A Note from the Editor

I am sure all Fellows will join Dr. Marie D'Iorio in congratulating Professor Graham Bell on his election as President-Elect and in extending all good wishes to him.

In this issue Dr. Peter Hackett is featured as the second in the series on Specially Elected Fellows. He was elected in 2007. His citation was:

Peter Hackett made major contributions while at the National Research Council Canada (NRC) in chemical physics that led to improved synthesis of vitamin D and isotopic enrichment via infrared multiphoton dissociation. He developed methods now widely used to study reactions at metal centers and was among the first to delineate potential revolutionary chemical properties of nanoscale metal clusters. He was pivotal in establishing the National Institute for Nanotechnology, a ground-breaking university-government collaboration. His vision and leadership has positioned Canada at the forefront of emerging fields such as nanotechnology, photonics, genomics and information technologies, and challenged Canadians to work together to develop technologies to raise the standards of living in developing countries.

In this issue he reflects on Public Servants and Public Policy. In September this year, the Royal Society of Canada joined with the Royal Society of the UK to present a Symposium in Toronto on Open Access.
Dr. Stephen Tobe was the speaker for the RSC and in this issue he reports on the Symposium.

Also in September, the Fraser Mustard Institute for Human Development opened at the University of Toronto. Dr. Marla Sokolowski accepted the position of Academic Director and tells us about the Institute in this issue of the Bulletin.

Once again I urge you to let us know what you think of the Bulletin. Comments and suggestions are always welcome and may be sent to the Secretariat or to me directly at betty.roots@utoronto.ca.

- Professor Betty Roots, Honorary Editor

Message from the Academy President

Dear Colleagues,

Allow me to start by congratulating Professor Graham Bell on his election as President-Elect of the RSC. As an Academy, we were truly fortunate in having three highly competent and experienced members who agreed to let their name stand for election. Thanks to Professor Jeremy McNeil and Professor Walter Davidson for their continuing leadership and service to the RSC.

I wish to warmly welcome Professor Keith Hipel on the Executive team of the Academy of Science. As President-Elect of the Academy of Science, Professor Hipel will participate increasingly in advancing our Academy’s affairs. In fact he already got his feet wet during a recent trip in Asia!

With the Induction of the 2012 new Fellows, the Academy of Science has made modest progress in acting on the recommendations of the Task Force on Equity and Diversity in the RSC fellowship. At a recent Inter-Academy Forum in Seoul, I learned that many Academies have struggled with the issue of equity and diversity in their membership and I was inspired by the solutions deployed by the National Academy of Science (Leopoldina) in Germany - in particular the Leopoldina was one of the first to launch a Young Scholar Academy and I am delighted that the RSC is going down that path. The Academy of Science is bound to be transformed by this new College.

-Marie D'Iorio, President, Academy of Science
For Better or for Worse: Public Servants and Public Policy

Professor Peter Hackett, FRSC

When I came to the Alberta Ingenuity Fund, its allocations were governed at arm’s length from government by a private sector Board of Trustees, an innovative governance arrangement first implemented in the creation of the Alberta Foundation for Medical Research by Peter Lougheed, the late Premier of Alberta. In 2008 the Alberta government began to contemplate undoing Lougheed’s arrangement and in 2009 it changed the enabling legislation bringing the allocations from the Ingenuity Fund and the Alberta Heritage Foundation for Medical Research (AHFMR) endowments under the direct control of government. I was asked to relocate to the Alberta School of Business. Since then I have been carrying out research on the state of science and innovation policy in Canada.

As a researcher, I am drawn to experiments and data but policy makers operate in very complex environments where political concerns ultimately direct the deciding vote. Ultimately all public policies are political compromises. The science of asbestos is clear but Canada’s decisions with respect to the Rotterdam convention have political constraints from the regional to the international level. Public servants must design their interventions for the greatest effect given these constraints. The extent to which they are skilled in this art determines the success of the adopted policies in the long term. We also have to acknowledge that policy makers are flying blind, without the benefit of real time performance data to adjust their policy interventions to better achieve the desired objective. The sensible management approaches that researchers and business people use to adjust their course are rarely available and are even more rarely used in government. However, eventually enough time passes, policies remain in place and data on the desired outcomes accumulates for all to see - both in Canada and in other countries. Then we can ask: Did the Canadian policies have the desired outcomes? Were they more effective than those adopted by the competition?

