

# UBC REPORTS

Volume 40, Number 1

January 13, 1994



Charles Ker photo

## Transparent Art

Checking quality at an early stage in the artistic process, Gu Xiong, a print-making technician in the Fine Arts Dept., holds a transparency to the light. He examined the transparency before the image was exposed onto a metal plate, developed and etched in a nitric-acid bath.

## Bronze chip yields Roman secrets

by Charles Ker

Staff writer

From a corroded sliver of bronze the size of a floppy disk, UBC Classics Prof. James Russell has pieced together a sizeable chunk of Roman military history.

For 23 years this specialist in Roman archeology has excavated a site in southern Turkey and displayed his findings at a nearby museum. In 1990, the museum's curator casually pulled an unimpressive object from a desk drawer and asked the professor his opinion.

"He told me it was found by a farmer in the village of Kalin Oren but he had no idea what it was," said Russell. "I recognized it at once."

The bronze fragment turned out to be one of a handful of remaining military diplomas granted to veterans who served in the eastern provinces of the Roman empire.

A mere seven square centimetres, the tiny sheet was nonetheless engraved with lettering on both sides. Representing only a quarter of the original tablet, it took a year of dogged detective work before Russell could translate and reconstruct the missing portion of this particular veteran's story. Here's what he found.

The certificate belonged to Papas, son of Cillis, who was honourably discharged from his regiment in the former province of Judea around the year 137. His father's name betrayed his descent from rugged coastal pirates who caused the Romans a good deal of trouble a century or two earlier.

Having dutifully served more than 25 years with the Roman army, Papas, now in his 40s, was looking forward to retirement. The final years of his soldiering career had been particularly busy.

Since 132, he and roughly 20,000 other auxiliary militiamen had been suppressing a fierce Jewish uprising called, after its leader, the 'Bar Kokhba Revolt.' Following this bloody, three-year conflict, Hadrian promptly expelled the Jews

from Jerusalem and renamed the province Syria-Palestine as further punishment.

Papas, a widower with four children, did not think it a good idea to remain in the war-torn region. While most of his contemporaries married local women and settled in the area of their last posting, he applied to Rome for his military diploma.



**This bronze fragment, part of a military discharge diploma, provided Classics Prof. James Russell with insight into Roman military history.**

The document enabled his family to return to the Turkish coast opposite Cyprus.

Russell surmised that the diploma probably hung on a wall in the soldier's Kalin Oren home where he retired with status and a healthy pension.

Through a painstaking process of cross-referencing the Kalin Oren fragment with others found in Europe and elsewhere, Russell was able to reconstruct the entire auxiliary army of Palestine in the half century after the Bar Kokhba revolt. As the only major conflict of Hadrian's reign from 117-138, this military operation sowed the seed for today's Middle East tensions.

Romans were such precise record-keepers that Russell says it isn't necessary to have a document perfectly intact. Most follow the same formulaic pattern.

Discharge diplomas served much the same purpose as modern-day passports. They provided proof of citizenship for the soldier, his wife, his children and their descendants. They also contained an elaborate list of the reigning emperor's titles and offices as well as the name of the soldier's unit and his commanding officer.

"If anyone wanted to travel, as our man did, he'd have to apply for a copy of the original record in Rome," said Russell. "Of course, he'd have to buy it much like our passports today."

But it is the lives of ordinary citizens which most interests Russell. By reconstructing the biographies of many ordinary people rather than one emperor, Russell says historians get a much clearer idea of life at the grassroots level.

Russell presented a report of this new find at the last annual meeting of the Archaeological Institute of America. The institute is the largest organization in North America devoted to archeology with a membership of more than 11,000 and 89 local societies in Canada and the United States.

Russell recently became the institute's first Canadian president in its 114-year history.

## Centre to focus on microbes

### Joint venture boosts microbe research

by Gavin Wilson

Staff writer

A new research centre at UBC will seek to identify previously unknown microbes and find out whether they have unique traits that can be used to make new drugs or help clean up pollution.

The West East Centre for Microbial Diversity is a joint venture between UBC's Dept. of Microbiology and the National University of Singapore's Institute of Molecular and Cell Biology. The two universities recently signed an agreement formally establishing the centre.

A \$2.3-million grant from Singapore's National Science and Technology Board will largely fund the centre's initial three years of operation. UBC will provide a site, equipment and scientific staff.

The combination of Singapore's excellence in molecular biology and UBC's expertise in biotechnology and microbiology will result in a first-class international research centre, said Robert Miller, UBC's vice-president, Research.

"This project will open the way for many new collaborative opportunities between Canada and Singapore and will stimulate the joint development of the pharmaceutical industry in both countries," Miller said. "This collaboration is an excellent example of the importance we place on partnerships with the countries of the Pacific Rim."

The centre, which will open early this year, will be headed by Julian Davies, head of UBC's Dept. of Microbiology and Immunology.

Researchers under his direction will look for novel ways of identifying different species of microorganisms. Although microorganisms play a crucial role in biology of all ecosystems, scientists have identified only one per cent of the total number of species, Davies said.

