

# Dental Research News

Research Development Office, (902) 424-1675

## VOLUME III, NUMBER 6.

### The Importance of Research at Dalhousie.

The report of the Committee on Undergraduate Education suggests that research seminars taught by several instructors from widely separate disciplines, would emphasize the importance Dalhousie attaches to research as well as to teaching, and would promote the integration of the two. The report goes on further to state that all upper year students should have some opportunity in their classes to learn of the research role of their faculty, especially through direct involvement in that research. The Faculty of Dentistry can feel justly proud of the excellent involvement of the students in faculty research.

This summer the following twenty-one students will be participating in dental research projects.

K. Ingham, J. Peters, and  
M. Wong (first year DDS)

G. Creighton, S. Duke, C.  
Johnson, E. Lemarezyk, S.  
MacLean, R. MacSween, K.  
Ozcan, and C. Perrin (second  
year DDS)

F. Brown, C. Krast, D. Miller, K.  
Russell, C. Theriault, L. Trus, B.  
White, and E. Wolton.(third  
year DDS)

R. Miller (4th year Physics) and  
T. Shakerinia (1st year  
Medicine).

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### Appreciated?

"Yes, discoveries such as that of fusion can and will occur in universities such as Dalhousie: but they are only likely to do so to the extent that universities are appreciated and supported by the public and by government."

(Howard C. Clark president and vice-chancellor of Dalhousie University).



**Eight Papers to be Presented at ACFD Meeting.**

Eight research and educational papers are being presented at the ACFD meeting in London, Ontario this month.

1. "Clinical Effects of Tongue Brushing" by Glenda Butt, Kate MacDonald and Barbara Harsanyi.
2. "In Vivo Fungal Presence of Growth on Two Resilient Denture Liners" by Bruce Graham, Derek Jones, JoAnn-Burke and Peter Thompson.
3. "In-vivo Compatibility of Reversible Hydrocolloid Impression Materials and Die Stones" by Jack Gerrow, Danny MacIntosh, N. Sheppard and Richard Price.
4. "Development and Evaluation of Restorative Dentistry Seminar" by Richard Price and Ron Bannerman.
5. "First Year Enrollment of Canadians in North American Dental Schools" by Ian Bennett and Marcia Boyd
6. Drug Awareness and Support Programme for Dental Students by Bob MacDonald.

7. "Scholarly Activity in Dental Faculties?  
The Science and Art of Clinical Dentistry"  
by Amid Ismail, Jack Gerrow and Richard Price.

A further paper is also being given by Doug Chaytor.

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**Aid to Research**

The W.K. Kellogg Health Sciences Library in the Charles Tupper Medical Building provides an excellent service to our research needs. As you know we can search the journal literature using the Index to Dental Literature and Index Medicus. However, the following systems are also available: Bibliography of Bioethics; Current Contents; Cumulative index to Nursing and Allied Health Literature; Excerpta Medica; Hospital Literature Index; International Nursing Index; Medline on Compact Disc; Psychological Abstracts; Science Citation Index. Computer searches can be made for you on various data bases at a cost of \$8 to \$15. For further details contact the information desk or take time to talk with the Dental Librarian Patrick Ellis. Your research needs can get quite a boost if you make good use of our Health Sciences Library.

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### Easy Statistics

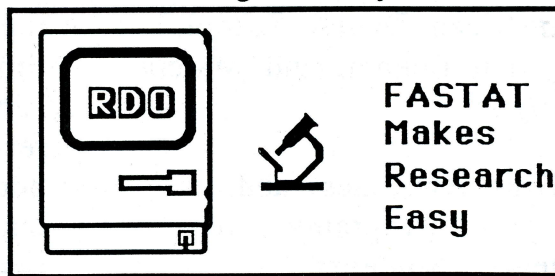
Finally, a statistics and graphics package for the Macintosh that is accurate and very easy to use. The programme is called FASTAT and has been purchased by the Research Development Office for use by Dental faculty on the Macintosh network. The system is ideal for graphics, tables, and surveys. The system is said to be designed for those who need accuracy and sophistication without months of confusion.

