

**STC****NEWS / NOUVELLES****VOLUME XV1 NUMBER 2 JUNE 1997****EDITOR: M.G. PRIOR****OFFICIAL NEWSLETTER OF THE SOCIETY OF TOXICOLOGY OF CANADA****C.P./P.O. Box 517, Beaconsfield, Québec, Canada H9W 5V1**<http://meds.queensu.ca/stcweb/>

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**FROM THE EDITORS'S DESK - Michael Prior**

Today we replaced the picture window in our living room. The view across the Georgia Strait is much clearer now. Retirement clears the view too, as Don Ecobichon is also discovering!



Did you know that the word *poison* literally means drink? It is directly related to *potion*. The origin is in Old French *puison*, from the Latin *potio*, genitive *portionis*, "drink". This word came to be used for a specially prepared drink, later for a drink prepared with poison. In modern languages the word then passed to the poisonous substance itself. Perhaps the linguistic experts are correct, for before we left England, one could still be asked "what's your *poison*?" as a invitation to choose a drink. Later, as a graduate student, I was occasionally teased that toxicology was really "dose 'em and kill 'em". Might this be a reminder of the former role of arsenic as "inheritance powder"? A role so deftly exploited by Catherine Deshayes, a.k.a. La Voisine. The European practioners of toxicology, according to Casarett and Doull, played a major role in the distribution of political power through the Middle Ages ... read the exchange of letters between our STC President, Dr. Gail Bellward, and the federal Minister of Health, The Hon David Dingwall.

Today poisons influence politics differently: as an aftermath of the Gulf War, at Love Canal, in a Silent Spring, as lead in gasoline and paint, or through air pollution. Now there are long term disabilities and lowered quality of lives instead of dead bodies. Impact is temporally disconnected from originating event, making it harder to show an obvious "cause and injury". Making it more difficult to garner political and financial support ... see the comments of our new canoeist/columnist (Don Ecobichon).

When is a remedy a poison? Several local stores have draped some of their herbal remedies in black. Why?

Because they may soon be treated as medical drugs and not as herbal remedies, under Health Canada's proposed actions. Will we have under-the-counter as well as OTC drugs?

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## **FROM THE PRESIDENT'S DESK - Dr Gail Bellward**

The next International Congress of Toxicology is to be held in Paris, July 6 to 11, 1998, with the theme of "*Chemical Safety for the 21<sup>st</sup> Century*" (ICT VIII). ICT-IX is planned for Brisbane, July 8-13, 2001, with the theme of "*Toxicology and Sustainable Development - Meeting the Challenge*". As many of you know, the very first ICT meeting was held in Canada. It seemed appropriate, therefore, for us to look into the possibility of hosting the X<sup>th</sup> Congress in 2004, to celebrate this milestone. It requires significant sums of money "up front" not only to put on such a meeting, but to prepare and win the bid to do so. As a result, at the last Annual General Meeting I was asked to determine if NRC would now consider backing us, as they did the very successful IUPHAR '94 meeting in Montreal. Previously, NRC had declined because IUTOX was not a member of the International Congress of Scientific Unions (ICSU), unlike IUPHAR. This is no longer the case, as last year IUTOX was admitted as a full member of ICSU. However, when I wrote to NRC asking if they would now become involved, I was informed that NRC does not have extensive research activity in toxicology and they do not feel that they could support a meeting of IUTOX in Canada. It appears that they only support those 16 organizations in which NRC is Canada's "adhering member" to ICSU, like the Pharmacological Society of Canada. Due to budget cut-backs, NRC does not want to expand into any further adhering memberships. This process has taken considerable time and correspondence, but the final letter from NRC was crystal clear: they will not support us. We are definitely caught in the wrong "time-warp"!

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## **EXCHANGE OF LETTERS BETWEEN THE PRESIDENT OF STC AND THE FEDERAL MINISTER OF HEALTH**

This exchange is about the concern of the STC about the proposal to discontinue research in the Bureau of Drug Research, Health Canada. First the letter from Dr. Gail Bellward to the federal Minister of Health.

Dear Minister,

I am writing to you in my capacity as President of the Society of Toxicology of Canada. At our annual general meeting in December the membership passed a motion requesting that I inform you of our concerns regarding the proposal to discontinue research in the Bureau of Drug Research. Our understanding is that the Bureau will terminate all pharmaceutical research as a cost-cutting measure, with this research being done by the drug companies, other Health Canada groups, or contracted to academic or commercial laboratories and expert committees.

