (all practically unrecognizable and in bad shape), and a nice ammonite cross-sectioned so that its chambers were clearly visible.

*Inoceramous vancouverensis* coin is 25 cents

The fossils clams (inoceramids) here on Cemetery beach are quite unusual in that they were evidently buried alive, probably because they were living at the foot of an unstable slope close to a major river estuary. Normally when bivalves are buried alive, the chemical decomposition is so active it dissolves even the shells, leaving behind only calcareous nodules. Perfect, museum-quality, shells are likely those of bivalves that were already dead before being buried. You can prove this by looking long and hard at apparently shell-free beds of these nodules—there are some on Whalebone and Spring beaches on Gabriola and on Denman Island. Eventually, in my experience, you always find one isolated nodule in the bed that contains the unmistakable shell of an inoceramid, one that had died presumably before being buried along with its living neighbours. That they were buried alive is an explanation for the fact that the nodules occur in well-defined strata in the bedrock—the creatures died together in catastrophic events, not randomly.

The nodules here on Cemetery beach have a rusty red or yellowish surface, with a featureless flint-like (calcite, silt, iron, manganese, and clay) interior that is greyish. The surfaces are often marked with trace fossils, the bodies, tunnels, and breathing holes of the wormy scavengers that fed of the decaying remains of the clams. These have been preserved because a mixture of calcite and clay expands as it sets making a kind of plaster cast of the immediate surroundings. The reason why we find both nodules and clam shells here appears to be that the sediment that buried them was sufficiently light for the decaying body parts, bloated with carbon-dioxide and other gas, to move a few inches upward through the sediment and away from the shells. Although there are a few examples of nodules and shells touching each other, they are nearly always separated by several inches.

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Typical nodule (A-type) with trace fossils (scavengers and their borrows) preserved on the surface. The nodules are high in calcite and clay but also contain iron and manganese. They are heavy. The metals were likely precipitated when slightly acidic groundwater encountered high pH water around the fossil. The nodules are the remains of the fleshy part of the giant clams (inoceramids).

Tube-shaped (B-type) fossils. They stick out of the bedrock vertically and are associated with inoceramids. The piece on the right of the picture is the broken off "cap" of the fossil on the left. Thin-sections show featureless interior apart from a central hollow filled with calcite crystals.

Some tube-shaped fossils, with a centre of a different colour and texture than the outer rim, are, I think, either the syphons, or less likely the feet of the clams, which were originally hollow or filled with liquid but were filled in from the rim to the centre with calcite as the fossil formed. They can be mistaken for vertebrae, but the small central tube is full of very large calcite crystals and probably has little to do with the original biological structure. These fossils often appear here sticking vertically out of the shale. Why, is a mystery? It could be, I think, but without any support, that the clams might have been trying to use their syphons or feet to dig themselves out of the sediment that was suffocating them. Or perhaps, they were digging into the sediment for nourishment.

The trouble with these theories is that there are today no bivalve species that are large and flat like a dinner plate and that live by lying on the surface of very soft sediment—predators don't

permit this—so we don't know what tricks these inoceramids might have got up to in order to survive in such an environment. Another possibility is that the vertical orientation is just an artifact of the fossilization process. Maybe as the main body of the decaying clams moved upwards, the syphons or feet were left dangling downward.

Experts that I have consulted are not convinced that these ideas are right and think it more likely these fossil were originally anemones. There is support for this in that although the tube-shaped fossils only appear where there are nodules on Gabriola, there are beds of nodules on other beaches and on Denman Island in particular, where there are no signs of these tubes among the nodules.

Further down the beach we saw a lovely example of an ammonite fossil. There was also time to look at the varnish clams. These are newcomers to Gabriola's beaches, easily recognizable by the purple interiors of the shells. This year there are also an abundance of blue mussels on the clam beds—the beds look black from a distance—which might account for the unusually high diving-duck populations in False Narrows this past winter.

Gravel pit, July 6, 2008

# 10. Ice age walk/talk

For anyone interested in both the ice-age geology of Gabriola and the wonderful mineral collection brought here from Texada Island—the goop—there will be a Gabriola museum walk/talk special in the gravel pit off of South Road on Sunday, July 6, beginning at 2 p.m. Please do NOT drive up to the pit, it is gated, and you won't be able to turn around.

Nick Doe (editor of the museum's journal *SHALE*) will be on hand with a microscope (please oh! please don't rain) so that we can attempt to identify the samples we pick up (bring some ziplock bags and any mineral/rock field guides you may have). The glacier that once buried the island in ice almost a mile thick brought all sorts of rocks from the northern end of the Strait of Georgia, and now, twelve thousand years later, Emcon are doing the same. Texada Island has a particularly fascinating geology because it is an above-sea-level location where Vancouver Island collided with the Coast Mountains.

The walk will be free to all comers, but donations to the Gabriola museum, or to its journal *SHALE*, will be gratefully accepted. The walk is entirely "at your own risk".

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

REVIEW of Gravel pit walk/talk by Nick Doe

Walk/Talk July 6, 2008.

Hot sunny day. Small, but enthusiastic crowd—delightful company. Tom Cameron was along to help with his knowledge of glacial and glacial-fluvial landscapes on the prairies.

