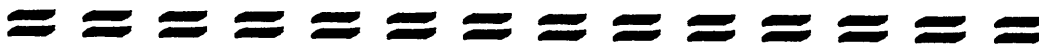




# Dental Research News

Research Development Office

(902) 424-1675



### RESEARCH SEMINARS

The Research Development Seminars will be held again this year. The meetings will take place in room # 3157, between 12:30 and 2:0 pm on the first Tuesday of the month. The seminars will commence in October 1988 and will continue through to May 1989. Special additional sessions will take place from time to time in addition to the less formal brown bag think sessions held last year. Any individuals who would like to make a presentation should contact the Research Development Office 424-1675.

### NEW MEMBERS JOIN RESEARCH TEAM.

The Department of Applied Oral Sciences and the Division of Dental Biomaterials Science are pleased to announce the appointment of Maxine Langman to the Technical position replacing Wendy Tobin. Maxine will be involved in the teaching and research within the Division of Dental Biomaterials Science.

The following three individuals have also joined the research team on the MRC programme grant:

Shirish Parikh, Technician  
Katherine Robertson, Technician  
Mary Robinson, Technician.

We are very pleased with the high quality research team which we have been able to put together.

### THE BRITISH INVASION



Five dental students from the UK spent their summer months at Dalhousie on an elective programme involved in conducting biomaterials research. The five UK students are shown in the above photograph together with Dean Ken Zakariassen and Assistant Dean (Research) Derek Jones. The UK students are from left to right Diedre Barrett, Rhona Liston, Sean Daley, Andrew Wright all from the University of Dundee and Philip Tangri University of Birmingham.

SUPPORT FOR DENTAL RESEARCH

Did you read the guest Editorial by Richard Ten Cate and the reply by George Beagrie in the August issue of the Journal of Dental Research ?.

Richard takes the view that dental research has in general been given a reasonable priority by the government agencies. The future of the separate MRC dental sciences committee is clearly in question. Richard Ten Cate believes that the forces now exist which favour change rather than protectionism. (will free trade open up more NIH grants to Canadians and will our US colleagues be obtaining MRC grants?)

George Beagrie on the other hand tends to argue for distinction of the dental sciences on the basis of social need. George points out that the National Institutes of Health in the United States set up the separate National Institute of Dental Research (NIDR) through which to focus on research related to the oral cavity. Those who have not read the Ten Cate - Beagrie debate should do so. (J.Dent.Res. 67, 1136-1137. 1988)

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TAKE HEART

If your research seems to be taking a long time to come to fruition take heart. According to Jim Gowen of the Mail Star, Dalhousie University Medical researchers led by Dr Hermann Wolf, are at the mid-point in a 10 year study to determine the causes of heart disease. You should aim to have some long term epidemiological studies combined with some short term clinical case studies in this way you can ensure that your publication record looks well balanced. We are fortunate that many dental clinical trials can be completed in three to five years. One encouraging statistic from the study by Wolf is that indications are that deaths from heart-related illnesses are dropping at a rate of about 1% per year.

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\$TAGNATION?

The Provincial Operating Grants for Canadian Universities have been increased by between 1.5 to 7.5% for the current fiscal year. The following operating budgets have been provided:

Alb.	\$725	million
BC.	\$332	million
Man.	\$176.2	million
N.B.	\$116.9	million
Nfd.	\$89.2	million
N.S.	\$201	million
Ont.	\$1.6	billion
PEI.	\$12.6	million
PQ.	\$1.2	billion
Sask.	\$146	million

In addition the following Capital Grants have also been provided:

Man.	\$7	million
Nfd.	\$22	million
Ont.	\$77	million
Sask.	\$25	million

Nova Scotia with \$201 million ranks fifth out of the ten provinces in terms of total university operating funds across Canada. The total funding for the current fiscal year is \$4.73 billion (Chronicle of Higher Education July 27th 1988). The operating funds for Nova Scotia have increased from \$47.4 million in 1972-73 to the present level of \$201 million for 1988-89.

This increase looks very impressive however in terms of constant dollars based upon the buying power in 1971, the funding for Nova Scotia Universities has hardly changed. In all probability Dalhousie's share of the funding may have decreased. These figures inevitably have an impact upon the level and quality of research which we are able to conduct at Dalhousie. We are less competitive in holding and attracting top researchers, and in addition the hidden costs of research produce further restrictions on research productivity. We also need to remember that Departments at Dalhousie in the past five years have had to reduce their budgets by 18.4%.

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WE DO HAVE HOPE

"Science is the refusal to believe on the basis of hope".

C.P.Snow.