Researchers hope that some newly identified microbes will provide source materials for new pharmaceuticals. Metabolites produced by microbes are responsible for most antibiotics already on the market.

Another use of microbes the centre will

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Gavin Wilson photo

**The West East Centre for Microbial Diversity will be headed by Julian Davies, head of UBC's Dept. of Microbiology and Immunology. The centre, scheduled to open early this year, will seek to find ways in which microbes can be used to clean up pollution or to make new drugs. Establishment of the centre is a joint venture between UBC and Singapore's Institute of Molecular and Cell Biology.**

## Microbes

*Continued from Page 1*  
investigate is bioremediation — a technology by which microbes can restore polluted soil or water by consuming contaminants and metabolizing them into non-toxic substances.

The centre will encourage the commercialization of technology and will actively seek collaboration with industry partners in both countries, including joint

ventures, technology licensing, commercial spin-offs and contract research.

A third goal of the centre will be to undertake fundamental research. Topics will include the study of evolutionary relationships between different microbes and microbe gene exchange and transfer in the environment.

"The importance of plant and animal bio-diversity is well

known, but no one talks about the bio-diversity of microbes," Davies said. "Yet without microbes there would be no plants or animals."

Davies compared today's knowledge of microbes to that of particle physics in the 1930s. Then, scientists knew that subatomic particles existed, but had a limited knowledge of what form they took and what they did.

## Letters

### Japan can learn from UBC programs

**Editor:**

I'm on the administrative staff at Kansai University, which is one of the biggest private universities in Japan, and recently completed three weeks of research at UBC. The theme of my investigation was concerned with lifelong education and I found that the University of British Columbia has a quite wonderful continuing studies program.

The number of enrolments — 25,000 in credit programs and 15,000 in non-credit programs and more than 80,000 non-credit registrants on the database — is amazing and about 10 times more than our enrolments. In Japan, it is more common that companies provide these kinds of non-credit programs. Though there is different background between UBC and Kansai University, UBC's way of thinking and strategy of continuing studies are really attractive to students.

In Japan, the number of 18-year-old students is declining. For this reason, Japanese universities have to look for another student market segment. A similar situation occurred in North America about 10 years ago, and North

American universities dealt with this problem quite successfully. Now we need to study their strategies and tailor them to our programs.

Distance education is also a study system that we could learn. I understand the demand for this sort of education is growing in B.C. In addition, I observed great facilities in Media Services to support the distance education. In Japan, for example, CATV is not so common a medium but we are thinking of utilizing some new medium such as packaged videotapes and satellite systems. Some of the Japanese adult students have very little time to study, so we should develop strategies to accommodate them.

When I attended one of the continuing studies class, I was able to see some questionnaires completed by the students. One question was "Why have you decided to take this course?" Some of the answers were "Because UBC programs have a good reputation." It appears that continuing studies at UBC are successful.

Community support is the most important ingredient for success. Needless to say, there are a lot of aspects of the UBC program that we can learn from.

**Yoshifumi Arahori  
Kansai University  
Osaka, Japan**

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### Calling all Authors!

Are you the author of a book published between January 1993 and December 1993? If so, we would like to hear from you!

On **March 16, 1994**  
President David Strangway and University Librarian Ruth Patrick are hosting the **4th Annual Reception for UBC Authors.**

If you're a UBC author, please contact Margaret Friesen or Pauline Willems Main Library (822-4430 / 822-2083) by January 31, 1994

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### Inequity in the Classroom

January 20, 1 to 4 pm  
Brock Hall 204D

Using the video "Inequity in the Classroom," participants will consider how some behaviours can contribute to a classroom climate which is not entirely favourable to optimal learning. Issues include teaching and learning as they relate to gender and culture, and the impact of stereotyping in the classroom. Open to students only. Limit 20. Call 822-2415 to register.

Facilitators: Begum Virgee and Sarah Dench, Women Student's Office



## UBC REPORTS

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Jack Wong photo

## Action Agenda

Actor Tom Jackson, co-star of the hit CBC television series *North of 60*, hosted a "Celebration of Cultures" night recently at the First Nations Longhouse. The event was part of a three-day conference called Action Agenda for Self Government which was designed to help define the future relationship among First Nations, governments and private business.

## Offbeat

by staff writers



John Chong photo

Michael Smith brought two place settings home from last month's Nobel Prize banquet in Sweden.

It was a feast for the eyes. And Michael Smith couldn't resist the temptation.

UBC's Nobel Prize winner for chemistry bought two place settings used at the banquet in Stockholm, Sweden on Dec. 10, held in honour of 1993's award recipients.

The place settings were commissioned in 1991 to commemorate the 90th anniversary of the Nobel Prize and to promote Swedish craftsmanship. Smith hopes his daughter, who has a brochure describing the china in more detail, will donate it to his collection of Nobel memorabilia.

"I picked up everything I saw. I don't know how I missed that one," he quipped.

