PRESIDENTIAL ADDRESS: "The Poetry of Geology"

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First, I have a confession to make. The biggest concern I had about accepting the responsibility of being President of GAC was giving this Presidential Address. Everything else has been easy compared to standing here before you with, well, presidential pretensions. I don't mind giving a speech; I've done that enough times in my career. In fact, it was 20 years ago this month that I presented my first GAC–MAC paper in St. John's in 1974. Any of you who attended the St. John's '74 meeting will remember it, I'm sure.

But a Presidential Address! And in Waterloo! My predecessors have been of such national stature, scientific or otherwise, that they could unblushingly go before you and offer a Presidential Address, but what might I say that could even begin to qualify?

First, I thought I would resurrect the geological model portrayed in my last Survey report, namely that one can explain the disposition of tectonic and lithostratigraphic elements in the central Newfoundland Appalachians simply by invoking sinistral strike-slip faulting along boundary faults with the adjacent cratonic areas (Blackwood, 1985). I am convinced this model will eventually gain the recognition it deserves, and thought it would give me prestigious credibility for my Presidential Address. Alas, it seems that such claims of veneration may be premature, and besides some of you might have the gall to question me about it afterward.

Then I thought, why not do something a little different. Perhaps off the wall even! Of course, the problem with this is, it can land you in a mess of trouble. But I am reminded of Derek Ager's comment in the introduction to his recently published book (Ager, 1993) *The New Catastrophism: The Importance of the Rare Event in Geological History* (incidently, if you haven't already read it, I strongly recommend it; you will find it provocative and entertaining). Professor Ager said that one of the benefits of getting older was that he was not afraid of women anymore and was no longer afraid of making a fool of himself. Well, I stopped being afraid of females in Grade 4, and I've made a fool of myself so often that destiny must have been preparing me for today. So ladies and gentlemen, please bear with me, and hear what I have to say about "The Poetry of Geology."

I will start with this somewhat personal affirmation: despite the rise of tribalism in the wake of the Cold War, and the claim by some educated commentators that this is inevitable given human nature, I want to express contempt for cultural chauvinism, and to challenge the assertion that nationalism and internecine conflict are the planet's fate.

What all Earth's people need now is a universal creed that transcends national borders, religious beliefs and ethnic origins. Earth's people need to understand their connection with each other, and with the planet. Earth's people need an understanding of the dynamics of the planet, and how puny are anthropocentric conceits in the face of them. Earth's people need earth scientists to teach them something of the omnipresence of Earth forces.

One way, I believe, of doing this is through the poetry of geology.

Yes, the poetry of geology. A definition that I like of poetry is given in Webster's Third New International Dictionary (1976): "... a quality that stirs the imagination or gives a sense of heightened and more meaningful existence." This also comes very close to my definition of what is spiritual, and as the official purveyors of earth-science principles, geoscientists are also the high priests of a universal dogma, the basis for which influences the lives of everyone on the planet.

Now that last statement may appear to some of you to be somewhat conceited in itself, in an overblown, fanciful sort of way. But let me introduce you to someone who cannot be accused of self-serving zeal regarding the redemptive power of geoscience, someone who understood spirituality and poetry, and who in 1864 in St. John's, Newfoundland, gave a lecture entitled "The Poetry of Geology" (Harvey, 1864). I am referring to that savant, the Reverend Moses Harvey, who was the minister at St. Andrews Free Presbyterian Church in St. John's from 1852 to 1878.

Before giving you a sample of his lecture, let me tell you something of this extraordinary man. Moses Harvey was born in Northern Ireland in 1820 to parents of Scottish descent (Aldrich, 1984). He was educated in Belfast and ordained to the Presbyterian ministry in 1844. He then preached in England until he emigrated to St. John's, Newfoundland, in 1852. While a minister in St. John's, he became famous for his lectures, and was a most prolific writer. He had more than 900 articles published in the *Montreal Gazette* under the pen name "Delta," wrote several books, including his most prominent, *Newfoundland, The Oldest British Colony*, and founded the *Evening Mercury* newspaper. Harvey was elected a Fellow of the Royal Society of Canada in 1891 and awarded the honorary degree of Doctor of Laws from McGill University that same year. He died on 3 September 1901 at his home in St. John's.

As you can see, the Reverend Harvey was a man of broad interests. He was instrumental in alerting zoologists to the giant squids around the Avalon Peninsula, he catalogued the birds and wildflowers of Newfoundland, and he must have been one of the earliest advocates of fish farming with his inaugural lecture to the Royal Society entitled "The Artificial Propagation of Marine Food Fishes and Edible Crustaceans."