Our primary concern is with the loss to Canada of the high level of expertise and extensive experience which currently exists in the Bureau of Drug Research. The Government of Canada has, in our view, a responsibility to be able to respond in an unbiased manner which is independent of commercial interests to drug related issues, including those of an emergency or crisis nature. In spite of conventional wisdom that suggests that such expertise can be readily obtainable as needed from the private and/or university sectors,

this is not necessarily the case. While the Government's capabilities may be augmented through the use of the private and/or university sectors, core in-house expertise is absolutely essential.

While we are in agreement that a balanced budget is an important goal for the Government of Canada, we are not persuaded that elimination of the pharmaceutical research activities within the Bureau of Drug Research will contribute to achieving that goal. Indeed, we feel it more likely that, because the expertise will inevitably be required, costs and response times on critical issues will increase. It takes years to build up a competent and cost effective group of research scientists. The Bureau of Drug Research has now achieved this level. It does not make sense to close it after all the money invested in it, only to invest money developing new groups capable of solving problems for the government in the manner and time required. During this process, it is quite conceivable that a major public health question would arise, leaving the government with no proper scientific advice. If such a crisis occurred, public outrage would undoubtedly result in re-institution of research within the Bureau, beginning all over again. That is, all the years of development will have been lost, as happens when such groups are disbanded. It appears to be a lose-lose situation, medically and financially.

As professionals concerned with public health, we hope that everything possible is done to safeguard the quality of medications available to Canadians. The Bureau of Drug Research has made significant contributions to this goal. Some examples include:

- \* the initiation of bioequivalency guidelines (which have resulted in significant decreases in drug costs),
- \* development of assay methods for drugs and their constituents, resulting in finding excessive solvent residues and other impurities in drug products,
- \* finding why a particular vaccine was ineffective (a substance in the diluent inactivated the vaccine).

For all the above reasons, we believe that in-house pharmaceutical research by the Bureau of Drug Research should not be closed down for the safety of Canadians. Moreover, we do not foresee that down-sizing of the Bureau will be successful in decreasing overall costs in the long-term, nor that multinational corporations can be expected to have similar concerns to the Canadian government. I would like to discuss the position of the Society of Toxicology with you or a member of your staff at your convenience. My phone number is (604) 822-4103; FAX (604) 822-3035; Email [gailbe@unixg.ubc.ca](mailto:gailbe@unixg.ubc.ca) I look forward to hearing from you regarding the concerns expressed.

Yours sincerely,

G.D. Bellward

(President)

*And the reply from the Minister of Health to Dr. Bellward ...*

Dear Dr. Bellward,

Thank you for your letter of January 13, 1997, regarding the recent changes made to the organization of Health Canada's Drug Directorate. I appreciate having the opportunity to respond to your concerns. Please accept my apology for the delay in responding.

I can assure you that the decision to concentrate the Drug Directorate's efforts in new areas does not mean that the work of the Bureau of Drug Research was not valuable or appreciated. Indeed, the very success of that work has permitted the Directorate to move forward, away from fields where the regulatory science is developed and understood, into new and different areas.

At a time when budgets at all levels of government are shrinking, the Drug Directorate is also facing strong demands that its activities be carried out in a climate of accountability and performance measurement. As well, the research undertaken in the Directorate must be more immediately applicable to the needs of the Programme. My officials believe that significant cost savings can be obtained by regulating pharmaceuticals differently, either by requiring the necessary research to be done by pharmaceutical manufacturers, or through contracts with other Health Canada, academic or commercial laboratories. A crisis management capacity will continue to exist, as the Programme intends to strengthen its biological laboratory capacity.

I understand your concern that the expertise, experience and non-partisan professionalism of the Bureau of Drug Research cannot be replaced. Please let me assure you that the Drugs Directorate will continue to include a large number of regulatory, scientific and medical officers, directly involved in the review process of drug products, biologics and radiopharmaceuticals. Amongst them some 61 have doctorate degrees, 34 are licensed physicians and many others are licensed pharmacists with many years of experience in the regulatory field.

As well, the Drugs Directorate will continue to obtain external advice through Expert Advisory Committees. Committee members are selected for their expertise and knowledge, and are required to disclose any circumstances that may place the member in a real, apparent or potential conflict of interest situation.