Smith's other prized mementoes include the autographs of each of the other Nobel Prize winners, including South African President F.W. de Klerk and African National Congress leader Nelson Mandela. They shared the Nobel Peace Prize in 1993.

"It was the first time in the history of the award that all of the winners were together in the same room," Smith said, the excitement still evident in his voice. "I heard that de Klerk was leaving early so I grabbed him." In addition to the place settings, autographs and, of course, the Nobel Prize itself, Smith amassed invitations, menus, programs and photographs from a whirlwind week of activities surrounding the award presentation ceremony.

Smith has already taken many of the items on a roadshow — literally — transporting them to and from campus in the back seat of his car to show to his UBC friends and colleagues.

After savouring the goodies a while longer, he plans to donate the collection to UBC for permanent display.

# Talks clear path for dispute resolution

Informal discussions help keep the peace among claimants of the Spratly Islands

by Charles Ker

Staff writer

Visitors to Ian Townsend-Gault's office often stop and ponder a defaced picture of retired U.S. General Norman Schwarzkopf pinned to the door. A beard and hair are scribbled onto the full-page newspaper ad that proclaims "His War, His Book, His Life."

Colleagues in UBC's Faculty of Law agree that, with a few alterations, the two men do look vaguely similar. They also point out the office's location on Military Road. Then they note each man's involvement in complex security matters on the other side of the globe.

Of course, the major difference between the two is that while the brash army general was waging war in the gulf, the UBC associate professor was promoting peace at sea.

Since 1989, Townsend-Gault has quietly helped ease tensions in the South China Sea where no less than six governments — China, Taiwan, Vietnam, Brunei, Malaysia and the Philippines — have staked claims to a curious outcropping of reefs, shoals and sand banks called the Spratly Islands. Jurisdictional friction over these so-called islands is based on an unsubstantiated notion that they hide rich gas and oil reserves.

Of international concern, especially to the neighbouring countries of Laos, Indonesia, Thailand and Singapore, is that the islands (identified on charts as "Dangerous Ground") lie dangerously close to a major shipping lane linking the Indian and Pacific oceans. The combination of factors adds credence to the belief that after Cambodia, this 1,000 square kilometres of storm-swept sea is the region's next military flashpoint.

For Townsend-Gault, the situation posed an intriguing mix of environmental, international, marine and resource-based law, all areas in which he teaches and does research.

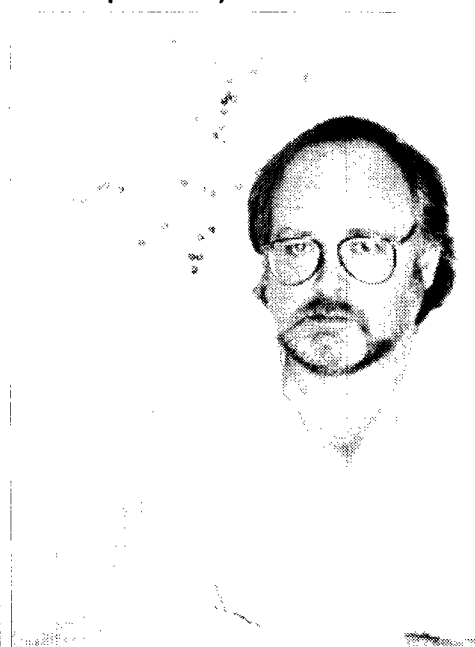
Outside his academic work as director of UBC's Centre for Asian Legal Studies, he has acted as a petroleum legal consultant for First Nations groups, Texaco, Mobil Oil, Dome Petroleum and a United Nations consultant for the government of Vietnam. So, when it was suggested he help get the various Spratly claimants together for some constructive dialogue, he jumped.

"The key is to downplay the whole Spratly aspect in favour of broader issues that can only be addressed in a regional context," he said. "If a tanker runs aground off someone's coast, there has to be a co-operative mechanism in place to respond."

Townsend-Gault used an initial series of grants from the Canadian International Development Agency (CIDA) to spark interest among potential participants.

This eventually led to his successful pitch to CIDA for \$960,000 to fund a UBC-based project called Managing Potential Conflicts in the South China Sea.

Now entering the fourth and final year of this phase of funding, the project has spawned four "informal" workshops and two "technical" meetings on marine scientific research and resource assessment and ways of development. Two more tech-



Charles Ker photo

**For four years Associate Prof. Ian Townsend-Gault has been working to keep the peace among nations claiming rights to the Spratly Islands.**

nical meetings are scheduled early in the new year followed by a fifth workshop next summer.

Despite keen interest from Australia, the U.S. and Japan, Canada is the only non-regional participant allowed at the meetings. Townsend-Gault and his asso-

ciates look after funding and research support across a range of international ocean law and policy issues. They also add an element of continuity to the talks which often feature a different set of faces at each meeting.

To create a sense of common purpose around the table, there are no flags identifying the various delegations of bureaucrats, am-

bassadors and legal policy experts. And none of the discussions are binding.

"It's all in pursuit of maintaining the fiction that everyone is there in their own personal capacity," said Peter Tyedmers, a graduate student and member of the six-member UBC project team. "The moment people start wearing hats you get polarization and less chance of agreement."