We first looked at some of the morphological features of the pit—glacial grooves in the sandstone bedrock, how the bedding was tilted slightly indicating isostatic rebound of the island after the ice was gone, how the ice had shaped the stones wearing one surface flat.

The indications are that these glacial deposits date back to the "Younger Dryas", a period after the ice age had ended (from about 11000 to 9500 BC) during which near ice-age climatic conditions temporarily returned, probably as the result of a disruption of the world's ocean currents by enormous volumes of meltwater discharging from the centres of the continents. Among the indications that this is the case is the fact that the pit was already above sea level when the gravel and sand were being deposited (there are Ron Ewing tells me marine clay deposits beneath the floor of the pit); there is evidence of meltwater; the clays are well oxidized, which they wouldn't have been below a large glacier; and the glacial grooves also are not all absolutely in the same geographical direction, indicating that the ice was responding to local topography and therefore likely quite thin.

We then took advantage of the microscope we had set up, some dilute hydrochloric acid, plenty of water for washing, a strong magnet, a knife to test hardness, and mineralogical guide books to sort through the pile of Texada aggregate (a.k.a. “Texada goop”or “Texada slime”) in the pit. This turned out to be a fascinating exercise. We found all sorts of volcanic (extrusive and intrusive) fragments along with examples of metamorphic rocks. There were calcite crystals, limestone, and probably marble and dolomite. Particularly interesting are the contacts between intrusive granitic rock and the carbonate deposits on Texada. One small grain was turquoise green, probably copper-rich malachite. Another seemed to contain thin layers of “golden mica” or perhaps “fools gold” (pyrite). We also found jasper and a fair bit of magnetite. Many samples just could not be identified, and, as a poor excuse, I’ll say are probably rare.

Certainly a pleasant and refreshing change from all this sedimentary stuff on Gabriola.

Commons, September 13, 2008

# 11. Antique rock show

Last year, the Gabriola Historical & Museum Society held an ANTIQUE ROCK SHOW and the society will be doing it again this year as part of Islander Day on Saturday, September 13. We will however be at the Gabriola Commons this time and not at the Museum.

All are welcome to visit the Museum table 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 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 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 would be best to take Grandma's diamond engagement ring to the Antiques table, not to ours.

There's no guarantee we'll know what everything is, but it will be fun if you are curious about rocks, and it will be free, though donations to the Museum and subscriptions to *SHALE* are always appreciated. We will be doing this from noon to shortly after 3 in the afternoon. For more information contact the Museum at 9987.

REVIEW of the ARS by Nick Doe

It was a lovely sunny Saturday afternoon with a very gentle breeze on the lawn at the Gabriola Commons and a good crowd turned up for the Fall Fair. We were fortunate to have the help of Dr. Steven Earle, a geology teacher at Vancouver Island (Malaspina) University, at the ARS table.

Display items included a bucket full of erratics collected from the beach (mostly volcanic and intrusive igneous rocks) brought here by glaciers from the mainland; some Texada Goop which was accompanied by sieves and a can of water for washing away all the clay (many people were intrigued to see how varied the pebbles in the goop are once cleaned up and to discover that some of them are magnetic); a selection of rocks from all four geological formations on Gabriona (Gabriola, Spray, Geoffrey, and Northumberland) dating back some 65 to 75 million years ago; and some ice-age clay full of shells collected from a site on Gabriola that is now some 70 metres above sea level.

Compared with last year, fewer people brought along curios for identification, though many stopped by for general chat about “rocks” and children (and a few others) enjoyed peering into the microscope we had brought along. There were a few attempts at obtaining an identification based on no more than a verbal description but, surprise, surprise, we had some difficulty with that. Notwithstanding the relatively small number of curios, those that we did see were all very interesting.

We had a ground stone Indian spear head (unbarbed lanceolate point) found in the 707 Park. These are usually made of slate, but this one was made from a compact, grey, fine-grained sedimentary material. This I very glibly and inexpertly asserted was probably a thousand years old (it’s actually impossible to date such individual objects collected without an archaeological

context) on the basis that ground stone tools tend to be younger than chipped or flaked tools, and spears were in more recent times partially replaced by bows and arrows.

We also saw an epiphyseal disc (part of the backbone of a young whale), probably, though not certainly, dating back to the time when sea level around Gabriola was much higher than it is now (about 11500 BC). These discs were used by the Coast Salish as spindle whorls. It is only the second one I have seen from Gabriola

Several people brought in varieties of the B type nodules (*SHALE* 9, pp.41–52) discussed above in the Walk/Talk June 8, 2008 review. One was claimed to be from Brighton Beach in England, but I wasn't fooled by that (was I?). Another particularly interesting one had a coating that was red (hematite?) rather than the usual yellowish-brown rusty iron colour (limonite?) and had white-calcite-filled tension gashes running around its circumference. Speculation was that it was a B type nodule that had been cooked in a fire at some time (the Snunéymux$^{w}$ often heated stones in a fire and then dropped them into water to boil it), but this theory clearly calls for some experimental proof.

We also saw some lovely (museum-quality, hint! hint!) specimens of petrified wood complete with coalified bark taken from the mudrock (shale) on Whalebone Beach. It would be 72–75 million years old. Unfortunately not enough detail to be able to identify the species. Some kind of palm tree perhaps given that the climate at the time was almost tropical and these together with ferns dominated wetlands in the late-Cretaceous Period.

All in all, a good time was had by all.