

For the first time in recent history, the Gazette is including a science supplement to present some of the more important and often controversial issues in the field of science which otherwise might receive little notice.

We hope to publish articles on scientific, environmental and technological issues that are of relevance to students and the community. Hopefully, we'll also be able to report, in basic English, on research that is being carried

out on campus.

But we need your help! The next issue will concentrate on research that is going on at Dalhousie. If you have any stories, comments, ideas for stories, graphics or other contributions you would like to make in putting the next issue together, please contact the Gazette through the SUB enquiry desk or at the Gazette offices on the third floor of the SUB.

## Sympathy for Strays

### ANIMAL RIGHTS...

TORONTO (CUP) — A controversial battle between the Toronto Humane Society and the University of Toronto will directly affect the quality of education and health care in Ontario, says the chair of the university's animal care committee.

David Mock has been at the forefront of a heated public debate over whether or not the Scarborough City Council should halt the supply of stray dogs sold to U of T for research.

Mock says ignorance is the main reason for strong public protest over the use of research animals in university facilities.

"This issue has allowed a lot of misconceptions to emerge," he says. "By hitting at the question of dog sales, the Humane Society is trying to elicit people's sympathy for their pets. However, we don't use pets in research. If a citizen brings in an animal to be put to sleep, it will never be given to us. Our subjects are strays that would have been killed anyways."

University official Stephen Lindt says none of the animals experience any pain during the various experiments. He said university researchers obey tightly controlled regulations.

"Eighty per cent of all dogs are used in acute experiments where absolutely no pain is felt because the animal never wakes up," Lindt says. "For the remaining test, dogs are given painkillers as would be given to a human. The emphasis is on humane treatment at all times."

Though much of the debate so far has focussed on animal rights, Stephen Best of the Humane Society says the real issue is one of animal control. Best wants U of T to rely on animals bred specifically for research.

"All we want is for researchers to stop using random-source animals," says Best. "Owners tend to be passionate about their pets... they trust that their animals won't go to research and will let them free if there is a chance that they might. Purpose-bred animals allow for research but don't disrupt the community."

Mock dismisses Best's suggestion as unrealistic.

"The quality of research will suffer if we have to rely solely on purpose-bred dogs," Mack says. "One reason is that it will cost us \$1000 per dog instead of the current \$100."

Mock adds that purpose-bred animals are also unsuited to research. "We need a genetic mix because we are not going to perform the surgery practiced here on pure-bred human beings."

Mock is worried that an adverse change may adversely affect U of T's standing as a world leader in health research. "We need active research facilities to draw the most competent staff and graduate students," he says.

"To jeopardize this research, which accounts for half of the University's medical budget, is to jeopardize the health of this institution and province."

## Doctor has cure for all that ails

By ATUL SHARMA

*I was led to believe, from an early age, that science was invaluable to our well-being and not only made our life easier but helped to unravel the mysteries of the universe. At the time, I even believed it was foolish to spend a lot of money to provide food for the poor and hungry. Why not just invest the money in scientific pursuits which would inevitably find a way not only to feed the poor but also to benefit humanity in other ways. It wasn't until later that I discovered there was already enough food in the world to feed everyone. Something else was important.*

*Criticisms have often been leveled at the applicability of arts courses. More generally, people, including myself, have asked what is the utility in studying the arts. Aside from personal enjoyment and satisfaction, what is being achieved?*

*Later in my life, I examined science and realized that it was endeavouring to achieve the same things, enjoyment and satisfaction. Doubts about the utility of the arts were now applicable to science. What was actually being gained? Was it just a round-about way of getting those things that the arts had already offered, or was science unravelling greater truths beyond needs and motivations — perhaps even such questions as to why we are here and what our role is in the greater scheme of things.*

*I approached Dr. Malcolm MacAulay, head of pathology department at Dalhousie, because I was aware that he had studied and was knowledgeable in general philosophy and metaphysics. I wanted to get his perspective on science and art.*

*He suggested I read, as general background, Zen and the Art of Motorcycle Maintenance by Robert Pirsig. I did and then returned to interview him for the*

Gazette. The following interview has been edited and does not require a reading of the book.

**Dr. MacAulay:** I see three kinds of reality. There are scientific notions about reality which have to do with the rules of how substance interact and other concepts that are necessary to state those rules. It is concerned with how things work in relationship to each other. Not necessarily why they would work. This comes to a second aspect of reality and that is causation which generally is the field of religion. Thirdly, we have the artistic aspect of reality which has to do mostly with the emotions, as far as I understand it. Each one of them seems to have a rigour of its own in regard to how one operates when predominantly inside on each of the three forms of reality. On the tombstone of a scientist, they are likely to put, "She did good things"; on the tombstone of an artist they are likely to put, "He led a good life"; on the tombstone of somebody who is religious, they are likely to put, "God liked what she did".