FASTAT's point-and-click interface lets you do all your work without ever switching modules. An optional command window can keep track of your work or run batches while you eat lunch. FASTAT can perform summary statistics, one-way and multi-way tables, chi-square, Pearson and Spearman correlations, regression, nonparametric tests, ANOVA, ANOCOVA, series transformation and smoothing, forecasting, principal components and common factor analysis.

FASTAT makes sophisticated Two- and three-dimensional graphics easy. scatterplots, line plots, bubble plots; regression and confidence intervals, influence plots, probability plots, scatterplot matrices (sploms), box-and-whisker plots, histograms and cumulative histograms with smoothing, stem-and-leaf diagrams, time series

plots, autocorrelation and partial autocorrelation plots, factor loading plots. Scatterplot brushing tools let you isolate and extract cases visually and "zoom in" on point clouds. You can use MacDraw-like tools to adapt graphs for slide presentations. Some of the graphs are only a click away. Click on a variable name and you get a histogram or a box plot of the variable. Click on regression output or a cell in a correlation matrix and you get a scatterplot of the variables. Built-in text and data editors let you scroll through results, cut and paste, change fonts, add explanatory notes. You can even move statistical results into the data editor and analyze them. You can delete entire rows or columns from the data set.

FASTAT has fast on-line help!. You can get help for every procedure and instant definitions for each statistic and term. The FASTAT's manual is easy to read and, better still, easy not to read. You can tell at a glance what to read and what to skip, easy step-by-step instructions begin every section.





### Dental Statistics

We have 13,164 dentists and 6,064 dental hygienists, the ratio to population being 1,973 and 4,205 respectively. Canada's population increased by 12% in the period 1974-84, whilst the number of dentists and hygienists increased by 49% and 290% respectively. The average cost per person for dental treatment in 1985 was \$86. It is interesting that in dentistry we hear so much about the ratio of dentist to population yet the figures for the medical profession are much more alarming with a total of 53,207 physicians one per 479 of the population. Health care costs in Canada were 8.5% of the GNP in 1988 compared to 11.1% in the US, 9% in Sweden and 6.2% in UK. The total per-capita costs of health care in Canada in 1988 was \$1,370 compared to \$1,926 in the US, \$1,195 in Sweden and only \$711 in UK. However, what is more interesting is the government share of the total spending which was 76% in Canada, 40.8% in US, 90.9% in Sweden and 86.2% in UK. The total 1985 health care expenditures in Canada was \$40 billion. Of this \$40 billion total dentists received \$2,178 million (0.005%) in professional fees. This works out at \$165,451 per dentist. In comparison the total professional fees for physicians was \$6,249 million. This works out at

\$117,447 per physician, however, in the case of the physicians the overhead costs would generally not be as high as in dentistry. The cost of drugs and appliances was \$4,930 million, of which \$2,178 was for prescribed drugs, and \$157 million was for appliances and prostheses. Currently, senior Canadians comprise 11% of the population but account for up to 40% (\$16 billion) of the health costs. By the year 2039 Canada's seniors are expected to represent 25% of the population, health care costs are a major problem for the future. When we look at the dental statistics dealing with numbers of dental personnel, costs of treatment and projections for an aging population outlined above, we can clearly see the need for research to be conducted to demonstrate how the trends and developments in dentistry during the past ten years have resulted in a significant improvement in the dental health of the Canadian population. We also need research to be able to predict the dental needs of the future. The general public and politicians can easily misinterpret the above statistics if they are not backed up by adequate epidemiological clinical studies. This need represents a real research opportunity for our clinical dental faculty members. [Source of statistics Health and Welfare Canada].



