CREATING A RESEARCH ENVIRONMENT

Prepared By
Bruce H. Sells FRS (C)
Executive Director
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The Canadian Federation of Biological Societies

The Canadian Federation of Biological Societies (CFBS) is a research consortium representing Canadian Biological/Biomedical Associations.

The Federation was founded in 1957 to promote research, facilitate the dissemination and encourage the utilization of knowledge in the Biomedical/Life Sciences.

CFBS is composed of researchers from university, government and industrial laboratories.

Our goal is to work towards a forward-looking science and technology policy that will serve Canada well in meeting the challenges of the 21st century.

The principle functions of CFBS are 1) to act as an advocate for the Biological/biomedical sciences at the political level, to increase public awareness of the life sciences in Canada and 2) to organize a major scientific conference each year to "show-case" the best in Canadian Biological/Biomedical Research.

CFBS ADVOCACY BRIEF

EXECUTIVE SUMMARY

The morale of Canada's research community has increased greatly, during the past several years, as a result of the Federal Government's initiatives. These include creating the Canadian Foundation for Innovation (CFI), the Canadian Institutes for Health Research, (CIHR), the Research Chairs Program and extending the Networks of Centres of Excellence (NCE) Program. The Canadian Federation of Biological Societies (CFBS) applauds these actions and believes that they will assist Canada to move forward in its quest for greater visibility as an important scientifically-advanced country. The success of these new ventures to promote Canada as an innovative society will depend ultimately upon our ability to retain our best scientists and to encourage students with creative minds to choose research as a career.

To retain and attract the most creative scientists and to encourage development of a pool of highly trained personnel require that we ensure the research environment is such that these individuals can maximize the use of their exceptional skills. Conditions that impact upon the "research environment" are *consistent and adequate funding* to permit competition at an international level, an appropriate balance between *time* available for research and other responsibilities, *a pool of well-trained technical, post graduate and post doctoral personnel* and *up-to-date and well maintained laboratory facilities*. Researchers frequently leave this country because positions are lacking that permit them to exploit the training they have received, or the support systems within those positions are such that they find it impossible to work at an internationally competitive level.

The focus of this "brief", therefore, is on the research environment in which Canadian scientists have to work with the recommendation that attention be paid to the infrastructure of the institutions where the majority of our scientists perform their research. By improving the "research environment" the Government will not only stem the "brain-drain" but also encourage students to choose research as a career. In writing this brief we recognize, at the same time, that the Government has supported a number of initiatives which the scientific community has applauded and which will have a beneficial effect on the morale of all researchers. Nevertheless, it must also be recognized that, although the Government is creating a better environment, the full cost of research is yet to be achieved. Some strains have been recognized that need to be dealt with immediately if the Government expects to produce the "innovative society" it desires.

THIS BRIEF ARGUES FOR:

1. "Overhead/indirect costs of research" to reduce the strain on over-stretched university operating budgets.
2. Strategies to reduce the financial pressures on students entering graduate programs; and provide more attractive conditions for post doctoral trainees.
3. Increasing "core" funding to universities.
4. Improving research-infrastructure within university and government laboratories.
5. Increasing levels of research funding to match more closely the percentage of gross national product spent by the U.S.A.(and /or members of the G-7 community)
6. Increasing our global profile by encouraging more reciprocal exchanges with international research centres.

In summary the Government should ensure that Canadian Science is at a consistently international standard by providing the necessary support systems at a level seen to be globally competitive.

PRIORITIES:

The items, argued for in this brief, represent **our priorities for the next 3 years**. We believe *that the first item, overhead costs of research, should have the highest priority* since provision of these additional funds will not only reward research excellence but will also reduce the financial squeeze being imposed upon universities in providing the underpinning to support the research enterprise. Given the demand for a highly trained labour force, *our second priority would focus on strategies to encourage students to enter graduate programs.*

INTRODUCTION

During the past several years the Federal Government has focused its attention on making Canada a more "Innovative Society". To encourage this process, it has supported a number of initiatives it believed would create an environment that would assist Canada to be more productive.

The Canadian Federation of Biological Societies (CFBS) has applauded the efforts that support the engines of creativity. These include the Canadian Foundation for Innovation (CFI), the Canadian Institutes for Health Research (CIHR), increased funding for the granting councils, the Networks of Centres of Excellence Program and the Program for University Research Chairs.

It is important to realize, however, that the recent funding increases were built upon a base that was previously seriously eroded. While there is much to praise in the Government's approach we believe, at the same time, it is essential for us to identify areas which may impede the

Government from achieving the goals it wishes to attain. It is in this spirit, therefore, that this brief is presented.

Given the rapid changes in technology Canada must, in order to survive and compete globally, have a continuous flow of creative and well-educated personnel from which to draw its skilled labour. At the same time Canada must develop an environment which encourages the retention of its most creative and productive individuals in order that this Nation can compete in the market place of new ideas.

