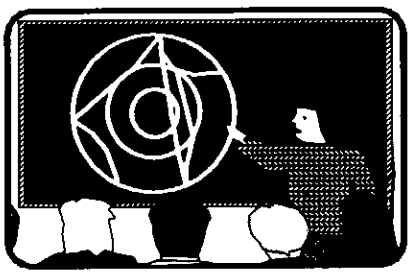
# Conference Reports



## We've seen the Enemy and it is Us. The Why and How of Communicating Science: A report on the Royal Society of Canada workshops

Michael J. Keen
*Geological Survey of Canada*
*Bedford Institute of Oceanography*
*Dartmouth, Nova Scotia B2Y 4A2*

Alan Morgan
*Geological Survey of Canada*
*Terrain Sciences*
*601 Booth Street*
*Ottawa, Ontario K1A 0E8*

Godfrey S. Nowlan
*Geological Survey of Canada*
*Institute of Sedimentary and*
*Petroleum Geology*
*3303-33rd Street NW*
*Calgary, Alberta T2L 2A7*

We recently found out just how literate Canadians are in science. E.F. Einsiedel asked 2000 adults on the telephone how long it takes for the Earth to circle round the sun. Half don't know. Did human beings arrive before the dinosaurs? More than half don't know ... and nearly half don't really appreciate that our ancestors were animals. The news is not *all* bad — four-fifths are at least Copernicans, and know that the Earth does course around the sun, although one-fifth of these thinks that it takes ... a day (Einsiedel, 1990).

We can in a way understand that Canadians do not appreciate the intellectual glory of science, but it is surely alarming that so many don't know how the world works. It's certainly bad for the ego that so few can name one Canadian scientist (Figure 1). Perhaps we don't spend enough on education? Possibly — but we spend more per head than West Germany, or Japan, or the United Kingdom. In fact, our nation spends the second highest amount per head on education of any in the world. No doubt we won't need scientists in the future. Let's hope not — we have only four in every thousand in our labour force now, half as many as Japan. We'll continue to mine British Columbia's trees, and Newfoundland's northern cod, and Alberta's oil, they'll all go on for ever, won't they? Science and engineering, technology and mathematics can't be important to a nation of hewers of wood and drawers of water.

The nation — the world — needs leaders who know how science and technology can serve. The nation — the world — needs scientists and technologists who will serve. We have to communicate well if these points are to be accepted in society. We have to reach adults, we have to reach children and these are different targets to be reached by different means. These means include the media and the schools, and the involvement through networking of everyone who can contribute.

We just have to be able to communicate.

The evidence that we communicate well with the public is not very good, is it? They should pay us more, we always say, but they don't. They should love us better, we say, but they don't. Sixty-three per cent of the 2000 Canadians surveyed by Edna Einsiedel couldn't name one Canadian scientist. Over 40% thought that scientists have a power on account of what we know, and that makes us dangerous. Are we really unknown? Are we really dangerous? Do you help at school science fairs? Have you been into your child's classroom? Do you communicate badly? Do you explain earthquake damage in terms of eigen-values? Maybe you need help to communicate? Have you been to a communications doctor? Every serious politician has to reach the public and uses a communications doctor. Every chief executive officer has to reach the public and seeks help.

We have to reach the public too. We should seek help.

Help came from the Royal Society of Canada in a series of workshops organized by its committee on Public Awareness of Science: "Communicating Science — Why and How" (Table 1).

Participants from about 80 Canadian scientific societies and organizations in the science business met at the Chateau Laurier in Ottawa on 25-27 March 1990. We came from all around: universities from all provinces, ACFAS, the engineers, the granting councils, medicine, museums, Sigma Xi, and the Youth Science Foundation, the media, and public relations and communications experts from many agencies, including the Geological Survey of Canada. Earth scientists turned out in force (Table 2).