## New ISO International Committee for Biological Testing

Many ISO technical committees in the medical and dental fields have a need for International Standards on biological test methods, ISO Council has recently agreed to the establishment of a new technical committee, ISO/TC 194, entitled "Biological Testing of Medical and Dental Materials and Devices". It is expected that this TC will work very closely with the other medical and para-medical TCs so as to standardize test methods across a range of interests, particularly avoiding duplication of effort, and the possibility of different test methods on the same subject being developed.

It is anticipated that certain fields, such as dentistry for example, will require more individual and specific standards. Germany has agreed to act as secretariat for the new Technical Committee TC194 and a meeting will take place in Germany on July 12-13th.1989. Canada is most interested in this work but it is unlikely that we will be able to actively participate at this time.

The major problem which the dental ISO/TC106 committee had with the setting up of the new committee was the conflict with the existing joint FDI/ISO

committee on Biocompatibility. It is not clear at this time if the new TC194 will be developing standards or just acting as a coordinator for other ISO committees. One possible solution would be that subcommittees could be setup for each of the subject areas. Considerable concern has been expressed in the dental field that the highly specialized nature of the dental problems might be lost in the new proposal. The formation of a dental subcommittee however would also present a further problem in that some individuals would now have to attend two meetings TC106 and TC194.

The TC 194 committee has included in its programme of work the preparation of a guide giving details of the biological test methods which are most applicable to specific materials and devices. The various test methods which have been established will thus be consolidated. The dental Technical Committee ISO TC/106 have already produced a Technical Report TR7405 which gives details of the biological test methods which are most applicable to the various materials and devices.in the dental field. The TR7405 report was published in 1984.

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### Linear Regression

A very good article by Godfrey, (N. Engl. J. Med. 1985; 313:1629-1636) discusses the method of fitting a straight line to data by linear regression and focuses on examples from 36 Original Articles published in the New England Medical Journal. Authors generally used linear regression to summarize the data (as in 12 of 36 articles in the survey) or to calculate the correlation between two variables (21 of 36 articles). Investigators need to become acquainted with residual plots, which give insight into how well the fitted line models the data, and with confidence bounds for regression lines. Statistical computing packages such as our new FASTAT enable investigators to use these techniques easily. Data analysis is largely a search for patterns or meaningful relations among the observed data. Are older persons more susceptible to some disease than younger ones such as root caries?. Is there any relationship between genetics and periodontitis. Is one metabolic variable related to another?. Does the dental plaque flora differ on sound and carious human root surfaces?. Such patterns in the data can often be summarized by means of mathematical models. One of the simplest patterns (or models) for data on a pair of variables is a straight line. The

techniques for fitting lines to data and checking how well the line describes the data are called linear-regression methods. Using these methods, we can examine the relation between a change in the value of one variable and a change in the main variable of interest in the study.

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### Statistics in Dentistry

The importance of a knowledge of statistical methods in relation to most aspects of dentistry is discussed in a paper by Bulman and Osborn (Br Dent J 1989. 166:51 & 216). Definitions of terms used in descriptive statistical methods are provided as well as a review of the techniques themselves. Why not spend ten minutes reading parts 1 and 2 of this paper during lunch hour, it may be helpful to your research project. Following this you will be able to make full use of the easy FASTAT system provided by the Research Development Office which will be made available on the Maintosh network in the next few days. FASTAT can handle up to 50 variables and unlimited cases with the storage available on the network, your worksheet could be four feet wide and as long as a football field. You will find with FASTAT that doing research has never been easier and more exciting.



### **Health Science Terminology**

The Medical Research Council of Canada (MRC) is a federal agency established to promote, assist and undertake basic, applied and clinical research in Canada in the health sciences. The Council has no laboratories of its own, it therefore supports research and research training in health sciences in universities and hospitals and affiliated establishments. The training of health personnel and the transfer of new knowledge into the clinical milieu are the two main continuing concerns of the Council.

For some years MRC have noted deficiencies in health science terminology which has certain negative effects on research and teaching, and hence on health sciences and health care. In an era of instant information exchange, these deficiencies are likely to result in even greater communication problems in the future. In the light of the objectives of the federal government in official languages, these facts have stimulated the MRC to propose certain initiatives in terminology, within the orbit of the 1983 five-year plan.