**Gazette:** There isn't one truth or reality — there are actually three? What is reality or the truth?

**Dr. MacAulay:** I don't know that I want to define truth. It gets too difficult. I guess I could give you two or three approaches toward defining it. From the Aristotelian point of view, if you have a good set of rules which you can give to somebody else to carry out an activity that we'll call an experiment, and that second individual gets the same results as you get, or to state it more broadly, if the nature of the results don't differ, depending on who does the experiment, then the rules are the boundaries or the definition of truth, and if everybody can agree to use these rules then they are true rules.

In art you have the luxury of not really having to define it like you do in the Aristotelian approach because it has got to do with feeling. It has got to do with whether

another person's emotions are stimulated or changed by the art piece so you don't have to define it — you just have to observe whether or not the emotional changes occurred.

**Gazette:** In art are you saying there are no rules — only the evoking of emotion?

**Dr. MacAulay:** If the art will evoke an emotional response in most people, then it is closer to the truth, as far as truth in art is concerned.

**Gazette:** In science, we work within a set of rules that are agreed upon. Is this the closest we can come to what really exists or is there hope for absolute understanding?

**Dr. MacAulay:** I don't think we will obtain it in the biological field. Everytime we carry out a series of experiments intended to simplify our knowledge of a particular biological event, we always seem to end up with three or four new biological substances, each with their own particular reactions and each controlling some aspect of the organism's metabolism or physiology. We always end up discovering multiple redundant control mechanisms and multiple redundant pathways for events to take... almost as if it is God punishing us for thinking we're too bloody smart!

In Physics and Chemistry, we only have a total understanding of the hydrogen molecule but when you get beyond two atoms, it is impossible to have at any one time a total understanding of the system of three or more atoms. I don't think that Biology, Physics and Mathematics are going to adequately be able to explain our mental processes. An operative and descriptive set of rules talking about how substances interact fails to deal with causation.

**Gazette:** Why is science so important to us today, then?

**Dr. MacAulay:** We are in the current situation apparently because some four centuries ago or so, the (Christian) church which, at that time, guided people's behaviour came up against a group of people who

were having some success at explaining the rules of how substances interacted with each other. I guess a deal was struck so that the people, many of whom were actually church-men, could pursue this endeavour of establishing these rules as long as they didn't deal with causation. It would be the province of the theologians within the church to decide what causation was. Subsequently, they had a lot of problems because theologians felt that they could, using only rhetoric, dialectic or revelation, decide not only things spiritual but how substance ought to obey spiritual rules. Since then many people came to the conclusion that Science could better direct our activities but I think that Science, in the last half century, has failed miserably at being the body of knowledge that can declare how we should act and value things. Most people realize that now.

**Gazette:** So causation answers 'why' and Science cannot deal with it. Aside from religion, how are we now attacking 'why'?

**Dr. MacAulay:** We seem to have management as some new move to find a panacea and we've got high priests of management who seem to think that we can, through government application of management principles (whatever the hell they are) guide us to our value systems and guide our actions based on our value system.

**Gazette:** You mean these people take causation away from us and dictate what is important? Who are they?

**Dr. MacAulay:** Oh, they are all over the place. This University is producing them up the yin-yang.

**Gazette:** Could you use an artistic approach to govern society?

**Dr. MacAulay:** I don't know of any society that ever used art as the motor for deciding kinds of behaviour so I can't judge whether art would succeed or fail. It can be used to set up a value system. You could decide what kinds of feelings are good and what kinds of feelings are bad or you can decide what kinds of emotions are good and what



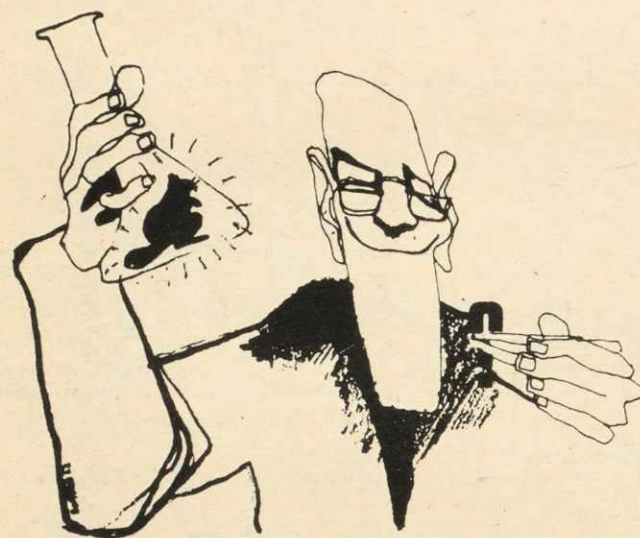
Dr. Malcolm MacAulay yearns for Yen.

kinds of emotions are bad because you like them or everybody likes them and I suppose then that art would attempt mostly to resolve a series of emotional responses toward some good emotional responses. On the other hand, when you look at expressionism and its origins, you might argue against my case.