Townsend-Gault hopes principles discussed in the informal workshops will be adopted formally in future meetings of the countries concerned. But the time for such formal discussions has not yet arrived.

As the current phase of the South China Sea Project proceeds, two further CIDA-sponsored opportunities have cropped up for Townsend-Gault.

First, he will use an \$800,000 grant to help the Vietnamese government draft laws governing many aspects of their marine legislation from fisheries to environmental protection to marine traffic. Specific plans include the establishment of a marine law and policy research centre in Vietnam where people from all resource sectors can meet and exchange information and ideas.

Through a second grant, the professor will help Vietnamese officials use the legal system to protect human rights as the country moves toward a market economy.

**"If a tanker runs aground off someone's coast, there has to be a co-operative mechanism in place to respond."**

- Ian Townsend-Gault



# Grad student confirms map discrepancies

by Charles Ker

Staff writer

Forest company officials have always had more than a sneaking suspicion their annual harvest projections are based on maps that aren't altogether accurate. Now their suspicions have been mapped out in colour.

As part of his master's thesis in geography, graduate student Michael Joy used advanced computer technology to combine three sets of maps of one Alberta forest into one. The government-supplied maps (two sets based on aerial photographs and one on satellite images) were produced over a 20-year span and purport to contain the same information about the forest's composition.

Using a sophisticated computer system called a GIS (geographic information system), Joy overlaid the maps with dramatic, and graphic, results: yellow denoted agreement of a decidedly deciduous lot; green represented the government's certainty of a coniferous stand and grey marked areas where the maps disagreed. Almost half of Joy's map was grey.

"We found a great deal of uncertainty with the information," says Joy. "If you are uncertain about the composition of an area to be logged and your company only has rights to a specific species, then it's hard to make projections about volumes you intend to cut."

Joy's work is part of a UBC project looking into broader issues of GIS technology and the accuracy of spatial information on which it operates.

Spatial data, explains Asst. Prof. Brian Klinkenberg, refers to roads, rivers, mountains, buildings, lakes - anything that takes up space. Historically, these features have been illustrated on paper maps.

What makes GIS technology special, the UBC geographer says, is its ability to turn maps from simple descriptive products into prescriptive tools. Apart from overlay capability, GISs allow planners in all professions to construct "what-if" scenarios by applying forecasting models to maps that have been digitized into a computer.

As a tool, GIS has revolutionized municipal planning and resource management. Klinkenberg estimates that close to 80 per cent of all government information is spatially referenced and could be used in a GIS. Not only do the systems identify map features in a manner that makes geographic sense, but they can relate these features to whatever the user wants.

In California, for instance, planners use a GIS to examine topographical characteristics such as slope and soil in a search for potential landslide areas. In Canada, New Brunswick legislation makes it mandatory for forestry companies to store GIS maps showing their harvesting

and silviculture plans over a 10-year period.

By coupling digital maps with any number of external databases, Klinkenberg says the GIS has done for geography what the microscope did for biology.

"Just as the microscope lets us see a world we hadn't viewed before, GIS allows us to explore relations we wouldn't have been able to otherwise because computers can handle so much more information," says Klinkenberg. "There's no end to its application."

But with the seemingly endless array of applications comes a great potential for error.

Klinkenberg, Joy and forestry graduate Steve Cumming are trying to develop models which will give planners some idea of the level of uncertainty in spatial information. Just because information is stored in computer format, says Klinkenberg, people mistakenly assume that it is correct.

"People invariably discover that when one agency's map showing roads is compared to another agency's map showing bridges, the roads and bridges don't line up," he said.

While Joy's "uncertainty" map of the Alberta forest took close to three months to make, the techniques he developed in producing it will make similar analyses of other forests much quicker. His research might be strictly academic right now, but Joy believes his uncertainty maps will help forestry planners make better-informed decisions in the future.

Along with issues of accuracy, Klinkenberg is also investigating how GISs can be made more accessible. Currently, spa-



Charles Ker photo

**Michael Joy, a graduate student in geography, used a geographic information system to combine three sets of maps into one. His colour-coded map shows discrepancies in forestry data.**

tial data is not easily shared because users must not only have a thorough knowledge of GIS, but environmental modeling and remote sensing too.

Klinkenberg is trying to come up with a common user interface which will allow people to take knowledge of one system and use it in another.

## News Digest

**P**rostate disease specialists and patients gained a new provincial resource with the recent opening of the UBC Prostate Clinic, the first of its kind in western Canada.

Located at Vancouver Hospital, the clinic is a multidisciplinary, co-operative effort combining the research, resources and expertise of the hospital and the university with the B.C. Cancer Agency and St. Paul's Hospital.

"The advances in prostate disease treatment have been remarkable in the past five years, and it is difficult for urologists to keep up with the changes and provide their patients with current information," said Dr. Larry Goldenberg, a clinical associate prof. of surgery and director of the new facility.

"This clinic will be a place where they can turn to for the latest research reports and for updates on treatment options."