Let’s look at an example. In 2002 after a long series of national consultations about how to increase national productivity, the federal government set an Innovation Agenda with the goal of moving business expenditures on R&D (BERD) measured as a fraction of GDP, from 15th to 5th place among the Organization for Economic Co-operation and Development (OECD) countries. This goal implied an increase in GDP from research-based industries of around $300B. Various policy tools were harnessed to this agenda among them Science and Experimental Research and Development Tax credits, increased spending on research in institutions of higher education and government stimulation of labour-sponsored venture capital funds.

Even though the Innovation Agenda has been reworked and renamed a couple of times since then, these policy instruments remain in place. How effective have they been? GDP has increased by $300B and OECD data show that the productivity gap between Canada and the USA narrowed substantially over this period. At the same time, BERD has fallen year after year. Canadian governments now pay for over twenty five percent of business research, the most generous support in the OECD. Yet the returns are among the most meager. Every Swiss pays $25 on average to support business research and gets back $1450 from Swiss companies; in Canada we pay $105 and get back $450. There are over five hundred government programs that support business innovation in Canada. No one knows how effective they are? The return on investment of Canadian venture capital runs around two percent, the rate for US venture is around fifteen percent. Why should Canadians be encouraged to support an increase the supply of venture capital when it makes such poor returns? Finally, Canada produces PhDs at a rate that is the lowest in the OECD on a per capita basis.
Finland spends same amount per capita on higher education research as Canada yet it produces PhDs at three times the Canadian rate.

This brief exposé highlights some shortcomings; a complete analysis shows that these policies were built upon a shaky foundation. National productivity is determined by more than BERD; competition policy, prices and the exchange rate play major roles. In competitive environments businesses have existential incentives to create innovative products and to seek out the R&D that they need. The critical need in venture capital is competent management more so than extra investment. Indeed extra investment usually competes with and displaces competent management. Perhaps policy makers should create incentives for returns on venture rather than ones for increased investment. Perhaps policy makers should also create some expectations of returns from their investments in higher education research? Massachusetts Institute of Technology (MIT) has over thirty Nobel Prizes among its faculty and alumni yet it is perhaps better known for the economic returns of the businesses created by its alumni.

The more I have looked into these matters the more I have become convinced that a major effort is required to renew the capacity of the public service to envisage and champion effective public policies to enable a creative economy in Canada. Canada has an extremely competitive extractive economy, complete with a well-developed system of innovation. Canada is a smart supplier of natural resources to the world. That is the reason that we have been able to afford the current set of poorly performing public policy experiments. But remember these public policies were created by public servants.

We will have to be much smarter on the public policy front if we are to maintain Canada’s place in the world when competence in research and innovation are more uniformly distributed around the globe. Over the past twenty years, the fraction of the global total of research papers in nanotechnology produced by China has increased linearly from one to twenty five percent. China has vast pools of investment money and a strong incentive to unleash entrepreneurship. Many other counties are on a similar development path. Canada’s future will be very competitive indeed. Our public policies in support of research and innovation must measure up.

Biography

Professor Peter Hackett, FRSC, has been Executive Professor in the School of Business, and a Fellow of the National Institute for Nanotechnology (NINT), at the University of Alberta since 2009.

He is a chemical physicist with 200 publications including 11 patents in photochemistry, the use of lasers in chemistry, and in nanotechnology. He received a BSc in Chemistry (1969) and PhD in Photochemistry (1972) from the University of Southampton. After completing his PhD he left the UK to join the National Research Council Canada (NRC).

During his research career at the NRC he developed the use of lasers in chemistry and nanotechnology. He became Vice-President Research at NRC and was responsible for creating NINT and other technology cluster initiatives across Canada. He helped secure federal funding for genomics research and has championed the role of Canada in developing technologies that further global human development. He supported entrepreneurship at NRC; 50 spin-off companies were created during the seven years he was Vice-President.
He went to the Alberta Ingenuity Fund as President in 2004 and grew the organization at 30% per year for five years, creating initiatives in nanotechnology, prion research, water research, and the development of knowledge-based industries.