Who would have believed this possible five years ago? The Royal Society of Canada courting publicity? We all know that scientists attend Short Courses on "Applications of the Scanning Tunnelling Microscope to the Determination of the Interquark Spacing in Lherzolites", but you mean we must learn from professionals in ... networking, fundraising, lively teaching, print media, broadcasting, marketing ... We can? We should? Oh horror! But why?

Scientists should be good communicators. We write papers and grant applications. We report on projects, and we try to convince our boards of directors that drilling on Pinnacle X is a sure-fire certainty. We know that space for a Letter to *Nature* is very competitive. The topic must be appropriate for the market sought by *Nature* — global interest. The Letter must be succinct — 1000 words, including the pithy summary at the start, in bold. The journal accepts only four figures or tables, and so they have to count. We all know that the continents were fitted by computer and not by Wegener because Bullard, Everett and Smith's famous figure showed us so!

Why can't we do the same for the public through TV and radio, newspapers and magazines? Perhaps we can, but Edna Einsiedel's survey tells us clearly that we don't, and so perhaps we have a lot to learn.

Two of the Royal Society of Canada's workshops focussed on public communications: one on print, the other on television. Imagine

having to write a newspaper article on an unfamiliar subject in a short time. This was the exercise performed by participants in Lydia Dotto's workshop on print. The raw materials were a scientific article and a taped interview with the author. Most scientists could not understand the abstract of the article and were grasping for important points in the body of the paper. Newspaper articles were written in less than half an hour and each contributor got to compose a headline on his neighbour's contribution. It became clear how facts become unintentionally altered in the newspapers, and the workshop drew attention to the poor skills possessed by scientists for working with the media. We surely find the need for a quick article with a catchy headline hard to satisfy. The scientist, naturally careful, is so often ponderous, and insecure in his or her intellectual perambulations. We are so often unaware of the importance of the research to the public who pay. Role playing was also the theme of the broadcast workshop run by David Mowbray and Peter Lockyer of CBC. Scientists became reporters, scientists, rival scientists, administrators, and public relations officers simulating the announcement on a discovery in genetic engineering. Goodness! TV journalists are not evil! Heavens above! TV is visual! We all gained insights, and we won't all run and hide next time the local paper, or Derek York from *The Globe and Mail*, calls at the lab.

We have to apply these new skills to the media, and we must remember that just as

**Table 1 Speakers and workshop leaders.**

| | |
|---|---|
| Broadcasting | Peter Lockyer, Programme consultant; Broadcasting for International Understanding, Ottawa |
| Broadcasting | David Mowbray (formerly a physicist), Health and Science, Newsday, Canadian Broadcasting Corporation, Ottawa |
| Education | David Harpp, Chemistry, McGill University, Montreal |
| Education | William Haskett, Senior Exploration Co-ordinator, Unocal Canada Ltd, Calgary |
| Education | Douglas Hayward, retired, but still Honorary Professor of Chemistry, University of British Columbia, Vancouver |
| Fundraising | Henry Storgaard, President, Sportcom International Inc., Suite 402, 2197 Riverside Drive, Ottawa K1H 7X3 |
| Marketing | Mark Sarner, Director of Manifest Communications Inc., Toronto (whose clients have included *Participaction*) |
| Media | Lydia Dotto, Science Writer, Peterborough; formerly science writer with *The Globe and Mail* |
| Media | Joan Hollobon, Science Writer, Toronto; formerly medical reporter, *The Globe and Mail* |
| Media | Betty Lou Lee, Hamilton; formerly medical reporter, *The Hamilton Spectator, Kitchener-Waterloo Record* |
| Media | Felix Maltais, Director-General, Agence Science-Presse, Montréal; Editor *Je me petit-débrouille* |
| Media | Neil Morris, Deputy Director of Media and Public Relations, Medical Research Council, Ottawa |
| Networking | Pat Delbridge, President, Pat Delbridge Associates International, Toronto; Chairman, Environmental Choice Program; Member, National Round Table on Environment and Economy |
| Science Policy | William Winegard, Minister of Science, House of Commons, Ottawa (formerly an engineer, and President of University of Guelph) |
| Scientific Literacy | Edna Einsiedel, Communication Studies, University of Calgary, Calgary |