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UNDIVIDED ATTENTION GIVES  
CLUE TO OUR CULTURE?

Dr Vincent Cristofalo of the Centre for the Study of Aging at the University of Pennsylvania points out that although the average expectation of life-span of human beings has been extended substantially the outer limit of the human life-span remains at about 110 years, and that figure hasn't changed since the beginning of recorded history. It is established that normal individual cells have their own life-span and that by any definition of aging, normal cells in a laboratory culture do age. At some point laboratory cells in culture lose their ability to respond to growth factors and stop dividing. The fact that human cells seem to become arrested at a stage just before DNA synthesis may offer clues to the mechanism of aging. Scientists still don't know what the steps are and at what point a signal is sent to the cell nucleus which tells it to stop dividing. According to Dr Cristofalo "there is no simple answer" about the relationship between the age of cells grown in culture in the laboratory and the aging of people. Although we do not understand why aging occurs, we do know that cells taken from older donors do not grow as long in the culture as those taken from younger individuals.

MOUSE EAR MAY BECOME EQUIVALENT OF  
LABORATORY RAT

Geneticists believe that the common weed arabidopsis often referred to as mouse ear will become the plant equivalent of the experimental laboratory rat. The unusual feature which is exciting geneticists about the plant is the very small amount of DNA which it contains. Mouse ear only contains about 70 million paired bases in the DNA helix, compared to 5.9 billion in wheat. Conducting research using arabidopsis will be much easier than with many other agriculturally important plants. The cloning of important genes in the plant will allow "probes" to be developed to locate similar genes in other plants. This plant could well create a revolution in the wheat field, as well as the field of genetics.

MERCURY POISONING

Did you know that later in his life Newton grew very moody and reclusive. Recent evidence suggests that he may have been suffering from heavy metal poisoning, induced by systematic ingestion of small quantities of mercury and arsenic in his experimental work.

A DOGS LIFE

Clinical researchers are very often faced with the difficulty of finding sufficient subjects with appropriate clinical problem to provide them with a statistically viable study. Spare a thought for an Associate Professor of Development Anatomy at Purdue University, he is looking for about 60 paralyzed dogs. The research project involves the use of a weak electrical field which is applied to damaged spinal cords.

Previous work on guinea pigs resulted in some cases in which the animals recovered some ability to move following treatment with the electrical device. Although some of the dog owners think that their animals are gaining movement, the Purdue scientists aim to obtain complete and objective measurements of progress with the dogs before they make any pronouncements. The scientists are hoping to eventually try the therapy with human subjects.

PROTECTION MONEY

The world-wide market for environmental protection and pollution control equipment is running at \$70,000 Million per year, with over 10,000 firms supplying the products and services.

SERVICE FOR RESEARCHERS

The research Development Office is now able to offer a limited service to help with the input and analysis of statistical data.

IN SEARCH OF EXCELLENCE

Our colleagues in Biology and Oceanography are to be congratulated on obtaining \$2.8 Million as part of the provincial governments funding for a centre of excellence for the fishing industry. In addition to Dalhousie the centre involves a consortium of Memorial University together with three Quebec Universities, as well as industrial and government support. The 2.8 million dollars will be used to set up a gene probe laboratory.

Our own faculty's involvement with a "centre of excellence" initiative is progressing well. The deadline for the letter of intent is the 30th September, and the full application is due on the 30th November. We hope that we will be able to replicate the success of our colleagues, with successful applications to both the provincial and federal governments.

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BIOTECHNOLOGYThe Second Oldest Profession

Some say that biotechnology started in about 6000 B.C., with the use of yeast to make the first wine. However, the rapid strides in the science of DNA in which it is possible to add or subtract genes to transform certain organisms has resulted in a whole new industry. In 1980, the U.S. Supreme Court awarded Dr. Anwanda Chakrabarty, a scientist working at General Electric Co., the first patent on a living organism. However, biotechnology is highly controversial, some say it is both dangerous and immoral, while others point to the advantages of life-saving benefits. The Foundation of Economic Trends in Washington D.C. state that genetically engineered organisms might have unpredictable consequences like nuclear power or pesticides. This group have already sued to prevent the release of one product, "Frostban", a genetically engineered microbe designed to make fruits and vegetables more frost-resistant.