Funding for the UBC Prostate Clinic was provided by Vancouver Hospital and through private donations.

**P**atscan, UBC's patent and trademark search service, is holding its second annual Green Innovation contest, challenging B.C. post-secondary students to come up with innovative solutions to environmental problems.

Entries must consist of a novel, workable and commercially viable device or process that can be used in the clean-up, protection or conservation of the environment. The scope of the contest is very broad and education products such as games or toys may be entered.

Students are eligible to enter in one of two categories: graduate and undergraduate or college. First and second prizes of \$1,000 and \$500 will be awarded in each category. The contest is sponsored by Shell Canada's Environmental Fund.

Deadline for entries is March 15, 1994 and winners will be announced in May. For more information, call Ron Simmer at 822-5404.

**T**ranscription services from print to braille are once again available from the Crane Library and Resource Centre.

Translation of documents from print to braille, manually or by computer translation program, will be carried out by Theresa Andrews, braille and technical support technologist.

The first priority of the service is to look after the braille document needs of Crane's visually impaired student, faculty or staff clients. However, the service is available on a fee basis to other UBC departments as well.

Translation into braille entails analysis and assessment of the print document, scanning of the text by print scanner, re-formatting the material manually to eliminate graphics and other non-translatable items, and to ensure adherence to North American standard braille formats and translation by computer into grade two standard braille.

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## Forum

# Survey of female faculty yields asymmetric picture

by James Steiger

James Steiger is a professor in the Department of Psychology.

Connie Filletti's article ("Survey: climate chilly for female faculty") and the companion interview with survey author Florence Ledwitz-Rigby in the Oct. 28 UBC Reports served as a marvellous discussion piece for a recent meeting of my Psychology 317 class in research methods.

Filletti's article described a survey of all 344 tenure track female faculty at UBC by Florence Ledwitz-Rigby, special advisor to President Strangway on "gender" relations at UBC. I recognized instantly that the article had value as a teaching tool. As an exercise, I distributed copies of the article to the students, and asked them what they thought. I began by soliciting their opinion of vice-president Dan Birch's interesting statement, "This survey reminds us all that many

women experience this campus quite differently from men...No matter how much has been achieved, there is much more to be done to provide a nurturing environment for work and study."

My class and I then examined (as best we could

from the details provided) Ledwitz-Rigby's methodology and conclusions.

Let's begin with Birch's statement. The students quickly concluded that, since Ledwitz-Rigby never asked men how they experience the campus, the Birch comment had no empirical foundation. Perhaps men too find UBC a less than perfect place to work. Perhaps men find their female colleagues occasionally chilly. Who knows? Perhaps Birch feels he is in a position to speak for everyone.

Ledwitz-Rigby apparently thinks she can understand problems in human relations by polling only the women on campus. There is a thinly veiled message in Ledwitz-Rigby's asymmetry. The message is that the problems women face relating to men in the workplace cannot be solved directly - they require intervention by special agencies. Men are guilty oppressors, women helpless victims, so any solution must be imposed on men from above.

This is a variation of the arguments for asymmetry in other areas: (1) women prison guards can be trusted to strip search men prisoners (always, if you believe women correspondents to the Vancouver Sun, with perfect professional sensitivity) while men guards cannot be trusted to strip search women prisoners; (2) UBC staff should withdraw from "men's clubs" that refuse entry to women (this is disgustingly sexist behaviour), while women writers can prohibit men reporters from attending their conferences at UBC because the male presence would be "threatening." (3) women sports reporters should be allowed to enter men's locker rooms, while men reporters cannot be allowed to enter women's locker rooms etc., etc.

My view is that this "asymmetric" approach to working out human

problems is doomed to failure, because (a) it is based on the finger-pointing, name-calling variant of feminism that increasing numbers of women are rejecting, and (b) it invites the inevitable backlash from men who are smart enough to know what reverse discrimination in the workplace is costing them. Moreover, the asymmetric approach sells women short. The women faculty I know have no need of Ledwitz-Rigby or her survey. They are doing just fine on their own.

Many other aspects of the work are questionable, and were found by my students in a few minutes. For example, Ledwitz-Rigby appears to reach campus-wide generalizations on the basis of her work, but she reports no breakdown of her results by faculty and/or department. This is especially treacherous when only 58 per cent of her population responded. Perhaps every woman in Department

A feels the atmosphere is "chilly," while none of the women in Department B even responded. Does Ledwitz-Rigby not think this is relevant?