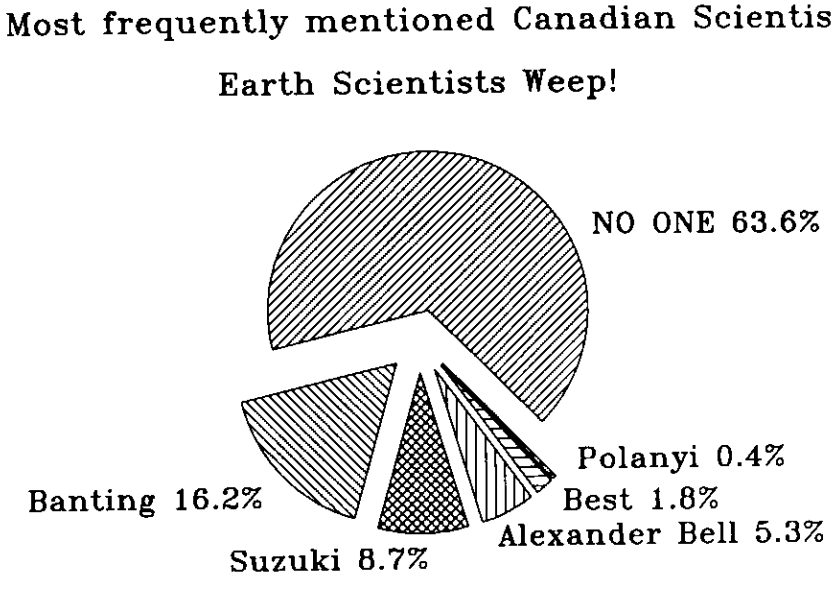



**Figure 1** *E.F. Einsiedel surveyed 2000 adults asking: "Can you tell me the names of any prominent Canadian scientist either living or dead you happen to remember?" Sixty-three per cent could name no one. The figure is based on the data in Einsiedel (1990).*

**Table 2 Earth scientists were there *.**

Association of Exploration Geochemists
Atlantic Geoscience Society
Canadian Geoscience Council
Canadian Geotechnical Society
Canadian Institute of Mining and Metallurgy
Canadian Quaternary Association
Geological Association of Canada
Geological Survey of Canada
Mineralogical Association of Canada

* (Apologies for omissions!)

scientific journals occupy niches, so do they. Readers of *Interquark Spacing in Mineralogy* are different from those of *Palaeontographica Bulgariana*. The media must sell newspapers and advertising space, and attract viewers and listeners, and the local TV and radio stations look for stories which appeal to their own audiences. They can be our audience if we reach out. Maurice Ewing of Lamont-Doherty Geological Observatory once said that you become famous by making a new sort of observation in an old area, or an old sort of observation in a new area. The media, too, look for new stories with old wrinkles, or new wrinkles on old stories. They look for them on their terms too. Fast-breaking please, like *Nature*, today, not tomorrow, and cheap, just like your own Project Leader or Dean keeps saying.

We have to be needed if we expect to be appreciated. We must then find out what it is that others need, and what central roles we can play. The simplest way to do this is to network: to reach out and work with others. Smart companies and smart governments invite the critics to join them, to come on board, and we can do this too. If we don't, we will find ourselves continually asked to parties when they are over, as technicians to fix up the mess that others have made. If we want to chat over drinks with the principals, we have to sit with them in the board room during the working day.