He has been awarded the Rutherford Medal in Chemistry, the Noranda Lecture Award, a Canada Award for Excellence in Technology Transfer, and the Alberta Centennial Medal.

Open Access Journals

Dr. Stephen Tobe, FRSC

A Symposium on Open Access jointly sponsored by the Royal Society (UK) and the Royal Society of Canada was held at the University of Toronto on September 21, 2012. Representing the Royal Society was Professor Emeritus James Till while the Royal Society of Canada was represented by Professor Emeritus Stephen Tobe. Oral presentations by both participants were followed by a question and answer session. The results of the Symposium are summarized below.

- Open Access (OA) Journals are journals that are freely available to the public via the internet. Generally, OA refers to scholarly peer-reviewed journals. (Examples of Open Access Journals include PLoS One and Frontiers, eLife (sciences) (will be published by the Wellcome Trust) and PeerJ (to be published December 2012/January 2013) will no doubt prove popular.

- Presently, there are 8181 Open Access journals of which 4039 are searchable online at the article level. There is a ‘Directory of Open Access Journals’ that lists all 8181 OA journals and provides direct links to all journals. See: http://www.doaj.org/.

- Many of the Open Access journals are highly regional and specialized, with a surprising number originating in ‘low-income’ countries. Many are country-specific and many are ‘published’ by scientific societies, and most have publication fees.

- Depending on the university in Canada, most students and researchers essentially have access to the vast majority of English-language journals. This is equivalent to Open Access. However, individuals not associated with a university or research institution, will have access only to true OA journal articles.

Problems with Open Access Journals

1. Archiving (i.e. long term storage and preservation)
   If an OA journal or sponsoring society or agency should close its doors, what will happen to the papers published in the e-journal? Although most authors will have copies of their e-papers, these will no longer be openly accessible unless the articles have been deposited in a university-sponsored OA repository.

2. Cost of publication.
   - For the most popular and highly ranked (e.g. high impact factor) journals, the publication costs can be prohibitive, in the thousands of dollars. E.g. PLoS One, Frontiers.
   - Authors could bypass the e-journals by using e-print institutional servers or sponsoring-agency servers, but these systems may lack conventional peer review. This also results in institutions or agencies becoming de facto...
◊ e-journal publishers.

◊ Some conventional print journals now allow authors to purchase rights to open access for their article but the cost can be prohibitive. This model is often called the ‘hybrid’ model and the cost for an Elsevier article can be several thousand dollars.

3. Other Issues:

   Competition between OA e-journals for high quality papers is becoming more intense. Will this result in a decrease in quality of submitted manuscripts? As well, because this is, in part, a profit-oriented business for many of the larger e-journals, will there be a decrease in quality as the publishers accept papers to maintain the profitability of the e-journal?

   Many researchers simply do not have sufficient research funds to publish in popular OA journals. This is a particular problem for researchers in developing countries who will not have access to such research.

   The burden for the funding of journals is being shifted from a subscription-based model to author-pay model and for institutions/libraries to the researcher.

   This has led some institutional libraries to offer to offset the cost of publication for OA. For example, in the case of the University of Toronto, the library has offered to provide funding for OA journals to a maximum amount is $3 000.00 per year. Hybrid journals do not qualify.

   Beware of predatory scholarly open-access publishers (motivated solely by profit).


   This website provides some interesting insights into OA and unscrupulous e-publishers. This list is growing rapidly.

   Many of the better OA journals allow comment and discussion on ‘published’ e-papers. This is encouraged and allows input immediately. In some senses, this represents additional peer review.

   **Additional Business Models for OA journals**

   There are different costs for e-publication for editors/members of the editorial board vs. the broader scientific community.

   Cost of publication in e-journals is typically in the range of $500.00-3000.00 per e-paper (also termed ‘page charges’ or ‘publication fees’). However, the more popular OA journals employ a two or three tiered system, with authors from low-income countries paying no fees or lower fees.

   There are a number of e-journals that do not charge publication fees but these tend to be smaller, with lower impact.
Biography

Dr. Stephen S. Tobe, FRSC, is currently Professor Emeritus of Cell and Systems Biology, University of Toronto. He was Associate Dean of Sciences, Faculty of Arts and Science (1988-1993) and Scientific Director, Insect Biotech Canada, Network of Centres of Excellence (1993-2002).