The UBC Reports articles seem slanted toward a particular conclusion. For example, Filletti states that "almost

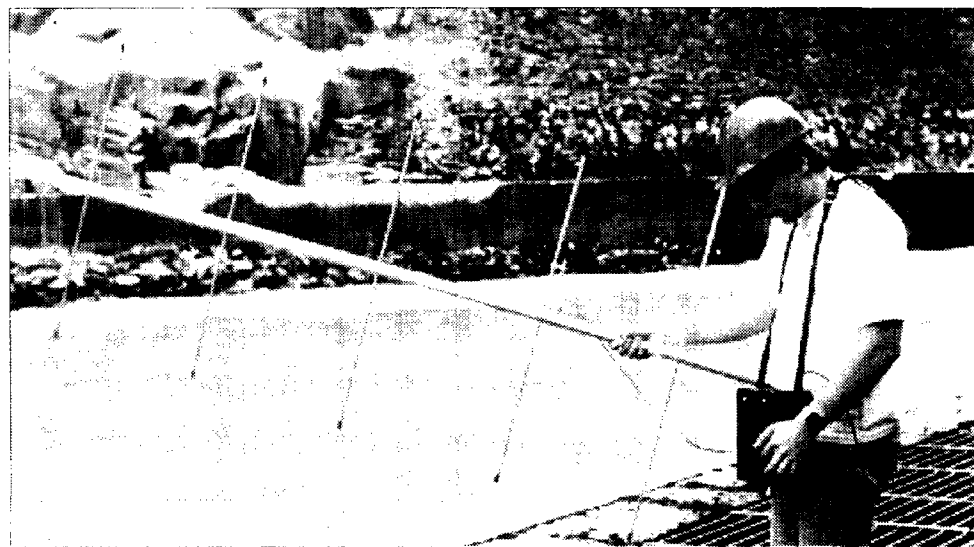
40 per cent of the respondents said that they were often the target of two or more of the 14 inappropriate behaviours listed in the questionnaire, ranging from the devaluation of scholarship about women to persistent emphasis on sexuality." It is impossible to evaluate the meaning of this statement, because we don't know what the "14 inappropriate behaviours" are. Filletti lists only two. The juxtaposition of these two behaviours with the phrase "two or more" might lead one to believe that these two behaviours are typical of the entire list of 14. This belief might be unwarranted. Perhaps the list of 14 behaviours includes some relatively innocuous ones. Perhaps we should withhold judgment until we see the entire list.

I could go on, but I hope I have made my point. As the father of two daughters, I am acutely aware that there are biases against women in our culture, and on our campus. The fact is, there are also many biases against men. Current fashion, symbolized by the efforts of Ms. Ledwitz-Rigby, is to present a completely asymmetric picture of a complex situation. Many men, aware of the problems women face, prefer to give writers like Filletti and Ledwitz-Rigby the benefit of the doubt. Unfortunately, our tolerance has given rise to a situation that now borders on anti-male abuse.

I find myself forced to conclude that the Ledwitz-Rigby survey, if as described, is biased, not particularly competent, and of little use. It is, on the other hand, nicely symbolic of what the Strangway administration has unfortunately come to represent to many faculty: meaningless but expensive bureaucratic "surveys" in place of serious solutions to the problems that plague our campus.

**"Perhaps men too find UBC a less than perfect place to work. Perhaps men find their female colleagues occasionally chilly. Who knows?"**

- James Steiger



Westwater Research Centre photo

**Hand-held antenna helps Tim Lissimore, a summer co-op student, track individual sockeye salmon surgically implanted with radio transmitters as they struggle up difficult passages in the Fraser Canyon.**

## Sockeye study

# Salmon threatened by global warming

by Gavin Wilson

Staff writer

The future of B.C.'s sockeye salmon fishery could be in jeopardy if the findings of two Westwater Research Centre studies are borne out.

The studies show that the Fraser River sockeye fishery could decline significantly in coming decades due to environmental changes brought on by global warming.

The climates changes could result in smaller and fewer salmon as well as lower river levels and warmer temperatures, which would make the salmon's already exhausting journey to its spawning grounds even more difficult, said Westwater Director Michael Healey.

One recent Westwater study conducted with the Dept. of Fisheries and Oceans observed the early Stuart River sockeye run on part of their 1,200-kilometre migration up the Fraser River.

About 30 of the fish were surgically implanted with a radio transmitter the size of a human thumb. With this Canadian-made technology, researchers were able to track individual fish as they passed a turbulent 30-kilometre section of the river, from Yale to Hell's Gate, the narrowest point of the Fraser Canyon.

As well as the fish's exact location, the transmitter also told them how fast the fish was swimming, how much energy it used and the temperature of the surrounding water — all key information for determining fish survival on the arduous journey.

Salmon stop feeding once they begin river migration, and energy depletion may cause many to die on route, said Scott Hinch, a research associate at Westwater who headed up the research team along with Ron Diewert of the Dept. of Fisheries and Oceans.

Information from the tagged fish also

identified places where passage is difficult.

"There were a number of places it was believed salmon have difficulty getting past — Hell's Gate, Saddle Rock, Sailor Bar and a number of others," Healey said.

"But these locations proved to be less of a problem than was generally believed. Salmon migrate through fast water by moving along the river bottom or close to the banks where the flow is slower and small crevices provide resting places.

"They can sneak up from back eddy to back eddy or hug the slower currents right against a rock face."

Instead, the researchers were surprised to find that innocent-looking gravel bars often posed a greater obstacle to upstream migration than formidable passages like Hell's Gate.