**Gazette:** What is your advice to students who wonder where all this leaves them?

**Dr. MacAulay:** Well, I think they should learn a little bit about science, art and religion and find a way to hop from one to the other when necessary. At times they will realize that they don't have to hop because the boundaries have overlapped. Then they are in the joint territory of two or even three approaches at one time.

Most of all, stop worrying about it and get on with it!



## A cry against vivisection

By MURALI RAJARAMAN

A word that is commonly used to describe the use of animals in research is "vivisection".

This word is preferred by animal rights groups because its connotation of dissecting live animals more effectively conveys their message. The anti-vivisectionists object to the suffering that animals experience during cruel research experiments.

To encompass all other animal experiments (cruel or not), an additional argument is made: since animals are not like us, they are not good experiment models for studying human illness.

Most of us have probably heard about or have witnessed the demonstrations against the use of dogs and cats in medical research at the Tupper building. What most people don't know is that the experiments in question took place ten years ago. When this information was revealed, it became obvious that the true purpose of the protests was not to stop cruel experiments on animals but to stop the use of any animals in research.

This shows that protests of this sort represent only a small part of larger campaign conducted by the animal rights groups. Their strategy is to attack those areas that the public will be most sympathetic to. They chose dogs and cats because most of us have them for pets. In reality, only about one per cent of animals used in research are dogs and cats. Many more of these animals are killed annually by humane societies or even on streets and highways.

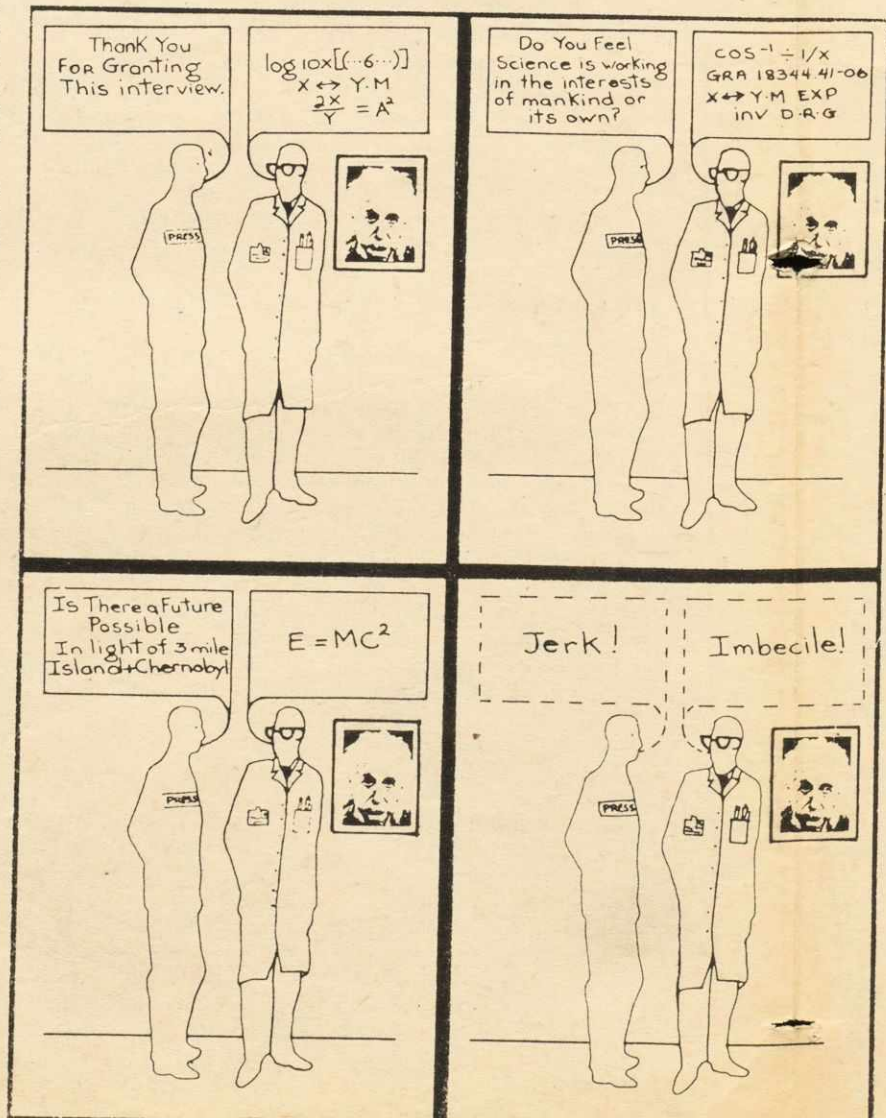
What about rabbits, guinea pigs, rats, mice, fish, caterpillars, fruit flies, etc? Who will weigh the potential human lives that can be saved against these lives? The point is that the short-sighted objections to the sacrifice of family pets ignore important considerations that are not readily understood.

