

Dental

Research News

Research Development Office, (902) 424-1675

GRANT APPLICATIONS SUBMITTED

The following five external grant applications have been submitted by the Faculty of Dentistry since September 1988.

1) NHRDP: "Evaluation of the Restorative Treatment Services of the Quebec Children's Dental Insurance Program" (Amid Ismail) \$194,000. This programme has a site visit on the 6th of December 1988.

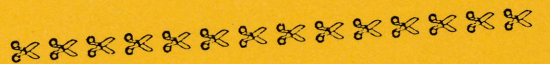
2) MRC Operating Grant application: "Corrosion Resistance of Electropolished Base Metal Alloys" (Elliott Sutow and Derek Jones) \$50,360

3) MRC Operating Grant application: "Oncogenes in Head and Neck Cancer" (Robin Howell) \$62,859.

4) MRC Major Equipment Grant: "Liquid Scintillation Counter". On behalf of Biomaterials Programme Grant \$38,005.

5) MRC Major Equipment Grant: "High Temperature Furnace". On behalf of Biomaterials Programme Grant \$18,335.

In addition to the above initiatives a letter of intent has been submitted for a Centre of Excellence in Biomaterials involving eleven other universities in combination with the Faculty of Dentistry at Dalhousie. The above news indicates a very healthy and growing interest in research within our faculty.



"One of the most frustrating things for Canadian researchers is that it is easy to get started, but hard to make a group grow beyond a small number of researchers".

Dr. Michael Hayden
Medical Geneticist
University of British
Columbia.



Funding for Students to
Attend IADR

A competition will be held again this year to select two or three students to attend the IADR meeting to be held in Dublin next June. Students who were involved with summer research projects are eligible. The competition will involve submission of an Abstract in IADR format by the faculty member (supervisor) and students. The two or three best abstracts selected will allow the students involved to be funded to attend and present the papers at the international meeting. The **deadline** for submission of abstracts for this competition is **Monday December 12th 1988**.

Forward abstracts to Dr. Jones, Research Development Office, Faculty of Dentistry.

Limited Time For Research??

A major legitimate complaint of many faculty members is the very limited amount of time they have for conducting research. One of the important steps in most research projects is a thorough search of the relevant literature. The Dental Library is not very far away from our offices, however, it does take time especially in the winter months when the temperature is - 25 °C. The chore of having to