STRAINS IN THE SYSTEM

In recent years the Federal Government has supported initiatives to raise the level of research in Canada and at the same time attempted to realize, in a commercial sense, the rewards of this investment for the Canadian taxpayer. In the past, much of our creativity in the form of intellectual property was lost from Canada by our failure to take advantage of the new ideas that could be exploited in the market place. Instead, many of our intellectual accomplishments were recognized by corporations outside our country and developed without any benefit accruing to the provider of the original investment.

The creation of the Networks of Centres of Excellence has been a strategy to overcome this problem. These Centres have resulted in producing networks of scientists in areas of research in which Canada excels and in creating relationships with industry in Canada for the benefit of Canadians. In addition, a number of "spin-off" companies have been created thus further developing our industrial capacity.

The success of these ventures should not, however, seduce us into believing that all research should have an obvious commercial application. There is unease that in some quarters the expectations from the investments in basic research will be greater than can be delivered and that the return will occur sooner than is reasonable.

1. Strains on Universities

Success in the development of new ideas and subsequently intellectual property that can be exploited requires the continuous emergence of individuals with creative ability. The source of these individuals is largely the universities of this country. For universities to be effective in delivering what is expected of them two conditions need to be met. Firstly, the academic programs should produce highly educated graduates trained in "leading edge" technologies. Secondly, the environment for faculty members within Universities, where most of the scientific publications and many proprietary interests originate, must be such that they can be expected to be internationally competitive.

Support for post-secondary education has eroded continuously over the past two decades resulting in an environment within higher education where students no longer are receiving the type of exposure to the tools of their disciplines. Laboratory exercises for science students have, because of lack of operating funds, decreased to the point where it is no longer a normal experience.

Budget cuts have forced a decrease in numbers of both faculty members and support staff. The ability of faculty members to devote sufficient time to research in order to compete globally is being severely compromised. Compounding the situation is the increased debt-load, being carried by graduating post secondary students, which is certain to prevent some of our more creative from entering graduate programs where the level of stipend does not allow them to reduce their debt. In addition, the competition for post-doctoral trainees in North America puts Canadian laboratories at a disadvantage, given the stipend paid in the U.S.A. A major concern emerging

from the conditions in post secondary institutions in Canada is whether we shall be able to compete for the best minds when our neighbour to the south is able to offer much more attractive opportunities to aspiring academics.

Some of the strains on university budgets have been imposed, ironically, from the very programs that have been designed by the Federal Government, to help researchers within universities. The Canadian Foundation for Innovation has been an excellent initiative and has created the opportunity for the purchase of instrumentation allowing Canadian researchers access to major scientific facilities. At the same time universities that administer the funds resulting from these awards receive no compensation for the extra financial burden imposed on the university accounting system or for the maintenance of the equipment once it is in operation. Consequently, universities find themselves in the situation in which the research dollars provided to their faculty members are increasing at a time when the university operating budgets continue to be squeezed.

Similarly, institutions whose faculty members are successful in grant competitions must absorb the cost of administering these funds. Since there is, in Canada, no compensation for the overhead costs of research, universities must use funds from their operating budgets that are under pressure from declining provincial transfer payments. These financial pressures could be alleviated, in part, by providing support to defray the costs of 1) additional library needs for specialty research journals, books and monographs; 2) computer access to international databases; 3) recruitment of research-oriented faculty members; 4) upkeep of research laboratories, maintenance of equipment and special facilities by qualified technicians; 5) university research offices responsible for processing research grant applications, and 6) administration of research grant funds.

2. Strains on Granting Councils

The Federal budget allocations for the support of research over the last several years have helped to create an environment that has improved the morale of the scientific community. The Canadian Foundation for Innovation and the recently announced program creating 2,000 Research Chairs within universities will greatly improve Canada's capacity for research. These programs, nevertheless, create further pressure on the granting councils to provide funds for the ongoing support of the major facilities awarded. Additional demands will result from an increased number of research-active faculty members hired through the Research Chairs program and from faculty renewal, as the aging professorate retires. We should also be conscious of the fact that as research becomes more sophisticated the costs of equipment and the running of laboratory increases significantly, thus, putting an even greater burden on the Granting Councils.

3. Strains on Government Laboratories

The last decade has witnessed an extensive infrastructure decay and downsizing of Federal Government laboratories. This size reduction was initiated to reduce costs and also to force departments to devise a rationale for their continued activities. In addition to advancing knowledge through basic research, Government laboratories have a unique role to play that cannot be filled by either the academic or the corporate community. One of the roles of Government laboratories is to provide the skills and tools to evaluate new developments that require certification in the interest of protecting the Canadian citizen.

They can also play a role in pursuing pre-competitive R and D which is too applied for most in academia and still too far from a potential product for industry. These laboratories should also have the capacity in certain areas to act as a support system in helping determine whether particular types of intellectual property have the potential to become commercially exploitable. Government departments that have positioned themselves to provide these services must be

supported. Others should be helped to define a vision that will give the government confidence that taxpayer's money is spent wisely.