And he was fascinated by geology. Not only did he recognize the sublime attributes of our science, but as a contemporary of Sir William Logan and Alexander Murray, he was led to understand its practical applications. Listen to what he had to say in 1869: "... the important practical bearings of the science of geology on mining, engineering, agriculture and architecture are now so universally admitted that all enlightened governments are devoting a portion of the public revenue to geological surveys...." (Harvey, 1869). Now I know there are cynics among you who would say that, today, "enlightened government" is an oxymoron. This is too severe, and I would remind you of the excellent provincial surveys and the world-famous Geological Survey of Canada that exist in this country

today. Let's hope that Moses Harvey's connection between societal need and geoscience will continue to be understood by our governments.

But I digress, having moved as far away from poetry, *i.e.*, government-funding practices, as it is possible to get! Let's return to my contention that earth scientists, perhaps above all others, have a cosmopolitan view of Earth, engendered by an understanding of the antiquity and ubiquity of geological processes, and that this understanding has a poetic quality of universal appeal. Here's what Moses Harvey had to say (Harvey, 1864):

> At first sight, it might seem almost hopeless to look for anything of a poetical type in the stony science, dealing as it does with rocks and earth-beds, and going down, as a great resurrectionist, into nature's awful charnel-house, and dragging thence, with pick-axe and hammer, the long-buried remains of extinct generations. One might fancy that the study of this science must be a sort of 'meditation among the tombs' — very dismal and repulsive — and that geologists must be about as fascinating characters as grave-diggers. In reality, however, this rugged science is rich in poetic elements, and furnishes stores of the noblest food for the imagination ... In the coming ages, I doubt not, poets will find, in the magnificent disclosures of geology, some of their finest inspirations; and will eagerly occupy the vast fields it has laid open to imagination's soaring wing.

Harvey refers to solid rocks as "the manuscripts of God inscribed on tablets of stone." Listen again to what he says geology is:

> It has recorded the convulsions and changes through which earth has passed, and told how its huge granite ribs were molten and cast in the primeval fires, ... how its rocky sides were formed, and then torn and hurled to the surface, amid convulsive throes, how its mountain-chains were raised aloft, its sea-beds and river-courses scooped out, and its continents built up. From the primeval granite, hardening over the internal sea of fire, up to the deposition of the vegetable soil in which the 'modest crimson-tipp'd' daisy takes root ... through all the growth and decay of world after world, and the rise and fall of empires and dynasties on which no human eye ever gazed ... tracing out their mighty ruins with the clear eye of reason, geology aims at nothing less than constructing a biography of our globe.

And then he asks the question:

> Is there no poetry in all this — nothing to stir the imagination? Is there no beauty in that mighty plan, reaching 'from everlasting to everlasting,' by which the Great Architect has been working for countless ages, to awaken our wonder and worship? Is there no melody to charm the ear of fancy in those wonderful 'rhymes of the universe' written on stony tablets? Nay, I think, here is the sublimest poetry — the poetry of truth, not of fiction.

Ladies and gentlemen, if a cleric in the mid-19th century, living in St. John's, Newfoundland, can so extol the poetry of geology, can we do any less? The poetic qualities of geology (or its appeal to the imagination) are probably what unconsciously drew us to the science, and apart from more mundane interests like earning a living or keeping a job, continue to fuel our fascination. My contention is that our understanding of Earth's history gives us a privileged perspective of Shakespeare's "mortal coil" (Hamlet, Act III, Scene I), and that earth scientists, in the broadest sense of the words, make the best world citizens, or should. I mean best, not in the sense of being better than anyone else, but best in appreciating a global vision of the planet, and even of the life on it.

Geoscientists, with our perspective on geological time, the ancestral commonalty of all life and the impermanence of geological edifices, are intellectually disposed to rebuke the dictates of parochial thought. We understand the ancient link between ethnic origin and the surface manifestations of Earth forces: deltas, islands, mountains, oceans, plains, climate. To geoscientists, the ethos of peoples can ultimately be traced to orogeny, marine transgression, glaciation, ocean currents, *etc.* It is difficult to be swayed by the rhetoric of tribalism when you understand that, in some instances, its claim to glory is a natural-feature icon that is nothing more than, say, a turbidite, or a transform fault, or a dormant volcano, mere ephemera in the context of geological time. And who but a geoscientist can fully appreciate the explosive connection between the fury and terror of a volcanic eruption with the benign beauty of a colourful sunset half a world away?