The Drugs Directorate supports the regulatory philosophy of shared responsibility, and views the formation and support of partnerships as one of its key roles. My officials recognize that there are other agencies and individuals in Canada and around the world who have an interest in ensuring that pharmaceuticals are safe, effective and of high quality, and that drugs contribute to an efficient health care system. Likewise, the necessary experience and expertise to gain this assurance is not restricted to employees of Health Canada. In this spirit, the Directorate maintains contact with agencies around the world.

I share your view that high standards of safety and quality must be maintained, and I appreciate your concern for the strength of Canada's drug regulatory programme. If you continue to have concerns about this initiative, I would suggest that you contact Mr. Dann Michols, Director General of the Drugs and Medical Devices Directorate, to discuss the matter further.

Again, thank you for writing, Yours very truly, David C. Dingwall

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## **BOOK REVIEW**

Basic Toxicology, Fundamentals, Target Organs and Risk Assessment. Third Edition. Frank C. Lu. Taylor and Francis,. 1996. CAN \$68 pp 358.

This softcover volume (there is a hardbound one too) is a major improvement over the two earlier editions, the author having updated the references somewhat and improved the diagrams, figures and tables, as well as the text. It is a small Casarett and Doull's Toxicology. In Part I are covered the general principles one expects to see (absorption, distribution, elimination, biotransformation, overview of target organs and mechanisms and modifying factors). Part II deals, in abbreviated fashion, with conventional toxicity testing and then goes on to chapters on carcinogenesis, mutagenesis and teratogenesis. Part III, by far the largest portion of the book, deals with specific target organ toxicity in concise but informative chapters, with good examples. Part IV is devoted to risk assessment in chapters dealing with food additives, food contaminants, pesticides, metals, industrial chemicals and environmental pollutants, once again with briefly discussed examples. My overall impression was that this section was a little weak.

The style of writing and chapter contents reflect the long service of the author in the world of national and international regulations and his knowledge of FAO/WHO guidelines, those of the U.S. FDA and EPA, etc. Brief but relevant lists of references accompany each chapter. Many of these references, while cogent to the topic, are 10 years old or more. This was a problem with the earlier editions too. While this is not a bad thing, providing a firm basis of background of earlier literature for students, newer concepts are not included, a major problem in a field as rapidly developing as toxicology. In addition to a good subject index, this volume also has a chemical index, permitting quick access to where in the text a particular agent may be discussed. It is a good introductory text in toxicology, containing a lot of information for the novice student. It would make an excellent text, at a modest price, for a beginning course in basic toxicology. It is worth your while taking a look at it as a prospective text.

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## **SNIPIT: SCIENCE OR ART?**

Cornelia Hesse-Honegger of Zurich has been making watercolours of insects since 1986. She specializes in painting the mutations induced in fruit-flies exposed to huge amounts of radiation. A recent exhibition of her work provoked the questions: are these paintings valid scientific evidence of mutation, or, although following a long tradition, should they be considered only works of art and not scientific data?

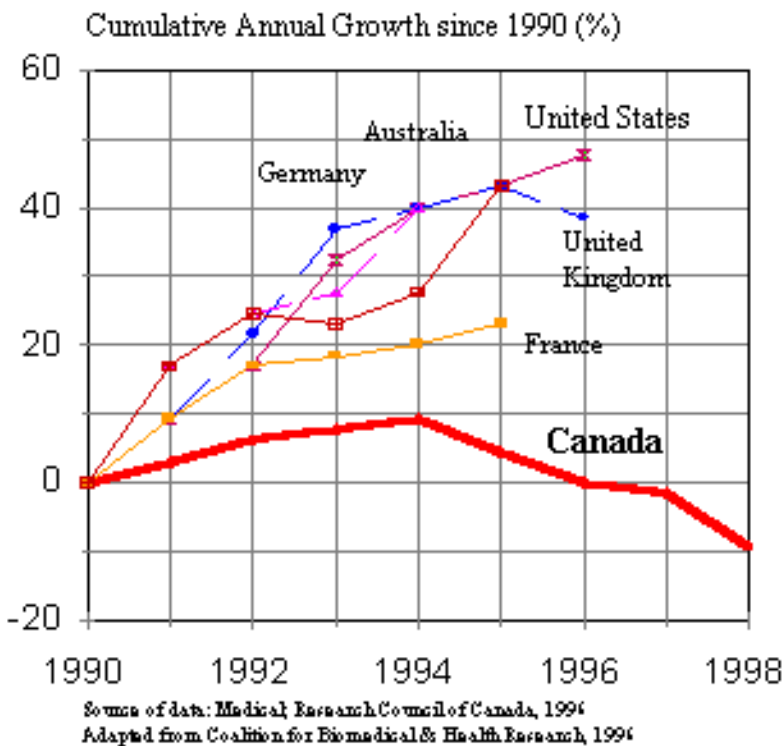
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## THE VIEW FROM MY CANOE - Don Ecobichon



