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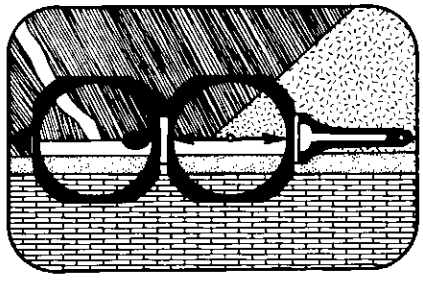

Geological Education

The Exploration Geologist on New Terrane— The Classroom

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Bruce Downing, a geologist with Falconbridge Nickel Mines, Ltd. in Vancouver and a member of Big Brothers of Canada, was approached by his Little Brother, Andrew Wiggs, with an unusual request in January of 1978. The request was simply, "Bruce, will you teach my class at Southland Elementary School something about your work as a geologist and help us to identify some rocks and minerals?" And Bruce responded in an unusual, perhaps a better word is atypical, way, "Yes." The next day he called the teacher, Joan Stancomb, and arranged to teach his Little Brother's class one and one-half hours each week (two class periods) for a period of two months.

She welcomed his assistance and informed him that this was no ordinary class. It consisted of 28 of Southland's brightest students, the cream of its 1977-1978 grade sixes and sevens. Mrs. Stancomb had been given special approval by the British Columbia Ministry of Education to develop a "Learning Enrichment Centre" at Southland. It was her responsibility to make the new programme as exciting and challenging as possible. Later Downing went to Jim McGregor, his boss in Vancouver, and said, "Jim, I'm going to be teaching a class of mixed grade six and seven students something about geology for the next eight weeks. O.K.?" What could Jim say but, "Fine! Go to it."

Bruce's response was atypical because few professionals in the world of earth science and mining or petroleum will take that kind of time out of their busy schedules to face the task of developing a theme for an eight week course (with Joan Stancomb's assistance), organizing lectures and activities and facing the students for 16 class periods. Most of us might react by saying, "But that's the job of the classroom teacher. We are not trained to teach grade six and seven students. My job is organizing that geochemical exploration programme for next summer's field season or describing that new species of *Ogygopsis*. Those readers of the *Journal of Paleontology* or the *Canadian Journal of Earth Sciences* are waiting for my next paper. Or, the financial strength of my organization, indeed my job, depends on my ability to find that new ore body, etc. etc." Deep down inside, the idea of facing 28 young and inquiring minds is terrifying. But remember, those students are 11 to 12 years old and are well prepared at this age to soak up new concepts, theories and geological knowledge. Television hasn't quite dulled all of their senses yet and their imagination can still be sparked when you show them that first slide of a wilderness campsite or the bear that got away with your evening beefsteak.

Bruce found the experience one of the most interesting and exciting of his life. The audience was receptive. It was all new to them. "All eyes were glued on me", he said. There was no attempt at disruption, no talking with the boy in the next desk, only intense interest. Admittedly, the class was composed of "brighter-than-average" students.

An important spinoff of Downing's efforts was that a classroom teacher was introduced to geology for the first time. We cannot assume that all of our elementary grade school teachers have had a geology course. In fact, most of them choose to elect biology or some other life science as their first year science course in university. Moreover, Downing's students displayed such enthusiasm for the topics he chose to cover that even his teaching colleague, Joan Stancomb, was truly amazed. Science can be made interesting for young students. Not just pure science, but also the day to day activities connected with exploration geology such as setting up the base camp, that first breakfast in camp, and even whacking specimens from outcrops and digging those soil trenches. Questions arose spontaneously. Where does soil come from and why is a geologist interested in soil? Is climbing in the mountains dangerous? How much does a helicopter cost? What happens after you find the asbestos? And many more. Together, geologists, students and teacher delved into the mysteries of the earth taking the pragmatic approach of the practising economic geologist.

The course was opened by introducing students to the definition of a mineral including their first exposure to the concept of the atom. Quickly the students got into hand specimen identification of minerals, and then rocks. Mineral identification kits were purchased from the Department of Geological Sciences at the University of British Columbia. The kits included a 10 power hand lens, a piece of glass, a streak plate, a dissecting needle (for testing hardness) and a magnet, all for only three dollars. "Watch the magnets."

Downing says, "They disappear rapidly."