Earth scientists are universalists, not in the religious sense of the word, but as people who are trained to think globally and are not intellectually deterred by either artificial or natural barriers. This insight has a poetic quality that transcends our differences as human beings and may yet be a force for greater harmony. Shakespeare wrote that there are "sermons in stones" (As You Like It, Act II, Scene I) and Moses Harvey said that "geology may be regarded as a great homily from a stony text, or as a great prose-poem with the globe as its subject" (Harvey, 1864).

With such encouragement, I am tempted to say that geology, or the Earth it describes, could become a modern metaphor for unity in the world. A sort of new universal mythology that strikes a responsive chord all over the planet. My reading of Joseph Campbell, the great American scholar who was the world's foremost authority on mythology, shows the early importance of the Great Goddess, the Mother Earth, in European Neolithic culture (Campbell, 1988). In a more popular vein, this theme is captured by Jean Auel in her novels set in the same region during the Upper Paleolithic (*e.g.*, Auel, 1990). Life coming from the Earth, the succouring qualities of the Earth, the connection between life and Earth are all part of the early Goddess mythology. Is it too great a leap to see similarity here, at least metaphorically, with the Gaia Hypothesis (Lovelock, 1972) of today?

According to Campbell, myths are stories of our search through the ages for truth, for meaning, for significance. Despite the rich variety of myths that have developed around the world, such as stories of creation, many have similarities that are difficult to explain given their disparate origin. Campbell (1988) says one explanation is that the human psyche is essentially the same all over the world, since all human beings have the same origin, the same instincts, the same impulses, the same conflicts and the same fears. But also important has been the influence of the natural environment, such that planting cultures, for example, gave rise to similar myths wherever the agricultural or planting tradition developed. The environmental influence, of course, reflects the rhythms of the Earth (seasons, climate, floods and glaciation). In this way, earth processes have contributed a common thread to human beings' search for meaning through mythology.

Unfortunately, today, not many people get divine inspiration from nature. In the book *The Power of Myth*, Campbell (1988) says:

> ... the only myth that is going to be worth thinking about in the

> immediate future is one that is talking about the planet, not the city, not these people, but the planet, and everybody on it... The society that it's got to talk about is the society of the planet... This is the ground of what the myth is to be. It's already here: the eye of reason, not of my nationality; the eye of reason, not of my religious community; the eye of reason, not of my linguistic community... And this would be the philosophy for the planet, not for this group, that group, or the other group. When you see the earth from the moon, you don't see any divisions there of nations or states. This might be the symbol, really, for the new mythology to come.

None of us deny the idealism of Campbell's longing, but that's what I am selling today. Just as the Gaia Hypothesis tends, as observed by Godfrey Nowlan in his article "The Ancient Biosphere" (Nowlan, 1993), to break down the barriers between scientific disciplines, so does a universal Earth-centred mythology break down the barriers between peoples. This is the first step toward global enlightenment, an understanding of our interconnection and our fundamental link to Earth. Moses Harvey, lecturing to his mid-19th-century St. John's audience, put it this way (Harvey, 1864):

> Man himself, in his mortal part, may be regarded as an extract from the granite — a fine essence concentrated from the flinty particles of the primitive rocks. The original granite mountain was worn down into minute particles, which were taken up by water and spread over the surface of the earth; here they entered into the composition of plants whose roots drink, in rain and spring water, large quantities of dissolved flint. The animal devoured the plant so these particles entered into a higher life. Man, in his turn, eats the animal or the plant, and thus builds up his earthy tabernacle with the original granite particles variously compounded... In the course of a lifetime we thus dispose of a considerable slice of granite.

Here Harvey has transformed the ubiquitous rock, our beloved object of study, but ignored by most people because of its commonness, into the veritable essence of life. Can we doubt the power of the poetry of geology to help create a universal Earth-based mythology? Aren't earth scientists, as professional recorders of Earth's evolution, well placed to contribute? I'll come to how we might do this in a few moments.

I just want to return here to the notion of universality or cosmopolitanism being well developed in earth scientists. I believe this comes from two factors: the historical and global scope of our science, and the personal development of geoscientists (perhaps of most scientists).

There is little that is immutable about earth history, or the hypotheses that we devise to describe it. Geoscientists are well apprised of the folly of taking anything for granted. Before plate tectonics, we knew how the continents grew. After plate tectonics, the proto-oceans were well behaved, until we discovered suspect terranes. And recent reconstructions of cratonic areas during the Late Proterozic have produced a much more exotic mosaic than previously contemplated. If Australia and Antarctica were once adjacent to western Laurentia (*e.g.*, Moores, 1991; Hoffman, 1991), a geological kinship is established that belies their current separateness. You get my drift? Our experience as geoscientists is that the more mature our science becomes, the more we must co-operate and look beyond our borders to find answers. In plate-tectonic theory, whether amalgamation or disaggregation, one is forced to think globally: an antiparochial predilection and a paradigm for continued success.