They believe there are two reasons for this: gravel bars force fish to swim near the surface, which they avoid if possible, and do not offer the resting places found in rocky canyons.

"One gravel bar near Yale, which extended across most of the river, proved to be an enormous obstacle, especially when water levels fell as they typically do in late summer," Hinch said.

"All of the obstacles seem to be particularly difficult for smaller sockeye. Larger fish sometimes breezed right through to Hell's Gate," he said.

The researchers believe that anticipated changes in rainfall and snow-melt patterns in B.C. caused by global warming could mean lower water levels in the Fraser during the summer months.

This would expose more gravel bars and create additional obstacles to sockeye migration.

Another Westwater study, undertaken by Hinch and Healey, found that if global warming predictions prove to be true, sockeye numbers and average weight will both significantly decrease.

## City's hospitals change names

University Hospital (UBC site) and Vancouver General Hospital will now be known as the Vancouver Hospital and Health Sciences Centre, hospital officials announced recently.

The name change is the result of a merger of the two hospitals last year after University Hospital (Shaughnessy site) was closed.

"Not only does the name signify the merger and the corporate changes that have taken place," said hospital chair David Esworthy, "but it symbolizes our commitment to being a hospital that provides the kind of care our patients deserve and our communities expect."

Esworthy said hospital mergers are becoming commonplace in North America

as health care facilities try to reduce costs.

As part of a plan to reduce duplication and optimize the use of hospital facilities, reconstructive orthopaedics will be consolidated in the Koerner Pavilion at UBC.

Twenty-four-hour emergency service will be maintained at both hospital locations — an issue that was of concern to the surrounding community.

Hospital managers also said surveys of public opinion showed that there was little understanding of the hospital's teaching and research roles, a perception they hope to change in the near future.

Esworthy said the physical application of the name change 1,700-bed institution — on signage, stationery, and logos — will be phased in over time as costs permit.

# Calendar

## January 16 through January 29

### Monday, Jan. 17

#### English Lecture

The Chilly Climate: Women In Academia. Sunera Thobani, president, N.A.C. Asian Centre Auditorium at 12:30pm. Reception follows. Call S.W.A.C. at 822-3203.

#### Plant Science Seminar

Management And Culture Of Poplars By Scott Paper Limited. Peter McAuliffe, Scott Paper Ltd. MacMillan 318D at 12:30pm. Call 822-9646.

#### Astronomy Seminar

The Age, Formation Redshift/Collapse Factor Of The Milky Way. George Lake, U. of Washington. Geophysics/Astronomy 260 at 4pm. Coffee at 3:30pm. Call 822-2267/2696.

#### International TA Training Program

Ongoing to Feb. 28. Learn to work effectively with supervisors, TAs/students; develop teaching skills, refine your use of English. Intercultural Training/Resource Centre, MLO. Auditorium Annex 221 from 4-7pm. Call 822-9583.

### Tuesday, Jan. 18

#### Animal Science Seminar

Factors Reflecting Calcium Assimilation In Growing Squabs. Sulernan Bhatti, PhD student. MacMillan 260 at 12:30pm. Call 822-4593.

#### English Seminar

Professional Development Seminar On Feminist Research. Dr. Veronica Strong-Boag, director, Centre for Research in Women's Studies/Gender Relations. Grad Student Centre at 12:30pm. Call Lara Perry at 822-3203.

#### Botany Seminar

Origin Of Chromista, The Third Botanical Kingdom. Dr. Tom Cavalier-Smith. Botany. BioSciences 2000 from 12:30-1:30pm. Call 822-2133.

#### Lectures In Modern Chemistry

Small (Molecules) Is Beautiful. Dr. Julian Davies, Microbiology. Chemistry 250 south wing at 1pm. Refreshments at 12:40pm. Call 822-3266.

#### Oceanography Seminar

The Effect Of Seawater Flow Velocity On Inorganic Nitrogen Uptake By The Giant Kelp. Dr. Catriona Hurd. Oceanography. BioSciences 1465 at 3:30pm. Call 822-3626.

### Wednesday, Jan. 19

#### UBC Board Of Governors Meeting

Held in the board room, second floor of the Old Administration Building, 6328 Memorial Rd. The open session begins at 9am.

#### Orthopaedics Grand Rounds

Self Report/Pain Assessment. Chair: R.W. McGraw. Speakers: Drs. P.C. Wing/B. Hayes/C. Solyom. Eye Care Centre Auditorium at 7am. Call 875-4272.

#### Noon Hour Concert

Musick Fyne. Music Recital Hall at 12:30pm. Admission \$2. Call 822-5574.

#### Canadian Studies Lecture

First Nations Writing/The

Problem Of Voice. Margery Fee. English. Buchanan B212 at 12:30pm. Call 822-5193.

#### Geography Colloquium

Evidence For Large Prehistoric Earthquakes In Western B.C. And Washington. John Clague, Geological Survey of Canada. Geography 201 from 3:30-5pm. Refreshments at 3:25pm. Call 822-5612.