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TRIVIA QUIZ

- 1) What do dental implants, resin/glass composites, defibrillators, contact lenses and inflatable penile prosthesis have in common ? (see page 7 ).
  - 2) The DNA helix in wheat contains:
    - a) 59 million paired bases
    - b) 5.9 billion paired bases
    - c) 590 billion paired bases
 (see page 3 ).
  - 3) Bone marrow contains the following percentage of stem cells:
    - a) 20%
    - b) 1.0%
    - c) 0.01%
 (see page 5 ).
  - 4) What do mouse ear and laboratory rats have in common? (see page 3 ).
  - 5) The total value in Canadian dollars of the Provincial Operating and Capital Grants for Canadian Universities for 1988/89 is:
    - a) Less than 5 billion
    - b) more than 10 billion
    - c) 2 to 3 billion
 (see page 2 ).
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TRIVIALITIES

"It is a very sad thing that nowadays there is so little useless information."  
Oscar Wilde 1854-1900

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WHO WAS HE?

Born 1901 in the US. Double Nobel laureate, for chemistry in 1954 and again for peace in 1962, he has the supreme gift of scientific intuition that arranges facts into patterns having the truth of simplicity in place of random disorder. All who are working today in chemistry and related sciences have been brought up on his books about the chemical bond.

(see page six).

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### TECHNOLOGY CAN BE DANGEROUS?

Dr Denis Stairs, Vice-President Academic and Research speaking to delegates at the International Oceans Conference at Dalhousie, pointed out some fears he has about too much reliance on technology. The scientists at the conference from around the world were discussing how scientific innovations in computerized fish stock data and telecommunications can be used to narrow the gap between developed nations and the third world. Dr Stairs was one of few speakers to question whether society should place an ever-growing importance on technology. At the root of his fears is the belief that there is a growing "secular faith" among the general public that technology holds the key to human prosperity and advancement.

With the words of Denis Stairs echoing in my ears I read the other day that British scientists had developed a machine that could measure electronically an individual's IQ (what ever that is?). The researchers have turned down one inquiry from a company which wanted to use the \$23,000 device to select individuals for boring jobs. The fictitious "Brave New World " and Orwels "1984" come to mind.

The device measures brain-cell activity through electrodes attached to the skull. It could be used to detect potentially life-threatening dementia in, for example, airline pilots or armed forces commanders with nuclear attack responsibilities or even those holding high political office for example. We may even find that the device would encourage a new breed of politicians to run for office?. Details of the device have not been published for fear that it might be abused in the wrong hands. The main purpose of the research was to develop a system which could detect dementia. This would enable family doctors to pick up the first signs of memory loss. With new drugs being developed for such problems, early detection is important.

Another story which caught my eye was that the Japanese plan to develop a hypersonic aircraft, which would carry passengers from Tokyo to London in three to five hours at up to five times the speed of sound. The aircraft's top speed has not yet been decided, but is likely to be close to 4,000 mph, about 2.5 times the speed of Concorde. However, our own Canadian Pacific Airline flights are some 6 to 7 hours late flying from Amsterdam to Halifax, and millions of individuals in Africa are starving to death.

Denis Stairs may be correct that too much technology can be dangerous. However, as scientists we must go forward with our research and hope that the results will be used for those technologies which can best help the human races survive and have a better quality life.

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### SUCCESS "STEMS" FROM BONE MARROW CELL RESEARCH

Scientists at Stanford University have recently reported dramatic success in purifying mouse stem cells. The stem cells are the ultimate source of all blood cells and the immune defense system. The stem cells may only represent about 0.01% of the bone marrow. Experiments were conducted using mice whose bone marrow had been destroyed by massive doses of radiation. A mere 80 to 100 cells were enough to repopulate the bone marrow of the mice permanently and give rise to blood cell formation. It was stated that some 200,000 to 300,000 cells from whole bone marrow would have been required in order to produce the same result.

If the purification and separation techniques are adequate to isolate the human stem cells this would prove to be one of the most important developments in biomedical research in the past thirty years. However, the major problem still to be faced is the identification of the pure human stem cell.

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## TOXICOLOGICAL RISK ASSESSMENT

The general population as well as governments are becoming increasingly concerned with the challenge to health posed by the environment. Some 18 years after passage of the Clean Air act in the US, 100 million Americans still breathe unhealthy air, and acid rain continues to kill lakes in the US and Canada. In our local provincial election campaign one news paper headline said it all with "If you can't pave it, then de-contaminate it" The recent fire in Quebec of a warehouse containing the chemical PCB produced considerable public outcry. The disaster was described as an environmentalist's nightmare after thousands of litres of oil containing the toxic PCBs caught fire, releasing poisonous black smoke which forced some 3,000 residents to flee from their homes. The PCBs resulted in conamination of certaian soil, air and water in the region. Exposure to polychlorinated biphenyls may cause cancers, liver disorders, skin rashes and possible birth defects.