put on outer clothing and overshoes and make our way to the Tupper Building is just too much, far easier to stay in the Faculty Lounge and have a coffee. Fortunately we live in the high tech computer age. You can now excess the library from the nearest HP terminal connected to the VAX and get into the "NOVANET" system from the Dental Building. All you have to do is to go to the nearest HP terminal connected to the main frame and hit "Return" twice to get "Develswitch" , then when the prompt asks "what system" simply type in "NOVANET". The system will then display information and comments required to complete your literature search. For those who are using the Macintosh system it is possible to access the mainframe and NOVANET via the MACSERVE. How ever did we conduct research before the advent of micro-computers microprocessors, photocopiers, and word processors, how many can remember what a slide rule is? The world is at your finger tips, you can access the scientific literature from the comfort of the Dental Building on the coldest day in February. Go to it, but don't forget your coffee break, unless you want to become a workaholic!

~~~~~

Third World Level

Arthur May, President of NSERC, used strong words to describe the position of Canada in terms of spending on research and development (Globe and Mail Oct. 24th 1988). According to Dr. May, Canada is almost on the borderline of slipping out of the group of countries called the developed world. Canada has ranked 10th to 14th amongst the world's countries in recent years in terms of spending on R & D. We now keep company with Australia, Spain, Greece and Portugal. According to preliminary estimates from statistics Canada, we spent 1.38% of our gross domestic product on research and development last year. These figures are down from 1.41% in the previous year which was also less than the figure for 1986. Canada compares well with other countries in terms of spending in government research institutions. Dr May stated, "its something we don't need to fix". He emphasized that Canada must increase its private sector spending on research and development which is the weakest link in the chain. The most important statement from our viewpoint however, was that money has to be spent in the universities "because we don't compare as well as we should.."

Research and Development as a % of GNP

|              |     |
|--------------|-----|
| Japan        | 2.8 |
| US           | 2.7 |
| West Germany | 2.7 |
| Sweden       | 2.5 |
| France       | 2.4 |
| Switzerland  | 2.3 |
| UK           | 2.2 |
| Netherlands  | 2.1 |
| Belgium      | 1.6 |
| Italy        | 1.5 |
| Canada       | 1.5 |
| Spain        | 0.5 |

Scientists and Engineers per 10,000 in labour force

|              |      |
|--------------|------|
| US           | 69.0 |
| Japan        | 63.2 |
| West Germany | 49.1 |
| France       | 41.2 |
| Sweden       | 39.0 |
| Switzerland  | 37.0 |
| UK           | 32.8 |
| Canada       | 30.0 |
| Italy        | 27.0 |
| Spain        | 10.0 |

The latest OECD figures shown above indicate our problem. Canada has less than half the number of scientists compared to the US or Japan in relationship to the size of the labour force. In addition the % of GNP spent on R&D is significantly less than the top ranked countries.



## The Perils of Perception from Down Under

Professor Antony Wheeler of the Department of Physiology and Pharmacology at the University of Queensland, Australia points out that seeing should not always lead to believing especially if what you think you see are "paranormal phenomena". The classic demonstration of a gap in perception can be seen by holding this issue of the Research News as far away as you can, then close your left eye, and focus on the dark circle in the magic box below. Keeping your left eye closed bring the book closer, you will find at about 25-35 cm from the tip of your nose (for the average sized nose), the "X" in the box should disappear. This clearly illustrates a gap in perception or a blind spot. The reason is quite simple. We have a blind spot on our retina at the point where the optic nerve passes through. Since there are no photoreceptors in this location we are blind to any images focussed on this spot. When making scientific observations we should always be on guard against scientific blind spots in our knowledge. Someone once said "Discovery consists of seeing what

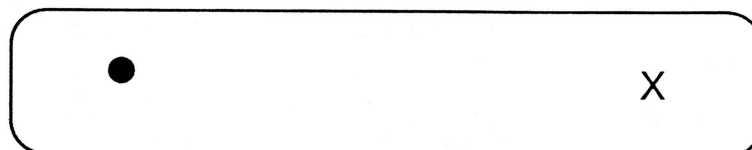
everybody has seen and thinking what nobody has thought." We could perhaps go further and say discovery consists of seeing what nobody has seen and thinking what nobody has thought. As individuals we tend to see what we expect to see, it is important that we aim to preserve our scientific objectivity. We should be on guard against scientific blind spots in our knowledge.

~~~~~

A Model System

The greenhouse effect predicts that Nova Scotia could be some 20% drier if the CO₂ is doubled. Climate modelers can play with the "what if" scenarios to predict how the world would respond to an arbitrary set of conditions. Computer modeling can also be used to study such factors as the biocompatibility of materials, the adhesion of cells to synthetic biomaterials or the adhesion of ceramics to metal. These are some of the projects being planned in our Centre of Excellence programme in Biomaterials.

THE MAGIC BOX



Seven Years Probation for Spreading Virus Infection

A programme you obtain from a network bulletin board may contain a virus that attacks your operating system and may erase your files. You may copy or borrow a programme which contains a Trojan horse that steals or erases files.

Many of us regularly trust valuable information and data to our computer without a backup disc. Hours, months, years of work can be destroyed in a few milliseconds. According to Peter Denning (American Scientist, Vol. 76, 1988) many of the PCs in widest use contain relatively few or no memory protection mechanisms. Memory protection can be implemented into computer design with negligible impact on instruction-execution speed. Having had three discs crash recently I have a major concern about the potential threat to my sanity.