Medical research itself is only a small part of larger group of targets. For instance, the use of animals in testing of non-medical research is objected to. Animal rights activists have also mounted attacks on sealing, trapping of live animals and on factory farming.

The far-reaching implications of this are not readily apparent since most of us are not directly affected. The move against sealing and trapping primarily cripples the native people of this continent. The objections to imprisoning, mutilating and slaughtering animals for the purpose of human consumption hurts the farmer who is already financially strapped.

There is no doubt that regulations and monitoring of any activities concerning animals is necessary. It is only when minorities radically voice their distorted-opinions without consideration or respect for others that problems arise. To tackle these problems, more propaganda will not help. Education of the majority so that a better understanding of the true situation can be reached is the solution.

## SCIENCE AND THE REPORTER



## S L U D G E A H O Y !

By RAY COTE

THE ISSUE OF THE WASTE products of our industrial society received a major boost when press stories began circulating in August 1978 of health impacts associated with the infamous Love Canal in Niagara Falls, New York. There was further impetus from an announcement that 75,000 drums of chemical wastes were found in the "Valley of the Drums" in Kentucky. Following several such findings in the United States, the Environmental Protection Agency supported by a large fund approved by the U.S. Congress began a major program to identify and clean up hazardous waste sites. Abandoned and existing sites numbered in the thousands.

Shortly thereafter, federal and provincial governments in Canada began investigating the scope of the problem in this country. Surveys conducted in the Maritimes, identifies 130,000 metric tonnes of hazardous wastes produced annually. Sources in Nova Scotia are responsible for the generation of approximately 52,000 tonnes of hazardous wastes annually with an untold quantity of wastes abandoned or improperly disposed of in the past.

But what are hazardous wastes? The term applies to unwanted chemical materials that exhibit corrosive, flammable, toxic or reactive properties. Criteria have been set

in each case to document in greater detail the hazardous nature of a waste. The following types of materials are considered hazardous wastes:

- acids
- alkalis
- pesticides
- paints sludges
- solvents
- tetraethyl lead sludges
- tank bottom sludges
- oils
- contaminated soil
- polychlorinated biphenyls

These wastes are byproducts of the manufacture, use and transportation of chemicals and chemical products. They are produced in large quantities by major industries in Nova Scotia, and in lesser quantities by smaller establishments, laboratories, farmers and homeowners. Some wastes are stored or buried on private properties, others are taken to dumps or landfills, while still other wastes are poured down the drain.

The danger is that these wastes, when released in the environment, will spread and cause contamination. Of major concern is the contamination of drinking water supplies, fish and wildlife habitats. There may be consequences for human health. Some of the wastes eg., acids and alkalis, are readily treated but others contain chemicals which are very persistent and accumulate in organisms.

As a result, the chemicals may reach levels that cause toxic effects in wildlife. Polychlorinated biphenyls are such an example.

And what can be done about hazardous wastes? First and foremost is the need to recognize that problem exists. The Minister of the Environment, The Hon. Guy LeBlanc recently created a Task Force to obtain public input on the hazardous waste problem. The Task Force is expected to make recommendations on the need for special waste facilities, public concerns about the management of wastes, financial arrangements, opportunities for cooperation, regulation of waste haulers. The creation of the Task Force is a major step in acknowledging that a problem might exist. Some other provinces are further down the road in putting a comprehensive management system in place.

Legislation and regulations with enforcement are also necessary. The former has been promulgated by the government as the Dangerous Goods and Hazardous Waste Management Act. Regulations must await the report of the Task Force.

Education, training and information transfer are also necessary components of an appropriate management program. These can be aimed at the homeowner who should minimize the wasteful uses of chemical products, the foreman in the

workplace who can control the dumping of waste products into sewers and the plant manager who needs information on waste reduction technologies.

Better storage, treatment and disposal methods can be employed. It is true that many wastes can be adequately treated by conventional technologies. Some wastes, however, require special methods such as high temperature incineration. These methods are costly but at what price can we put a contaminated ground water supply or human health? While treatment methods for most wastes do exist at some cost, the public is not always willing to accept the word of industry, government officials or scientists that the risks associated with the treatment or disposal methods can be reduced to acceptable levels.

For the future, low waste technologies and implementation of the 4 "R" program (recycling, reuse, recovery and reduction) must be our objective. Many industries, both small and large, have demonstrated cost savings and environmental improvements applying these technologies and programs. More improved access to incentives are required to enhance their acceptance.

Ray Cote is associate, director of the School for Resource and Environmental Studies at Dalhousie.