The title of this column was born one night during a discussion with Gordon Krip over what I could continue to contribute to NEWS/NOUVELLES - that is, following my heroics with moving, unpacking, landscaping, firewood cutting, etc. Gordon felt that my jaundiced views should still be inflicted on the membership.

Well, I hauled my red canoe down onto the lake to get a proper perspective on things. My neighbours thought that I should be committed but I think that it will be more natural when there is water rather than ice. Oddly enough, my perspective on toxicology specifically, science and life in general, is changing already.



You may or may not have seen the accompanying figure that came through the Internet some months ago (courtesy of Clement Gauthier), and shows clearly what I am, thankfully, escaping from. It reflects our government's policy of fiscal restraint. While the other countries shown have the same problems that we do, they are at least maintaining some appearance of stabilizing funding. By 1998, we will have a 10% "real" decrease. (*Editor's Note: The original graph can be found at the website of the Coalition for Biomedical and Health Research <[http://www.cbhr.ca/trends/chart\\_e.htm](http://www.cbhr.ca/trends/chart_e.htm)>*).

The Medical Research Council expects the pharmaceutical industry to take up the shortfall through joint-venture research, but this is not going to work - another story.

And then there is Dolly!!! What an uproar over the first successful cloning of an animal - a sheep "made" by transferring the nucleus from an udder cell into an ovum whose DNA had been removed. Now, committees are being struck to study the impact. Government bodies want to enact legislation/regulations to curb those nasty scientists before they go too far. Church organizations are in a panic. Are we really going to clone legions of like-thinking voters, an army for peaceful purposes, superkids or athletes (no need to take those anabolic steroids), molecular scientists, etc? While all of the media hype, blustering of politicians and doomsday prognostications were interesting, no one mentioned (except *Science* March 7) the fact that Drs. Wilmut and Campbell (Roslin Institute in Edinburgh) had tried this dam experiment 276 times, without success, before they obtained Dolly. I bet that Wilmut and Campbell wished they had not held a press

conference! For a sheep, Dolly appears remarkably at ease with the press, the visitors and the attention that she is receiving.

Well, it is time to get back to dry land. The ice is disappearing, the geese are returning and it is time to look over my fishing tackle. Have a good summer!!

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## **THE 1997 SOCIETY OF TOXICOLOGY ANNUAL MEETING: A GRADUATE STUDENT PERSPECTIVE - Michael W. Bolt, Department of Pharmacology and Toxicology, Queen's University, Kingston, Ontario**

The Society of Toxicology 36th Annual Meeting in Cincinnati was attended by greater than 4,000 individuals, and included many exciting and interesting events, limited only by the attendee's inability to be in two places at once. An early highlight of the week was the Plenary lecture presented by Mr. John Stossel of ABC News, entitled "*The Media's Crisis Mentality*." Mr. Stossel was very entertaining, especially when referring to the cigarette smoker worried about getting brain cancer from his cellular phone. Symposia of particular interest to me included "Genetic Polymorphisms of Human Drug Metabolic Enzymes" and "Intracellular Signalling Pathways and Responses to Pneumotoxic Agents".

Another highlight of this meeting was my poster presentation, where I was able to meet and discuss my research with many individuals from both industry and other research/academic institutions. The feedback was both positive and idea promoting.

One of the most pleasant events of the SOT meeting was the graduate student luncheon, where I was able to interact with other students and had the opportunity to meet a designated SOT member who was seated at our table (Dr. Linda Birnbaum). I also attended a continuing education course entitled "Epidemiology for Toxicologists II", many elaborate exhibitors' displays, diverse and educational poster sessions, workshops, and platform sessions. All of these activities in conjunction with evening social events resulted in a highly successful meeting, and I look forward to attending future SOT meetings.