A controller for the Soviet robot mission to Mars sent an erroneous signal last August which caused Phobos I to turn away from Earth and begin tumbling. Apparently, a computer used to check for errors in messages sent to the two Phobos craft had crashed that night, but the controller on duty sent the message anyway. Phobos 1's batteries

are now dead and the spacecraft is useless. This clearly shows how expensive computer errors can be.

According to the Chicago Tribune (October 22, 1988) the first person ever convicted of using a "virus" to sabotage computer records was sentenced on the 21st October 1988 to 7 years probation and ordered to pay \$11,800 to the company that had fired him. A major problem is the growing development of rogue computer programs or "viruses" which can destroy information before they can be detected. According to John McAfee, Chairman of the Computer Virus Industry Association in Santa Clara, California, it is very rare that people who spread computer viruses are caught. Using electronic mail and networking is one way in which viruses can enter your PC or by sharing discs with someone else who may have been infected. Is this the computer version of AIDS?



"Being a scientist is less a decision than a state of grace to be worked toward".

George A. Miller
American Scientist
Vol. 76, 1988.



Allergic Problem

A report in Nature (4/15/88:591) has indicated that the dusting powder compound used on some unlubricated latex condoms which is made from the spores of staghorn clubmoss are potentially hazardous.

The tiny spores may cause allergic reactions ranging from dermatitis to soft tissue granulomas. It is clear that the same problem could also occur with the use of surgical gloves. Either the clinician or the patient may suffer. We need to keep a sharp look out for allergic responses that can lead to a research project which can provide a valuable contribution to clinical dentistry. One example involved a dental company who had several complaints about a particular impression material causing allergic problems with patients. Only some time later was it found that it was the gloves which were the problem.



"Four thousand inheritable ailments are known to be encoded in the genome at birth".

Charles DeLisi.



100 Billion Reasons To Do Research

According to Edward Dolnick writing in Hippocrates 7.8/88:36-43, between 50 billion and 100 billion bacteria and other organisms are breeding and jostling for space in our mouths. It is due to these little fellows that we have dental disease and a Faculty of Dentistry. Researchers at the University of Colorado and other institutions are developing synthetic salivas. Why didn't we think of it first, it makes you want to spit! Saliva contains some sixty or more components which dictate which microorganisms will live and which will die. Tooth enamel is able to continuously repair itself from the store of calcium and phosphate contained within the saliva. The new synthetic anti-carries salivas which are rich in calcium and phosphate aim to penetrate tooth enamel more deeply than ordinary saliva. These synthetic "salivas" could well be incorporated into mouthwashes and toothpastes. Just think of the incredible number of *in vitro* as well as *in vivo* research projects that could be conducted on these products. Send for a free sample today and I guarantee it will significantly enhance your research career.

Informed Consent

Those of us who engage in research involving human subjects must clearly ensure that all experimental details are evaluated by our ethics committee which is a sub-committee of the Research Development Committee. Informed consent is an important element in ethical considerations.

A major court case in the US involves a patient John Moore who claims he has a property interest in his bodily products (his blood and spleen tissue) and can therefore proceed to sue his doctor and others and claims he has a right to a share of the potential millions of dollars profit which may be derived from those products. The main issue in the case concerns the form signed by John Moore prior to his splenectomy. The form did not mention that tissues taken from him might be used for research not directly related to his clinical care. The defendants claim is that this practice is "routine" in research institutions and in any case permission was not needed for such research because it posed no risk to the patient. The argument that the need to obtain permission would inhibit research which is essential to public health is not regarded as valid. The court stated that there is "no reason to believe

that medical research will suffer by requiring the consent of a donor of the tissue". The claim by the researcher that any patient attending a University based clinical facility must know that some form of research is routine for all patient care is also not valid.

These assertions are considered to be incorrect as to the fact and represent a physician-patient relationship that is ethically unsound. The patient must be fully informed at all times. We should clearly obtain preoperative written consent to use body tissues for research and/or teaching purposes. The Moore case may well go on for many years, however, the review committees of MRC and Health and Welfare will be alerted by the publicity of this case and will take a strong line on issues of this type. Mr. Justice Cardozo of the court of appeal has been quoted as saying "Every human being of adult years and sound mind has a right to determine what shall be done with his own body...".