With Cabinet approval, in April 1984 the Medical Research Council of Canada, in collaboration with the Terminology and Linguistic Services Branch

(TLSB) of the Department of the Secretary of State initiated a series of terminology projects in the health sciences. This initiative was designed in particular to promote the use of accurate language, in both official languages by university staff, students, researchers, practitioners, and all who have to use specialized terminology.

In order to increase the quality of the work and its acceptance by the scientific community, many people were asked to contribute. A Steering Committee was formed, with representatives from five Canadian universities (Laval, McGill, Montreal, Ottawa and Sherbrooke) and from the Department of the Secretary of State and the Medical Research Council of Canada. This steering committee worked out the guidelines for the project and coordinated its initiation. The selected objectives being to promote the development, distribution and use of standardized terminology in the health sciences.

The first stage, involved projects in biotechnology and semiology, genetic engineering and elementary signs and symptoms.

(Continued on page 8)



## Terminology (Continued)

The second stage saw the participation of the Association of Canadian Medical Colleges, and new projects were started in enzyme engineering, and the locomotor system.

A standard research method of preparing the vocabularies using accepted methods, and file preparation was used. These terminology files were put before committees of specialists in the area, who recommend which terms shall be chosen as standard. The Terminology and Linguistic Services Branch (TLSB) acted as expert advisor to the working teams of scientific experts.

MRC point out that the work undertaken by the committees on standardization must however be subsequently revised by the users to ensure better standardization of the terms. For this purpose, MRC and TLSB have published provisional vocabularies which have been sent to the scientific community for comment. After these comments have been considered and the vocabularies revised, a final list of terms recommended by the Standardization Committee will be prepared and widely distributed. The results of the work have also been entered into the Terminology Bank of the Department of the Secretary of State and are thus available not

only to the translators and editors of the federal government, but also to a large number of organizations for whom accurate terminology is an important means of promoting communication in actively developing fields.

Once the vocabularies have been standardized in the Canadian context, MRC hope to establish closer links with foreign agencies with projects where similar initiatives are under way in order to establish an international standardized terminology in the health sciences. In this sense, the efforts already undertaken go beyond the confines of Canadian bilingualism and can be used as a starting point for additional languages. A copy of the vocabulary is available for consultation at the Dental Research Development Office.

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### **Publish or Perish**

Publish or Perish is the name of a bibliographic database for the Macintosh. Version 3.0 of this programme lets you load references in text-file format, one field per line; redefine field names for uses other than bibliographic reference; and globally define field style. The programme can be obtained from Park Row, 4640 Jewell Street, #101, San Diego, CA 92109; 619/581-6778. \$10; \$49.95 new.



## **Bibliographic Database**

Pro-Cite is another database programme for the Macintosh; which is much more sophisticated than the Publish or Perish programme. Pro-Cite has been developed to make it easy to manage a bibliographic data-base and to create and maintain properly formatted bibliographies.

Pro-Cite has first identified the important parts of a bibliographic citation (author, title, publisher and so on) for twenty different types of materials. Each type of material has a workform associated with it. This workform presents you with a list of the fields relevant to the type of material, and space after each field name to type in the information for each field. You "fill in the blanks" much as you would any other type of form. These completed records then form a database.

Pro-Cite also uses what is called a "punctuation file," which places the punctuation into a citation when it is formatted into a bibliography. The punctuation file enables you to simulate various styles such as that of the American Psychological Association, Index Medicus, Science magazine, or whatever style you need. When you enter information into a workform, you can ignore

requirements like a period after an author name, or the quotation marks around an article title, or the bold style needed for the book title. The punctuation file handles this for you.

The importance of the punctuation file is this: you can use the same database to produce bibliographies in different formats, according to the bibliographic style that you need. You don't have to re-type the entire bibliography to conform to a different publisher's requirements.