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## **NEWS FROM OTTAWA - Doug Arnold**

I would like to start this update on what should be a positive note for the Health Protection Branch (HPB). Dr. J. Losos was named the Assistant Deputy Minister (ADM) for HPB in early May. Subsequently, Dr. Losos named the Director General (DG) of the Environment Directorate, Mr. R. Hickman, as the senior HPB Director General and moved him into the ADM's office (Mr. Hickman was the senior HPB DG in regard to length of service as a DG).

On the personnel front, April 1st has come and gone, but none of the vivarium staff have been given a written job surplus notice. However, they have all received a telephone call from Human Resources telling them that they are "affected" personnel, which, in "human resources" jargon, means that they may be declared surplus some time down the road.

Most of the research staff of the Bureau of Drug Research (BDR) have been seconded as submission reviewers or to other non-lab positions, and several have taken advantage of the Early Retirement Incentive program. The remaining 27 or so research staff of the Life Sciences Division still expect to be transferred to BBR (Bureau of Biologics and Radiopharmaceuticals). Another major change is that the Drugs Directorate is now the Therapeutic Products Directorate.

The situation in the Food Directorate is a mixture of "*no news is good news*" and "*when will the other shoe drop*"! It seems that the Minister's office has informed all of the Directorates that the monetary cuts would be considerably deeper than originally anticipated. Concurrently, the Food Inspection Agency decided which people from HPB it needs to undertake its mandate. Something like 68 indeterminate employees were left over. These people, primarily from the regional laboratories, have been "assigned" to the Food Directorate without full funding. In short, the Food Directorate must now find salary dollars for some of these people in addition to absorbing the greater than expected funding shortfall previously mentioned. In addition, each Directorate must also pay more for such services as library, etc, because these administrative units have been instructed not only to recover the costs for their services but to recover the costs for the heat and electricity that they use. Consequently, each Directorate is tentatively slated to be financially broke within six to nine months into the current fiscal year if the current situations are not ameliorated.

In closing, I would like to respond to a question that most of us have inwardly or outwardly wondered about regarding the lobbying efforts undertaken on our behalf by CFBS. I can report from first-hand knowledge that Dr. Paul Hough is more than earning his pay cheque on our behalf. Unfortunately, I cannot go into detail at this time about my experience in regard to Paul's efforts, but I will describe my "collaborative" efforts with Paul in our next NEWS/NOUVELLE.

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## **BEING PARTICULAR ABOUT PARTICULATES**

Respirable particulates are the subject of three ongoing initiatives:

- re-evaluation of the National Ambient Air Quality Objective (NAAQO) on particulates (currently measured as Total Suspended Particulate (TSP),
- risk assesment under the Canadian Envionmental Protection Act as a Priority Substance List #2 (PSL2) item, and
- a joint industry-government "Expert Panel" process on "Sulphur in Fuels".

Air quality concerns are being driven by human studies over very large populations which show increased morbidity and mortality associated with increasing levels of respirable particulates at or below 10 microns in diameter (PM10). These "ecological" studies assume the population of an entire region or city is exposed to PM10 at levels measured by regional ambient monitors, although the evidence, where personal exposures have been measured, does not support that assumption. In addition, heterogeneity in population susceptibility and chemical composition of PM10 is not explained. While a large portion of these ecological studies show a linear dose-response relationship over the range of current ambient levels, effects in animal toxicology and human chamber studies have been observed only at levels far above current Canadian ambient particulate levels.

In spite of these weaknesses in the data, the USEPA has proposed new standards for both PM10 and PM2.5, and Canada has two similar reviews in progress as mentioned. While revision of the EPA air quality standard will require development of control strategies, Canada has jumped ahead in looking at control strategies under the third initiative mentioned above, even before the NAAQO is updated. The "Sulphur in Fuels" expert panel unveiled draft reports on April 11 which suggest phenomenal dollar health benefits could be realized by reducing sulphur in fuels. These "benefits" were based on changes in air quality (reduced particulates with resultant reductions in morbidity and mortality) that are at or below statistical methods to detect. However, when multiplied by a large dollar valuation, the predicted "benefits" more than off-set the higher costs of reduced sulphur fuels. The expert panel process seems geared to provide technical support for a political "deliverable" from the CCME meeting in late May.