What emerges from considering the many demands that are placed on Government facilities is that extensive partnering is required both within and outside of Government, if these services are to be delivered effectively. Whatever direction it decides to take, each department should be governed by the requirement that excellence be the guiding principle, otherwise the contributions made will be ineffectual.

RECOMMENDATIONS:

The following recommendations represent those issues that we believe need to be addressed over the next 3 years. Our highest priority item for the next Federal Budget is a provision to compensate universities for the overhead/indirect costs incurred in supporting the research enterprise. The second priority is to improve the financial situation for individuals entering graduate and/or post-doctoral training programs.

GENERAL ISSUES:

1. To relieve the pressures, imposed by the research activities of its faculty members on university operating budgets, a mechanism should be employed to provide for the overhead/indirect costs of research.

2. To encourage our brightest students to consider a research career efforts should be made to reduce the debt-load that undergraduates must now bear as a result of increased tuition costs. This can be done by improved tax relief on stipends, while they are graduate students, and/or improved tuition support programs. Competitive funding for post-doctoral fellows again will help insure that our emerging research scientists remain in Canada.

3. To stem the "Brain Drain" and attract high quality individuals, efforts should be made "to provide a working environment at an international level". We believe that this can be accomplished by ensuring consistent funding that matches the percentage of gross domestic product spent by other competing nations. The new CIHR initiative, to be successful, will require that there be appropriate funding. Similarly, increased support for the Natural Sciences and Engineering Research Council will be required if the total costs of research are to be met.
4. In the academic setting it is important to provide 1.) an effective laboratory experience for undergraduate students, and 2.) research laboratories where the supporting infrastructure is capable of meeting the needs of scientists expected to compete internationally. This can only be achieved by effectively addressing the problem of "core funding" to Universities.
5. Similarly, in Government laboratories, the quality and delivery of service has been extensively compromised by deteriorating facilities and downsizing of staff numbers. Under-funding and infrastructure neglect within government laboratories should be addressed with increased support evolving as each department articulates a vision for its future, perhaps via a special infrastructure renewal program.
6. Core funding of universities and colleges has failed to keep pace with the needs of a society that is becoming increasingly more dependent on the availability of a "skilled labour-pool". The Federal Government should develop a new strategy, in cooperation with the Provinces, to increase support for post secondary education. Currently, when support from the Canadian Health and Social Transfers (CHST) for health and education is provided by the Federal Government, the only echo heard from the Provincial Governments, is for health. What has become apparent to many is that **in the battle between the Federal and Provincial Governments, over health care costs, support for post-secondary education has become a major casualty**. **Its recovery for the benefit of the Canadian economy needs immediate attention.**

7. The success of the Networks of Centres of Excellence has indicated that Canada has created an effective model resulting in scientists from across the Country interacting and working together. This model has been the envy of other countries and should be exploited further. Given our small population, additional partnership should be developed and should be especially encouraged not only among government departments but also between departments in government and the university community. This action should extend both the depth and breadth of expertise in areas of research.
8. International science partnerships are an important facet in a country's ability to perform research at a globally competitive level. The Government should be sensitive to these needs of the Canadian scientific community in its budget allocations. Canadian scientists have had the great benefit of access without user charges to the national facilities of other nations, often in collaboration with nationals of the host country. This will continue so long as Canada is able to reciprocate with frontier facilities of its own. The government needs to be sensitive to this fact, as well as the fact that they serve national rather than solely individual government department needs, when assessing proposals to create or up-date national facilities.
9. With the recent increased emphasis on capturing university intellectual property for commercial purposes and the pressure on academics to interact with the corporate community to obtain research funding, it is important to monitor the balance between the basic and applied activities. It is critical that we not loose sight of the fact that applied/commercial ventures depend in the long run on the support of a healthy basic research underpinning.

BIOLOGICAL ISSUES

Biologists have for a number of years expressed great concern over the changes to our environment. Much has been said concerning alterations in climate and global warming either by natural changes, about which we know very little, or from man-induced effects produced by industrialization and/or other perturbations. We have, however, invested insufficiently in research to make us more knowledgeable about how fragile or resilient our planet is to these influences. To address the issues surrounding our understanding of the environment in which we live requires that we invest in the individuals to perform these studies and introduce legislation based on their findings.

With the rapid growth in genetic engineering and the demand in the market place for individuals with knowledge of the fundamentals of biotechnology, greater attention needs to be given to this rapidly emerging area.

RECOMMENDATIONS

1. Currently in Canada we suffer from a lack of personnel in systematics, bioinformatics and Toxicology. These are areas requiring investment if we are to collect, classify and collate information concerning the diversity of species and knowledge on how they respond to our continuously changing environment. Much of the information gained through this investment may provide insights into how we, homo sapiens, should deal with our planet in order to survive.
2. To provide Canadians with wise environmental legislation requires that we have the best information that can be derived from research. More should be invested in these types of studies in order to produce legislation that can be trusted.
3. To respond to exciting prospects in the studies of gene expression and the industrial spin-offs emerging from the discipline of molecular biology, consideration needs to be given to ensuring that post-graduate education in this field is strongly supported.