He received an Honours Biology, BSc, from Queen's University (1967), MSc from York University (1969) and PhD in Parasitology from McGill University (1972). He was a Research Fellow at the University of Sussex (1972-74).

He was awarded an E.W.R. Steacie Fellowship from the Natural Sciences and Engineering Research Council of Canada (NSERC), 1982-1984.

Dr. Tobe was elected a Fellow of the Royal Society of Canada in 1987. He has more than 400 refereed publications and received the Invertebrate Neuropeptide Award for life-time contributions to the field in 2011.

He has been awarded the Gold Medal, Entomological Society of Canada, and the Pickford Medal in Comparative Endocrinology.

Fraser Mustard Institute for Human Development, University of Toronto

Professor Marla Sokolowski, FRSC

As Academic Director of University of Toronto’s new Institute for Human Development, I will be responsible for education and training programs as well as contributing to strategic research and the development and planning for the Institute. I will work with Professor Stephen Lye PhD who is the Executive Director of the institute. Dr. Lye is a Professor of Obstetrics and Gynaecology, Physiology and Medicine at the University of Toronto and Associate Director of the Samuel Lunenfeld Research Institute of Mount Sinai Hospital.

Mandate for the Institute

The health, learning, and well-being of all our children are central to the fabric of our society. Efforts to optimize development in early childhood in particular, and promote life-long health, require early identification and effective interventions routed in geographic, cultural, social, linguistic and educational contexts. Understanding this complexity requires expertise from many disciplines.

The aim of the Fraser Mustard Institute for Human Development (IHD) is to develop new interconnections that cut across disciplinary and professional boundaries to build evidence and understanding for the improvement of young lives and the promotion of human development in the real world. The IHD will contribute to improved human health, learning, social and emotional functioning, including effective approaches to prevention, early identification and intervention to maintain and promote health and wellbeing over the life course. The IHD is unique in building integrative research and educational programs across university divisions and affiliated institutions that include international leaders in health, education, social welfare and basic sciences.
IHD members across the University of Toronto collaborate in teams that use a multi-faceted approach to identify the mechanisms underlying human development trajectories and use these discoveries to improve learning, health, and society. Research questions, informed by societal needs, will focus on the interactions between genes and the natural, social, and cultural environments to determine developmental trajectories, and how those trajectories are modified and contribute to major disorders such as childhood obesity and developmental difficulties in cognitive, emotional and social functioning. Discovery science interacting with human subject research will ultimately result in new diagnostic and interventional approaches, as well as prevention and promotion approaches, including effective education models and improved treatment support for physical, social and mental health.

Knowledge from this research will be mobilized and impact measured by tracking the application of new knowledge in the health care and education as well as in innovative public policy that will drive change toward improved health and learning. Through its novel collaborative education programs, the IHD will prepare the next generation of researchers who will lead transdisciplinary teams that merge discovery and translational research while continuing to address complex questions relevant to human development.

**Biography**

Dr. Marla B. Sokolowski, FRSC, is a University Professor at the University of Toronto in the Department of Ecology and Evolutionary Biology, and Academic Director of the Fraser Mustard Institute for Human Development.

She received a BSc (1977) and PhD (1981) from the University of Toronto. She was a Natural Sciences and Engineering Research Council (NSERC) University Research Fellow at York University where she remained as Professor until 1999, when she joined the University of Toronto. She received a Canada Research Chair in Genetics and Behavioural Neurology in 2001. Dr. Sokolowski trail-blazed the development of a branch of Behaviour Genetics that addresses the genetic and molecular bases of natural individual differences in behaviour and is best known for her discovery of the foraging gene. She has published well over 130 papers. In 2007 she received the Genetics Society of Canada’s Award of Excellence.

Dr. Sokolowski co-directs the Experience Based Brain and Biological Development Programme of the Canadian Institute for Advanced Research (CIFAR) where she is the Weston Fellow.

She was elected a Fellow of the Royal Society of Canada in 1998 and is now Director of the Life Sciences Division.