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### **SNIPIT - GULF WAR SYNDROME**

The British government has promised an investigation into how decisions on medical treatments were made during the 1991 Gulf War, and why ministers and the public were misled about the widespread use of organo-phosphate pesticides. The prospect of some direct research into the likely causes of the syndrome, instead of a three-year epidemiological study, was welcomed by veteran's representatives.

### **SNIPIT - ORGANO-PHOSPHATE POISONING**

An inquiry into the policy of "obstruction, secrecy and misinformation" by the British Ministry of Agriculture over the poisoning of hundreds of farmers by sheep dip has been ordered by the head of the new government's new food agency.

**Society of Toxicology of Canada (STC)**

**30th Annual Symposium**

**December 4-5, 1997**

***Signal Transduction***

***Sessions include:***

**An Introduction to Signal Transduction,  
Signal Transduction Pathways and Drug Metabolizing Enzymes,  
Carcinogenesis and Signal Transduction  
Signal Transduction in Reproduction**

***Holiday Inn Montreal Midtown***

***420 Sherbrooke Street West***

***Montreal Quebec***

**Detailed Program will be available soon at the STC web site  
<http://meds.queensu.ca/stcweb>**

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## **SNIPIT - SUPERMOUSE**

Scientists at Johns Hopkins recently announced in *Nature* that they had succeeded in deleting the growth differentiation factor 8 (GDF 8 for short) from mice. The affected mice had unusually large shoulders and

hips, and all their muscles were two to three times normal size. Since GDF 8 is also found in chickens and humans, might this mean that the development rights may be obtained by a fast food chain and a hockey-football consortium?

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## **THE BIG FOUR ZERO**

Take a break from planning your Millenium Marathon and prepare for the Windscale Wingding in October. On Tuesday evening, October 10, 1957, a fire erupted in Unit 1 at the Windscale nuclear reactor complex on the coast of northwest England. A 1983 report by the U.K. National Radiological Protection Board estimated that thirteen people died as a result of thyroid cancer caused by iodine<sup>131</sup> released during the accident. Other radioactive isotopes released included cesium<sup>137</sup>, strontium<sup>89</sup>, strontium<sup>90</sup> and polonium<sup>210</sup>. The political fallout continues!

### **ACT 18th Annual Meeting**

**November 9-12, 1997**

**McLean Hilton, McLean, Virginia, USA**

*Symposium topics include: Reviews of ICH and OPPTS guidelines;*

*Food Quality Protection Act; Assessment of Novel "Biotechnology" Products;  
Environmental Justice; Risk Assessment and the Law;*

*Species Specific Considerations in Inhalation;*

*The use of Transgenic Mice in Carcinogenicity Testing; and other timely topics.*

*Continuing education courses will be offered on Sunday, November 9th.*

*These may include Workshops on Statistics and Carcinogenicity;*

*and Risk Communications for Scientists;*

*and Courses on Reproductive Endocrinology and Teratology;*

*Pharmacokinetic Modelling of Inhaled Materials;*

*and Regulatory Update on Male Mouse Liver Tumours and*

*Male Rat Kidney Tumours.*

**For more information, contact,**

**For more information, contact,  
The Secretariat, The American College of Toxicology,  
9650 Rockville Pike, #2220, Bethesda MD 20814, USA  
Tel: (301) 571-1840, Fax (301)571-1852, Email ekagan@act.faseb.org**