What of the future? Where are tomorrow's scientists and technologists? How do we reach tomorrow's leaders and help them to understand what science and technology they will need? Musicians and writers know where to look — in the schools. Catch 'em young, before seduction by sex and hard rock. The Kiwanis, among others, organize Music Festivals every winter (spring in Victoria). Canada Council helps Writers Unions send their best into the schools, where they read their works, help children write, enthuse, and create disciples. This all pays off — 13,000 participate in the Kiwanis' Music Festival in Halifax, and some 1500 stories, poems and paintings are sent to the Halifax City Library Children's Contest every year. You too can hate the ukulele ... but better thousands of children play that than nothing. Scientists have a lot of catching up to do.

We do not start from nothing, of course. Some scientists have been very active already, and the plenary sessions and the posters showed us some of the activities in place now (Tables 3 and 4). BC's Science World has the full force of the Government of British Columbia behind it, and it pays off — lots of scientists in lots of schools all through that province. The Calgary Science Network is an informal and unfunded group of scientists, educators and media people brought together to promote the public awareness of science. Scientists visit schools, and a way of feeding science stories quickly to the local media has been found. Many new contacts have been made. In Dartmouth, a Scientists in the Schools program has been helped by the Canadian Geological Foundation and the Royal Society of Canada. Many other efforts can be found throughout the land (Table 4).

We have to take advantage of children's innate curiousity for "natural history" and for the way things work. How should we do this? Don't scientists as a group right now come with a terrible reputation? Wouldn't Galileo have become a rock musician if we'd been there? And university faculty aren't rewarded for venturing into science education. It's not Research. Government scientists have no Mandate. Industrial staff may not be given the time and, of course, We are All Overworked. Science teachers are frequently trained ... in the arts, and many have no solid science base at all. Should we wonder that we face a scientist shortfall?

What can be done about this? How do we turn on young children?

Douglas Hayward sings "Roses are red and violets are blue" as he extracts their colours. He then changes them with baking soda and white vinegar or lemon juice, and then — changes them back again with white vinegar or lemon juice and baking soda. He isn't wooden while teaching do-it-yourself chemistry, and pupils learn how water molecules stick together, but never hear the word viscosity. Bill Haskett assembles the children as sand grains, and tucks the smallest into the middle of the crowd, and throws his shoes into the empty spaces to illustrate porosity. He gets them to drill for oil, and money in the bank, and gas in an automobile, starting with blank white paper on a board, charging them for their wells, and rewarding

**Table 3 Poster sessions.** Poster sessions were given on a number of topics. There were no abstracts associated with the meeting and some of the posters were given in unusual ways (*i.e.*, by videotape). The listing below gives an idea of what was presented.

Atomic Energy Chalk River Laboratories; AECL (Chalk River): "Public Awareness of Nuclear Science" — R. Clingen

Association for the Promotion and Advancement of Science Education; APASE (Vancouver, B.C.): "Public Education in Science" — B. Moon

Atlantic Geoscience Society (Halifax): "The Appalachian Story" Videotapes and highways maps; geological Information — L. Ferguson

"Calgary Science Network". (Calgary): — G. Nowlan

Canadian Geoscience Council (Waterloo): "EdGEO activities" — A.V. Morgan

Canadians for Health Research (Montreal): "Canadians for Health Research" — P. Guyda

"Discovery Centre" (Halifax): — G. Stroink

Genetics Society of Canada (Vancouver): "Why know about Genetics?" — T. Griffiths

Ontario Science Centre (Don Mills, Toronto): "Hands on Science" — L. DeDivitiis

Royal Canadian Institute (Toronto): "Work of the Canadian Institute in Science Awareness; Past, Present and Future" — A. Bruce-Robertson

Science Council of Canada (Ottawa): "Education of Science" — J. Howell

Science World (Vancouver) "Science Outreach Program" and "B.C. Science in the Schools Program" — G. Moss

Sigma Xi (Ottawa): "Science in a Shopping Mall" — N. Brousseau

University of Waterloo (Waterloo): "High School Newsletter Communication in Biology, Chemistry, Earth Sciences and Physics" — A.V. Morgan

Youth Science Foundation (Ottawa): "Youth and Science for Tomorrow" — J. Engelhardt

them for their discoveries. They learn quickly what mapping is, without hearing the word. Invite them both to your next GAC meeting or, if in Alberta or BC, to your school.