You can simply type in the information for the citations that you need into the appropriate workform. Or, you can use standard communication software to conduct searches on bibliographic systems such as Bibliographic Retrieval Services (BRS), the National Library of Medicine's MEDLARS system, or Lockheed Information System's DIALOG system. You can capture bibliographic records to a text file on a diskette. Have you noticed that it's easier to conduct research these days!

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### **Seven Year Scratch**

Analysis of the 2,035 operating grants funded by MRC in 87/88 shows that the average length of time that the grant has been held was  $7.3 \pm 2.7$  years.



### Dublin 1989

Ten of our 18 papers to be presented at the IADR meeting in Dublin were given a trial run on May the 18th. It was generally agreed that the papers were of a high quality and will be a credit to Dalhousie. The rich research environment of the IADR meeting will be of particular value for our dental researchers. The meeting also provides an opportunity to visit an interesting part of the world. Trinity College the location of the IADR meeting was founded in 1592 The City of Dublin was 1,000 years old last year. To mark the occasion, a sculpture was commissioned of a female figure half submerged in water, symbolic of the River Liffey. Dubliners quickly named her "the floozy in the Jacuzzi". Dublin is noted for its Georgian architecture which begins at the top of O'Connell Street, the main thoroughfare, and travels south down Westmoreland Street to the 18th-century grandness of the Bank of Ireland a pillared edifice which once housed the Irish Parliament. You should note that the Bank of Nova Scotia is located in Canada House at 65 St. Stephen's Green, which is also the address of the Canadian Embassy (telephone : 78-19-88). Taxis are said to be numerous, in Dublin but expensive thus

you will need to take a good pair of walking shoes. If you do take a cab from the airport, make sure the meter is in clear view. It is only a 10-kilometer trip into the city, but some drivers have been known to take scenic tour along the coast. The exchange rate is about one Irish pound to \$1.78 Cdn. The Irish Pubs are warm and welcoming and suite the informality of useful research discussions over a round of locally brewed Guinness. The Pubs to note are Doheny & Nesbitt on Marrion Row, where artists, barristers, businessmen, rogues and politicians rub shoulders; the Bailey and the Davy Byrnes in Duke Street; and Mulligan's of Poolbeg Street.

During the lunch time break between papers you may wish to take the pedestrian Halfpenny Bridge to get to the cafés and bookshops in the cobblestoned Temple Bar district.

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### Important Differences

"Of the many ways the results of statistical tests can be misleading, the most serious is to have a report of no statistical significance when the sample is not large enough to detect important differences".

R.N. Giere.

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## The Importance of Research to Halifax

The importance of research grants to Dalhousie University and to the City of Halifax can be judged by the fact that some 400 full and part time research personnel are supported by grant and contract funding awarded to faculty members. The important point is that these funds have been brought into the region from federal and private agencies. The average salaries being \$26,000 for a total payroll of some \$10.4 million. These individuals will spend a large proportion of this \$10.4 million in the Halifax region. Clearly Dalhousie researchers are collectively a major factor in the economy of the region. President Clark writing in the Mail Star recently pointed out that "Canadians all too frequently look on the universities as burdens on the tax payer and too seldom have an appreciation of what they can and do contribute not only to the economic and social development of Canada, but perhaps more importantly to the vigorous intellectual life of Canada". The dollars which are brought into the region are important, however, the major contribution of Dalhousie researchers in all subject areas is that they significantly enrich the quality of life not only in Nova Scotia but in Canada and the world.

## A Soft Day in Dublin?

When you pack your slides or poster to attend the IADR in Dublin don't forget to take along a light rain coat your camera, a sense of humour and extra travellers cheques.

Louis MacNeice was attracted to Dublin's "seedy elegance." In a 1939 poem, he referred to the O'Connell Street statue of Admiral Horatio Nelson as "Nelson on his pillar/Watching his world decay." In 1966, on the 50th anniversary of the Easter Rebellion, Irish nationalists blew it up.