However, the claim by John Moore to a share in the profits derived from the unique properties of his tissue which are being used to develop specific cell lines is less clear. There is no official policy or law which covers this issue.

Peer Review

Recommendations from the MRC Peer Review Advisory Group (PRAG) have attempted to refine the review system of MRC. The advisory group have produced a list of criteria for the selection of members to serve on grants and awards committees of MRC. These were identified as follows:

- 1) Current scientific excellence of the committee members, probably best measured by their holding grants.
- 2) The maturity and judgement of the member.
- 3) The breadth of scientific expertise.
- 4)The proven or anticipated performance of potential members as reviewers.
- 5) The balance needed between clinician-scientists and basic scientists.
- 6) The ability to review in Canada two official languages.
- 7) Regional distribution.
- 8) The need for turnover.

It has been suggested that a committee on committees should be set up to broaden the base for selection of committee members.



"We don't honour science in this country and we don't have a culture of science". Prof.Charles Scriver, Biochemical Genetics, McGill University.



MRC Budget Increase

The MRC have had an increase in the funding which amounts to \$61 million over the next five years. The federal government has given increases to the base budget of \$6 million for 1988-89, \$7 million for 1989-90 rising to an extra \$19 million for 1991-93. This increase puts the 1988-89 MRC budget up to \$188.6 million.

At the June meeting of the MRC Council four new Programme Grants and six renewal Programme Grants were approved for a total of \$3,326,000 one of which was our own Dalhousie Programme Grant in Blomaterials.



"Science is a limitless challenge - it's always there, demanding, frustrating, sometimes satisfying. It's a way of living, a way of thinking. Research is the pursuit of the unknown but not unknowable. The challenge of research lies in devising questions that are answerable but unpredictable".

Ruth Sager, Professor of Cellular Genetics, Harvard Medical School
American Scientist, Vol.
76, 1988.



MRC Grants in Dental Science

The MRC Newsletter (Vol. 17, No. 2, July 1988) gave details of the number of Grants held as of May 31st 1988 in the various categories. Dental Science was listed as having 33 Grants in Aid (operating grants) and one programme grant and one MRC group for a total of \$3,435,000 which represents 2.6% of the total funding. These figures did not include the second MRC Programme grant to be awarded to Dentistry in Biomaterials at Dalhousie which was approved in June 1988. In contrast to the funding in Dental science, research in the area of Neurosciences had 340 Grants in aid, 8 Programme Grants, and one MRC Group for a total of \$20.3 million, this represents 15.7% of the total MRC budget.

Abzymes

The development in 1986 by biochemists at Berkeley and the Scripps Clinic Research Institute in California of a combination of antibodies and enzymes to produce Abzymes represents a major breakthrough. The Abzymes can act as drugs for treating cancer, blood clots, or viruses.

"The reason I initially decided to become a scientist is that I couldn't believe someone would actually pay me to spend the rest of my life being curious and expanding my mind."

Marcia McNutt
Associate Professor, MIT
American Scientist
Vol. 76, 1988.

+++++
The Year 2,000

A discussion paper "12 years to 2000 " published by NSERC notes that Canada has a cumulative \$7 billion trade deficits in high technology, rendering the country vulnerable in the emerging new global economy and poorly equipped to improve its competitiveness.

£\$¥£\$¥£\$¥£\$¥£\$¥£\$¥£\$¥

Not Only in Canada?

A study released on the 6th September 1988 stated that the US will be unable to replace millions of lost jobs in heavy industries with new jobs in high-technology fields. The Council on Competitiveness said that the US has lost its once-commanding lead in many high tech industries. It was pointed out that only a concerted effort by government, industry and universities can reverse the trend.

∞∞*∞*∞*∞*∞*∞*∞*