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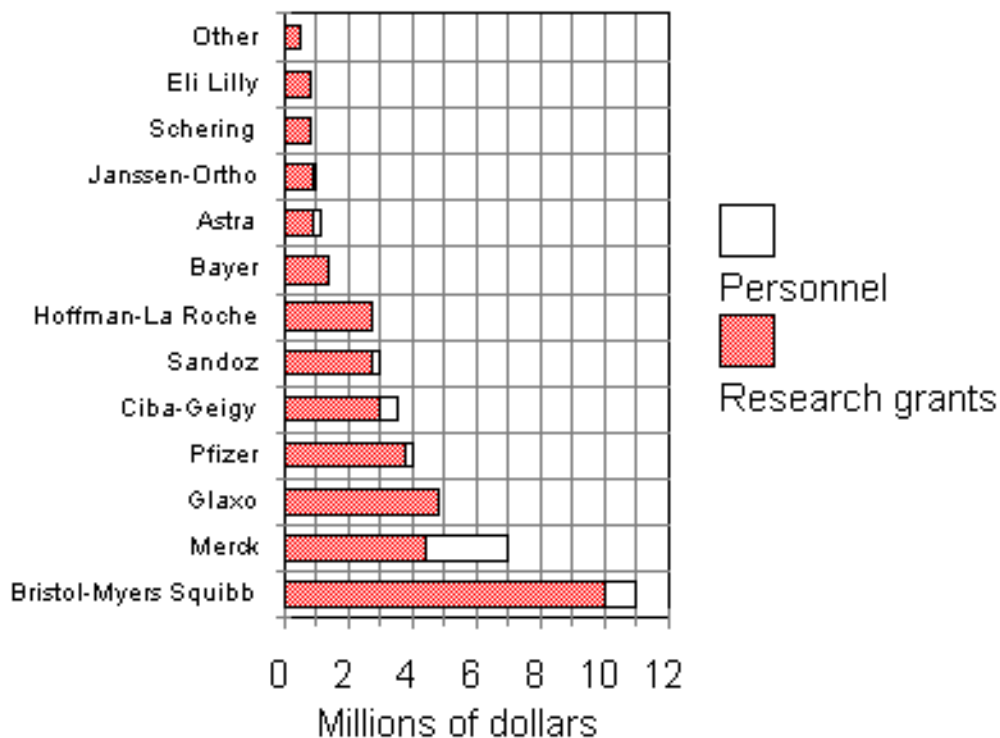
## **HOW TO SUBMIT THAT ITEM TO STC NEWS/NOUVELLES**

Yes, this means YOU! Send your articles, news items, notices of meetings, comments, etc, to me, Michael Prior, the Editor. I can be reached by fax at 604-885-5079, by phone at 604-885-4356, by e-mail at <michael\_prior@sunshine.net>, or snail mail at RR#1, Nestman Site, C-31, Sechelt, BC, V0N 3A0. The word processor is WordPerfect v6, which means I cannot read MS Word v7 or higher. It helps not to format the text with lots of internal commands before sending.

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## **PARTNERSHIP BETWEEN MRC AND PMAC**

The 623 members of the Pharmaceutical Manufacturers Association of Canada (PMAC) agreed to spend \$200 million over 5 years on university research, including a "significant" amount on personnel and training. The money would be allocated through a new partnership between PMAC and the Medical Research Council (MRC). The MRC agreed to add \$1 for every \$4 that a drug company funneled into a peer-reveiwed, approved project. In return the drug companies received extension of patent protection by twenty years.



After three and a half years, how is the partnership progressing? The accompanying graph, redrawn from data from the MRC and published in *Science*, tells the current story. However, an article published in *Science*, January, 1997, suggests that things are not going according to plan. Despite the controversy, PMAC and MRC may be headed toward at least a temporary reconciliation. The two groups are forming a president's panel to review megaprojects, starting a media campaign to tout the program, and create an

operations committee to tackle such ongoing disputes as accounting for corporate sponsorship of required clinical trials. There are obvious scientific, medical and political ramifications. Perhaps someone close to the action would like to brief us on progress in the next issue of NEWS/NOUVELLES...

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## SCIENTISTS CENTRE FOR ANIMAL WELFARE (SCAW)

SCAW, Washington University at St. Louis and the Office for Protection from Research Risks (OPRR) at NIH are co-sponsoring a conference on new technologies: electronic media and application for animal research and IACUCS, designing and remodelling facilities with computers, special IACUC use of computer tracking and record keeping, electronic grants applications, animal facility management and alternatives search. For further details see the Conference listing.