The Irish often refer to a "soft day" which means drizzling rain. You should aim to bring a light raincoat even in July. Three Irish cuisine restaurants boast Michelin stars, Patrick Guilbaud in the city; the Park, located in the suburb of Blackrock; and for those who plan to hire a car Dunderry Lodge, a 40-minute drive north in Naven, County Meath. However, you will have to be prepared to supplement the per-diem allowance since the average cost of a dinner for two at these establishments can be \$170. The best shopping is on Grafton Street. At the foot of Grafton street stands a bronze sculpture of Molly Malone, the 18th century wheel-barrow lady, nicknamed "the tart with the cart.")



## Enabling Technologies

The Chair-person of the Science Council of Canada Geraldine Kenney-Wallace issued a policy statement recently on new technologies. It was delivered in a report to the new Science Minister Dr Bill Winegard who is a former materials scientist and professor at the University of Toronto. The report identified three basic technologies which were said to be revolutionizing modern industry. Each region of Canada must develop its own technological identity that reflects what a locality wishes to become, what it is willing to do to get there. It was stated that each region should pick a speciality in one of these fields. The three so called enabling technologies in the high tech field were identified as:

- 1) Information and Communications Technologies.
- 2) Biotechnology, and ;
- 3) Advanced Industrial Materials.

The report calls on the federal department of Industry, Science and Technology to shake off outmoded thinking and come up with an industrial renewal plan designed to make Canada a world leader in the application of the three enabling technologies. Each locality should be encouraged to develop a market niche in one of the emerging sectors. This is possible due to the high-tech

explosion which has opened up an almost limitless array of products and processes in which to specialize. We still have time to get in on the ground floor in some of the newer ones.

A three point plan should be developed for each region.

- 1) Local officials should identify existing strengths that can be built on.
- 2) Regional planners should foster a technological identity, as a way of uniting the community behind a new set of economic priorities.
- 3) All of the principal players in the local industry scene should work to improve links between them. That means a better transfer of technology from the university laboratory to the local firm.

The new scheme will require considerable co-operation between Ottawa and the provincial governments. In addition it will require a massive transfusion of funds to Canada's scientific university sector. The scheme could offer a reason for hope for our research into new biomaterials at Dalhousie. Our research covers two of the three areas identified as enabling technologies.

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### **Future Clinical Scientists**

It is encouraging to know that by involving 21 students in our summer research projects we stand a chance of improving the future for clinical scientists. A study has found a positive correlation between exposure to research during professional degree studies and the development of a career in which research is a major activity. This was reported in the December 1, 1988 issues of the Canadian Medical Association Journal.

Medical students at the University of Manitoba have the option of participating in a B.Sc.(Med) programme, they spend two summers working on a research project. At the end of the summer, they write up their results in the form of a journal article and then defend their thesis before an examining committee. An MRC funded evaluation of the programme indicated significant differences between participants and controls. A positive association between an academic career was found. The data from the study indicated that the programmes impact has been significant; B.Sc.(Med) graduates are more likely than a control group to have won personnel awards, entered academic careers and obtained research grants. It was found that the programme

helped participants develop an interest in research and did not merely channel an existing interest.

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### **Toothpaste Court Action**

Colgate-Palmolive brought an action in the Appeal Court in London UK against an importer who had diverted a consignment of Colgate toothpaste made under licence in Brazil which had been destined for Nigeria. The toothpaste made in Brazil relied on local chalk and a main constituent and was said by Colgate to be of "inferior" quality compared to toothpaste manufactured in the UK.

The importer was found guilty in the High Court of Passing off (one product as another) and infringement of trademark. Shoppers who bought the toothpaste in Britain, where it was sold to retailers at up to 15% below the price of the UK produced Colgate, had been deceived and, being dissatisfied had complained. A research study looking into the quality of toothpaste sold in Canada might provide an interesting research project, why not think about it?.

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### **Hypotheses**

"The type of argument used to justify scientific hypotheses is basically the same in all the sciences".- R.N. Giere.

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