Why not get schools to establish a program of scientists, technologists and mathematicians not-in-residence? They would be on tap as advisors to teachers, and as links between the school and the scientific community (Table 5). Support National Science and Technology Week next October 12-21, 1990. Get together with scientists in your institution and your community and organize some events to highlight science and technology. Organize a pet rock clinic. Dress up as a fossil veterinarian!

Story tellers can have a ball! Who doesn't appreciate creativity after reading Crick or Watson on Crick and Watson, or Ken Hsü on the *Mediterranean Was a Desert*. Science and technology have many stories which could be in the newspapers every week, next to the Bridge by Club, and Birds by Warbler. We can all take lessons from Professor Hayward with his weekly columns in BC.

Spread the news that science is fun!

Some of this needs money, and many provincial governments and their school boards don't have any. Henry Storgaard showed us the essence of fundraising. Corporations are moving away from outright donations and more into the realm of "corporate sponsorship". The dollars he cited for success are large ($50,000-$100,000). Science and technology should have good sponsorship potential. Surprisingly, participants expressed a lot of interest in all this. The Five Steps to Successful Fundraising are: a feasibility analysis, a strategy, actually getting the money, good management, and evaluation afterward. This is really just successful project management, and we should be good at it. Participants left the workshop with a far better idea of matching their organization's needs to the strategies required for successful corporate sponsorship.

Should these workshops be repeated? Oh yes! Why not present them or their clones and satellites at Geological Association of Canada (GAC), Mineralogical Association of Canada (MAC), and Canadian Geophysical Union (CGU) meetings nationally? They would not replace A Short Course on Interquark Spacing, absolutely not, but they might

**Table 4 Useful addresses.**

*Biologue*
Department of Biology
University of Waterloo
Waterloo, Ontario N2L 3G1
*Interesting biological magazine for schools. 2 issues per year. 1 year $6.00; 2 years $10.00*

Canadian Science News Service
Lydia Dotto; John Holt
Room 45, University College
University of Toronto
Toronto, Ontario M5S 1A1
(416) 595-7153
*Send information for articles on Canadian R&D.*

Royal Society of Canada
Cathryn Bjerkelund
Academy of Science
P.O. Box 9734
Ottawa, Ontario K1G 5J4
*Articles on Public Awareness of Science for OYEZ.*

OYEZ, or
Public Awareness of Science Committee
*See Royal Society of Canada*

*Chem 13 News*
Department of Chemistry
University of Waterloo
Waterloo, Ontario N2L 3G1
*Interesting chemistry magazine for schools. Free sample. 9 issues per year. 1 year $7.00. 2 years $13.00.*

*Do-it-Yourself Chemistry For Elementary Schools* by Professor Hayward
c/o G.S. Bates
Department of Chemistry
University of British Columbia
2036 University Mall
Vancouver, British Columbia V6T 1Y6
*Book, $10; Book and video-tape of classroom session, $60.*

Calgary Science Network
Godfrey Nowlan
Institute of Sedimentary and Petroleum Geology
Geological Survey of Canada
3303-33rd Street NW
Calgary, Alberta T2L 2A7
(403) 292-5387

Environmental Choice Program
Pat Delbridge
President, Pat Delbridge Associates Inc.
102 Atlantic Ave, 3rd Floor
Toronto, Ontario MGR 1X9

Scientific literacy: a survey of adult Canadians
Edna Einsiedel
Professor of Communication Studies
Faculty of General Studies
University of Calagary
Calgary, Alberta T2N 1N4
(403) 220-3924

*Phys 13 News*
Department of Physics
University of Waterloo
Waterloo, Ontario N2L 3G1
*Interesting physics magazine for schools. 4 issues, $5.00*