For geoscientists, on a personal-development level, forces are at work that induce open-mindedness. Just a few years after completing my M.Sc. thesis, which I knew was the most solid piece of research ever carried out in the Newfoundland Appalachians, I went through the mental anguish of admitting I was wrong: cratonic basement didn't exist or, at least, wasn't exposed (Blackwood, 1978). Nothing can shake up a geological story like a few well-placed traverses, which my Survey job gave me an opportunity to do shortly after graduating. My "road-to-Damascus" enlightenment didn't come in a blinding flash, but over a period of months due to the unremitting evidence developed in outcrop after outcrop. After this, I was never right or wrong, just informed, to varying degrees, of the actual truth. Most earth scientists, I believe, have a prerequisite for freedom from prejudices, scientific or otherwise.

Well, if you buy into my thesis that earth scientists are cosmopolites because our profession deals with the Earth, the whole Earth, through all its ages, that we are aware of the vagaries associated with the evolution of life through time and the influences of physical processes on same, that we appreciate the Earth as the ground of some universal myths and the inducer of others (did the walls of Jericho, for example, as suggested by Derek Ager (1993), fall because of movement along the Dead Sea Rift?), that our development as scientists predisposes intellectual receptiveness, and that we are concerned with universal themes and rhythms known to have poetic appeal to Earth's people, what then are our responsibilities as earth scientists?

The primary responsibility is to continue elucidating the mysteries of Earth's past, present and future. This might be easier said than done, as societal support through government funding is required to carry out university and government research. Pure research, in particular, is essential for further breakthroughs in our understanding of how Earth works, and whether we humans can continue living here. Industrial geoscience should also be deeply concerned with global change and sustainable development. These "real-world" issues mean that the geoscientist must also contend with these non-scientific problems: bureaucratic insensitivity, political transience, economic stagnation and public misconception. How do we get on with the job in the face of these obstacles?

H.G. Wells wrote that "Human history becomes more and more a race between education and catastrophe" (Wells, 1923, p. 1100). Geoscience is crucial in avoiding that catastrophe, and so we must educate: each other, political masters, and the general public. I have grave reservations regarding our ability to have significant immediate impact on what I call the great abyss of contemporary public consciousness, but we must try. In fact, the Council of the Geological Association of Canada recently decided to strike a national medal to be called the E.R.W. Neale Medal, to honour those pioneering enthusiastic geoscientists who are committed to enlightening the public to the importance, and poetry, of geoscience. However, critically, in the short term, we must do our utmost to influence the decision makers in our society (and where possible, become one of them). In our places of work and through agencies like the Canadian Geoscience Council, we must become proselytizers for the importance of geoscience. Success is important here so we can get on with the other side of the education equation: acquiring knowledge. An environment that allows geoscience to flourish (especially in our universities) will result in the continued discovery of

fundamental truths about our planet, something David Crossley, in his article "The Earth's Core," calls "... information [that] remains forever part of mankind's heritage" (Crossley, 1993). He further describes this as a cultural activity rather than an economic one (indeed, a cultural activity of universal application). That must be the quest: to continue contributing to the total knowledge base of Earth, to raise understanding of our planet that will overwhelm positions of ignorance, to foster an osmosis of Earth awareness that will, in time, permeate the consciousness of all Earth'speople. And here, I believe, we have returned to my theme that earth scientists occupy a privileged position of insight, that our subject matter is of catholic dimensions, and that in its universal grounding and imaginative bearings, geology has a poetic quality. Listen to Moses Harvey one more time (Harvey, 1864):

> Let a geologist tell you the tale of some granite peak that lifts its 'bald, awful' head amid the clouds ... how it sprang of old from the fiery gulf ... how once the sea-weeds were wrapped around its shoulders, and the sea-shells decked its summits as the waves played among its crests ... how from the bottom of the sea slowly upheaved, through long ages, it rose to be a 'heaven-hissing' mountain; or let him sit down by some gray, moss-covered boulder or wave-worn pebble, and narrate through what strange wanderings and vicissitudes they have passed, and you will listen to a tale more fascinating by far than 'The Rime of the Ancient Mariner,' more wonderful than all that even Milton's imagination bodied forth.

Ladies and gentlemen, you are writing this epic poem, and Earth's people need to hear it.

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