The mineral sets were purchased from the Geological Survey of Canada. The set includes 36 minerals and the useful identification guide entitled, *A Table for the Classification of Minerals Represented in the Prospector's Set of Mineral Chips,* all for only four dollars, a bargain basement price if there ever was one. In addition the Geological Survey handed over a pile of some 30 booklets devoted to all aspects of geology and informally dubbed it's *Teacher's Packet.*

Bruce soon related minerals to rocks and rocks to soils - the rock cycle, and all of its important ramifications. Activities ranged from digging holes in Father's garden and observing the soil profile, to making a geologic map by studying a model where real samples of sediments, sedimentary rocks and igneous rocks were included. Students worked out the sequence of events in the map area, made their own maps and drew their own contacts using only scattered outcrop information. Field geology was brought into the classroom. Economic geology was introduced by including granite with chalcopyrite and sedimentary rocks with galena and sphalerite in some parts of the small scale model of a mythical field area. Uranium minerals were there somewhere too.

Many other activities followed from the shaking of a cylinder of water containing a sand, silt, clay mixture to observe sedimentation to making a model of a working volcano. After a thorough introduction to geologic processes the meaning of the rocks became clear. They were no longer just vestiges of a long forgotten past of the planet Earth. The excellent collection of photos and drawings entitled *Atlas of Volcanic Phenomena* published by the U.S. Geological Survey was used to illustrate volcanic products and processes as well as types of volcanic eruptions. Cellars, rock piles and gravel pits were ravaged by his students over the next eight weeks. Soon, some pretty fair rock and mineral collections began to develop. They were important to the student too, because they were specimens individually collected by each. Ski trips and winter hikes became more than pleasant excursions as students began to pick up pieces of andesite, for the first time, on Mt. Garibaldi.

Books such as *Geology and Earth Sciences Sourcebook for Elementary and Secondary Schools* were found to contain a wealth of activities perfectly suited for Southland's exceptional grade six and seven students. A new text entitled *Crusty Problems, Probing the Natural World* and published by General Learning Corporation was equally well suited for these young students. Another book, *Teacher's Guide to Investigating the Earth,* published by Houghton Mifflin Company contained more than 200 activities for teaching geology to grade seven and eight students.

And the work didn't end in the classroom. Students were required to prepare essays on some aspect of geology. Several chose to interview geologists and mining people in their protective enclaves towering high above Burrard and Granville streets in downtown Vancouver. These students soon learned that the mineral industry in British Columbia included not only knowledgeable geologists but geochemists, geophysicists, engineers, as well as a large back-up staff of technicians and clerical people. Slides of mining operations were shown in class and the whole academic exercise of the study of geology suddenly became more real and they realized that a vast group of people were concerned with the nation's resources.

Field trips to Caulfield Park in West Vancouver were critical in order to show granitic rocks in contact with schists on the south edge of the Coast Mountains. Garnets were present and they could only be seen with the help of the newly acquired hand lenses. So were joints, faults, and inclusions. Even glacial grooves were beautifully developed to attest to the last sweep of alpine ice down what is now Burrard Inlet.

Students summarized the results of their research in oral reports to their class and discussed the purpose of various exploration, and mining endeavours. By this time the crystal growing experiments had reaped a collection of perfectly developed geometric forms. Sugar, salt and copper sulphate were used to demonstrate crystal growth. The culmination of the course included a slide presentation of an exploration project of Falconbridge. Downing pointed out that $160,000 was spent before the company reached its conclusion that the area was not suitable for development as an economic mineral deposit. The students were amazed. They learned, for the first time, that the risks in mining are indeed high and that exploration means large expenditures of funds, long days and nights in hostile terrane and much time away from home. But they relished his field life and wanted to try it themselves.

The Toronto brass arrived one day and Downing got an opportunity to explain his teaching experience. After an initial moment of mild surprise the management realized that he had told the story of geology and mining in such a way that young children realized what the name of the game was and how much was at stake. They nodded their heads in approval. Southland's students will remember Bruce Downing, a geologist who loves his work and enjoys working with young people too. But at the same time they have had their first introduction to geology, economic mineral deposits and mining.

But that isn't the end of the story. Downing returned to Southland again this year to teach one and one-half hours (two class periods) for each of another six weeks. By the middle of December of 1978 at least 43 more students in British Columbia's public school system will know what geology is all about and will use this knowledge not only to appreciate the efforts of exploration geologists everywhere, but to enjoy their future hikes and outings in the Coast and Rocky Mountains of western Canada. For the first time, these 11 and 12 year olds will know "the story behind the scenery."

Why don't you try this experience yourself, and soon? A teacher and 25 students are waiting for you somewhere. Maybe you'll only present a 40 minute slide show and pass around a few economic minerals. But you represent the industry and a profession. Can you imagine the impact of 10,000 geoscience and geotechnical people, miners and engineers talking about their work and about the earth for even one hour a year in a public school classroom? They won't forget you either. And they might even listen to that next mining commercial on television. But most importantly, they will begin to develop an understanding of the planet Earth. Their next question to that teacher of theirs might well be, "Can't we study this some more?"

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