We also hear major concern over polar ozone activity since the discovery of a hole, or thinning of the ozone layer, over the Antarctic. Ozone in the upper atmosphere protects the earth from harmful ultraviolet radiation. The pollution of the atmosphere with chlorofluorocarbons (CFCs), is believed to have been destroying the ozone layer. The popular press also reports on the cancer risk posed by drinking tea and coffee or eating animal protein or fat as well as for cigarette smoking or the drinking of alcohol.

Against this background the general population as well as governments are becoming increasingly concerned with the potential for toxic materials being placed in contact with tissues of the body. Clearly there will be increasing pressure in the future for extensive biocompatibility testing of all new classes of dental

and medical biomaterials and indeed for those classes of materials which have been in use for some time.

Our own research programme in biomaterials has a major commitment to this very important aspect of health care. We are evaluating biomaterials in accordance with national and international recommended test methods and are also aiming to refine and develop new and improved biocompatibility test methods where necessary.

### DISPOSABLE

The new continuously worn lenses are also said to eliminate the risk of infections caused by contamination when using cleaning solutions. The "new" disposable 14 day lenses are the same as those previously sold as 30 day lenses: small soft plastic discs with a high water content. The claim that the new disposable lenses will eliminate cleaning and prevent protein build up does not convince some ophthalmologists. Perhaps dentistry should try disposable crowns and bridges to eliminate protein build up?.

### PREJUDICES

"A great many people think that they are thinking when they are merely rearranging their prejudices".

William James

Who was he ? Linus Pauling.

## HEALTH PROTECTION, A DIVISIVE PROBLEM

In addition to the need to evaluate biomaterials for potential toxic risk when in contact with tissues of the body, we also need to regulate and evaluate the use of medical devices.

The Canadian Health Protection Branch have established seven categories for medical devices.

- 1) Musculoskeletal System
- 2) Cardiovascular System
- 3) Alimentary System
- 4) Nervous System
- 5) Urogenital System
- 6) Special Senses
- 7) Immune System

Manufacturers wishing to conduct clinical trials in Canada must obtain authorization from the Health Protection Branch who may then grant them "Clinical Trial" status for an initial period of twelve months. "Clinical Trial" status may be required by the Branch when the data submitted were not conclusive, for general marketing, with respect to safety and efficacy.

The HPB information letter(#750 August 12th 1988) shows that a total of six companies have cardiovascular systems which have been granted clinical trial status and are currently undergoing clinical trial; a total of four companies have contact lens and ocular devices with clinical trials being conducted, two companies have devices associated with the alimentary system and the nervous system being evaluated. A further total of four companies have clinical trials being conducted relative to the musculoskeletal system, this is the group to which most dental materials and devices are assigned. Of these four companies Anchor Implant Limited of Vancouver are conducting clinical trials of a dental implant system, Ceraver from France are evaluating the HERMES total knee system, Dow Corning Canada have a clinical trial of a cobalt-chromium-molybdenum bipolar endoprosthesis, while Howmedica are

evaluating a total elbow (radial-ulner-humeral) implant system.

The HPB information letter(#751 August 12th 1988) lists several hundreds of "medical devices" which have been issued with notices of compliance. These range from several dozen dental light curing resin/glass composite restorative systems and alloys for dental amalgam to titanium cranio-facial prosthesis, alveolar ridge augmentation grafting implant materials, calciobiotic root canal sealer, processed bovine cartilage, cemented and uncemented porous coated total hip (femoral-stem head and acetabular cup) prosthesis systems, bone plates, screws and pins, modular tibial and femoral components of knee prosthesis, titanium and silastic finger, wrist and toe joint implants, absorbable suture, polylactic acid surgical dressing material, hydroxyapatite material, carbon fibre ligament, absorbable collagen hemostatic agent, electronic bone growth stimulator, multiprogrammable neural stimulator, cardiac valve prosthesis, defibrillators, pacemakers, vascular graft prosthesis, woven vascular prosthesis, implantable drug delivery systems, mammary prosthesis, inflatable penile prosthesis, intrauterine copper contraceptives, and deodorant tampons.

Vast numbers of contact lens types are included in the list, UV absorbing intraocular lenses, soft prolonged wear contact lenses and tinted soft contact lenses. The earlier versions of soft contact lenses, introduced seven years ago, have now been much improved and redesigned so that they can be worn for a week or two and then thrown away and replaced with a fresh, sterile pair. Earlier versions had been blamed for various eye problems, but the new soft lenses are said to have added safety and convenience. The manufacturers say that a lens worn for one or two weeks is safe because it will not build up the same amount of protein which accumulates on a lens worn for longer periods (Users of the earlier 30 day lenses had developed corneal ulcers).