Royal Canadian Institute
President, B. Cinader
Suite 312, 720 Spadina Ave.
Toronto, Ontario M5S 2T9
(416) 928-2096
*Spreading wings across Canada; joint projects in public communication.*

Science for Educators
Malcom Harvey
Director of Physics
Chalk River Nuclear Laboratory
Chalk River, Ontario K0J 1J0
(613) 584-3311

Science World BC
Gerald Moss
1455 Quebec St.
Vancouver, British Columbia V6A 3Z7
*Scientists in the Schools; Science Fairs; Road Shows; Outreach Programs.*

Scientists, Technologists and Mathematicians in Darthmouth Schools
Michael Keen
Geological Survey of Canada
Bedford Institute of Oceanography
Dartmouth, Nova Scotia B2Y 4A2

*Wat-on-Earth*
Alan Morgan and Peter Russell
Department of Earth Sciences
University of Waterloo
Waterloo, Ontario N2L 3G1
*Interesting earthy magazine for schools. 2 years, 4 issues, $6.00.*

Youth Science Foundation
151 Slater St., Suite 904
Ottawa, Ontario K1P 5H3
(613) 238-1671
*Appreciation and Understanding of Science in Young Canadians. Canada-wide Science Fairs.*

**Table 5 Things to know and do.**

**Periodic Tables: Do You Know?**

Canadian: Which province has the most Carbon? Iron ... ?

Geographical: A country named after an element?

Geographical: An element named after a country?

An element discovered by a woman?

An element named after a woman?

...

**A Few Things That You Can Do!**

Your school can adopt a chemist, a mathematician, a biologist, an earth scientist, a physicist ...

You can write a local column for the newspaper, notionally for children ... but in fact for mothers and fathers

Invite a teacher to your lab in the university, industry, or government

Reward the scientists, technologists and mathmeticians who communicate

Organize a Short Course on Public Appreciation of Science at your next GAC/MAC/CGU/CMOS/CAP ... meeting ...

WOLFVILLE '92 can do it, so can you!

provide the means to inform the public of the importance of ... interquark spacing. Why not sub-sets at regional meetings, of the Cordilleran and Pacific Sections of the GAC or of the Atlantic Geoscience Society. No opportunity should be missed. Perhaps managers of the provincial and federal geological surveys, the exploration managers of oil and gas companies, and earth science department chairs could devote their next meeting to Public Awareness instead of ... well, whatever it is.

Linda Christiansen-Ruffman — President of the Canadian Sociology and Anthropology Association — posed questions at the end which suggested topics which we had missed, topics for future meetings: just what is the message that we want to tell — what are the principles that we want to promulgate? Is the substance of our message that the technological fix is all the world needs, and just give us money and all will be right? Or do we want to share our knowledge of the intellectual glory of science so well described by the Boorsteins, Sagans, Cricks and Goulds of the world, and in which all scientists play greater and lesser parts? Is it to pass on as best we can a glimpse of that rare incomparable flash of creativity? Or to describe the rigour with which hypotheses must be tested?

We must surely be clear about the principles that we want to spread.

These comments at the end suggest too that we missed a second topic. Are there not ethical standards which scientists might surely hold in common, and which would be the background in our communicating with the public? Lawyers and doctors are, like us, imperfect, but at least they have published standards by which they can be judged. Do we? We have important roles to play in our society, and we can't ignore the consequences of our discoveries, or of the regulations which we formulate and monitor, or the lessons which we teach. Working with children in the schools soon shows that they are now well aware of our world's environmental problems, and of the tasks of cleaning up faced by their generation. Could it be that communicating ethical standards to scientists and technologists is as important as communicating science and technology to the public?

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**Reference**

Einsiedel, E.F., 1990, Scientific literacy; a survey of adult Canadians: University of Calgary, Graduate Program in Communication Studies, Calgary, Alberta, 50 p.

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