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## CONFERENCES, MEETINGS AND WORKSHOPS

**1997**

July 6 - 10 7th European Association of Veterinary Pharmacology and Toxicology Congress, Madrid, Spain. Contact Scientific Secretariat, Professor Arturo Anad'n, Department of Toxicology, Faculty of Veterinary Medicine, Universidad Complutense, 28040 Madrid, Spain. Tel: 34-1/3943834, Fax: 34-1/3943840

July 20-23 Estrogens in the Environment IV: Linking fundamental knowledge, risk assessment, and public

policy. Arlington, Virginia. Contact: NTP Liaison Office, P.O. Box 12233 (MD-A3-01), Research Triangle Park, NC 27709, USA. Tel: (919)541-0530; Fax (919)541-0295; E-mail: britton@niehs.nih.gov

Aug 11 - 13 Current Issues on Chemical Mixtures, Fort Collins, Colorado. Contact: CSU Office of Conference Services, Colorado State University, Fort Collins, CO 80523-8037, USA

Aug 24-26 Risk of Extreme Events. Washington, DC. Contact: Society for Risk Analysis. Tel: (703)790-1745; Fax: (703)790-2672; E-mail: srauburkmg@aol.com

Sept 7-10 Mechanisms of Toxicity: a Joint Centre for Alternatives to Animal Testing (CAAT) & the Industrial In Vitro Toxicology Group (IIVTG) Symposium. Baltimore, Maryland, USA. Contact: CAAT, 111 Market Place, Suite 840, Baltimore, MD 21202-6709. Tel: (410)223-1693; Fax: (410)223-1603; E-mail: caat@caat.spharbor.jhu.edu

Sept 8-10 Mechanisms of Susceptibility to Mouse Liver Carcinogenesis. Chapel Hill, NC. Sponsored jointly by the Carcinogenesis Speciality Section and the North Carolina Regional Chapter. Contact SOT Headquarters: (703) 438-3115, Email: sothq@toxicology.org

Sept 13-16 North American Congress of Clinical Toxicology, St. Louis, MO. Contact: M. Thompson, Regional Poison Centre, Cardinal Glennon Children's Hospital, 1465 South Grand Bd, St. Louis, MO 63104, USA or Fax 314-577-5355

Sept 25-26 Electronic Media and Applications for Animal Research Facilities. St. Louis MO. Co-Sponsored by Scientists Centre for Animal Welfare, Washington University in St. Louis, and the Office for Protection from Research Risks. Contact SCAW, Tel (301) 345-3500, Fax (301)345-3503, Email: scaw@erols.com

Nov 9 - 12 18th Annual Meeting, American College of Toxicology, McLean, VA, USA. Contact: The Secretariat, The American College of Toxicology, 9650 Rockville Pike #2200, Bethesda, MD 20814, USA. Tel: 301-571-1840 Fax 301-571-1852

Nov 10 - 14 5th International Congress of Therapeutic Drug Monitoring and Clinical Toxicology, Vancouver, BC, Canada. Contact 5th International Congress, Events and Management Plus, Inc, PO Box 1570, 190 Railway Street, Kingston, ON K7L 5C8 Tel: 613-531-9210, Fax: 613-531-0626

Dec 4-5 Thirtieth Annual Symposium, Society of Toxicology of Canada, Holiday Inn Montreal Midtown, 420 Sherbrooke Street West, Montreal, P.Q.

## **1998**

March 1-5 Society of Toxicology Annual Meeting, Seattle Washington. For information or registration, contact: SOT HQ, Tel: 703-438-3115 or Fax: 703-438-3113

March 24-28 XVIIIth Congress of the European Association of Poison Centers and Clinical Toxicologists, Zurich, Switzerland. Contact: Prof. PJ Meier-Abt, Swiss Toxicological Information Centre, Klosbachstrasse

107, CH-8030 Zurich, Switzerland, *or* Fax ++41-1-251-88-33 *or* e-mail stic@access.ch

July 6-11 ICT VIII (International Congress of Toxicology), Chemical Safety for the 21st Century, Paris, France. To be held in the Palais des Congress, Porte Maillot, Paris. Contact: Remi Glomot, Secretary-General, Tel 38.87.60.00, Fax 38.87.60.00

Dec 4-5 Thirty-First Annual Symposium Society of Toxicology of Canada

## **1999**

March 14-18 Society of Toxicology Annual Meeting, New Orleans, Louisiana. For information or registration, contact: SOT HQ, Tel: 703-438-3115 or Fax: 703-438-3113

December Thirty-Second Annual Symposium Society of Toxicology of Canada

## **2000**

March 13-16 Society of Toxicology Annual Meeting, Philadelphia, Pennsylvania. For information or registration, contact: SOT HQ, Tel: 703-438-3115 or Fax: 703-438-3113

December Thirty-Third Annual Symposium Society of Toxicology of Canada

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