#### International TA Training Program

Ongoing to Mar. 2. Learn to work effectively with supervisors, TAs/students; develop teaching skills, refine your use of English. Intercultural Training/Resource Centre, MLO. Auditorium Annex 221 from 6-9pm. Call 822-9583.

### Thursday, Jan. 20

#### Women Students Office Workshop

Inequity In The Classroom. Begum Virgee/Sarah Dench. WSO. Co-sponsored by Multicultural Liaison Office. Brock Hall 204D from 1-4pm. Registration 20 students only. Call 822-2415.

#### Physics Colloquium

Geologic Nozzles: Old Faithful, Mt. St. Helens And The Colorado River Rapids. S. Kieffer, Geology. Hennings 201 at 4pm. Call 822-3853.

### Friday, Jan. 21

#### Paediatrics Grand Rounds

Approach To The Difficult To Feed Child. Dr. Maureen O'Donnell, MD, FRCPC, Developmental Pediatrician. Sunny Hill Health Centre for Children. G.F. Strong Auditorium at 9am. Call 875-2307.

#### Health Care/Epidemiology Rounds

Birth Of A Profession: Statutory Approach To Health Policy. Dr. Arminee Kazanjian, assist. prof., Health Care/Epidemiology; assoc. dir., Centre for Health Services/Policy Research. James Mather 253 from 9-10am. Call 822-2772.

#### Noon Hour Concert

UBC Contemporary Players. Stephen Chatman/Andrew Dawes, directors. Music Recital Hall at 12:30pm. Call 822-3113.

#### Occupational Hygiene Program Seminar

Comparative Risk Of Chemical/Manual Brush Control. Dr. Frank Dost, prof. emeritus, Agricultural Chemistry/Forest Toxicology, Oregon State U. Chemical/Mechanical Engineering 1202 from 12:30-1:30pm. Call 822-9595.

#### International TA Workshop

Ongoing to Mar. 4. Pronunciation Workshops For International Teaching Assistants. Intercultural Training/Resource Centre, MLO. Open only to present/past participants in TA training. Buchanan B118 from 2-4pm. Call 822-9583.

#### Chemical Engineering Weekly Seminar

Fluid-Particle Separation By Acoustic Resonance. Steven Woodside, grad student. Chemical Engineering 206 at 3:30pm. Call 822-3238.

#### Theoretical Chemistry Seminar

Aspects Of Moderately Dense Gas Kinetic Theory. G. Wei. Chem-

istry 402 central wing at 4pm. Call 822-3997.

#### Institute Of Health

Promotion Research Seminar Moving Theory To Outcome Measurement. Dr. P.H. Kate Lorig. Stanford U., CA. IRC #5 from 4-5:30pm. Call 822-2258.

#### Open House/Reception

Gathering to conclude Chilly Climate Week. Grad Student Centre Thea's Lounge at 8pm. Refreshments/cash bar. Call 822-3203.

### Saturday, Jan. 22

#### Vancouver Institute Lecture

Computerizing The Oxford English Dictionary. President John Stubbs, SFU. IRC #2 at 8:15pm. Call 822-5675.

### Monday, Jan. 24

#### B.C. Cancer Research Centre Seminar

Basic FGF Expression In Human Squamous Cell Cancer: Its Relationship To Regional Tumour Cell/Endothelial Cell Proliferation. Dr. Susanne Schultz-Hector, Institut für Strahlenbiologie, GSF, Munich. B.C. Cancer Research Centre Lecture Theatre at 12pm. Call 877-6010.

#### Plant Science Seminar

Characterization Of The Cummer Necrosis Virus Coat Protein Gene. Dr. Morven McLean, Agriculture Canada. MacMillan 318D at 12:30pm. Refreshments. Call 822-9646.

#### Red Cross Blood Donor Clinic

From 3-9pm in the Mary Murrin/Isabel MacInnes Lounges, Walter Gage Residences. Donors are reminded to bring identification and to eat a substantial meal 1-4 hrs. prior to donating. Call 877-7810.

### Tuesday, Jan. 25

#### Animal Science Seminar

Follicular Regression In Cattle. Mohan Manikkam, PhD student. MacMillan 260 at 12:30pm. Call 822-4593.

#### Botany Seminar

The Effect Of Seawater Flow Velocity On Inorganic Nitrogen Uptake By Giant Kelp. Dr. Catriona Hurd, Oceanography. BioSciences 2000 from 12:30-1:30pm. Call 822-2133.

#### Lectures In Modern Chemistry

How To Control Chemical Reactions With Lasers. Dr. Paul Brumer, Chemical Physics Theory Group, Chemistry, U. of Toronto. Chemistry 250 south wing at 1pm. Refreshments at 12:40pm. Call 822-3266.

#### Oceanography Seminar

Removing The Effects Of Particle Fluxes With A Horizontal Component From Sediment Trap Data. David Timothy, Oceanography. BioSciences 1465 at 3:30pm. Call 822-3626.

#### Graduate/Faculty Christian Forum

The Word And The Words: Can The Bible Speak To Our Present Situation? Dr. Alan Reynolds, U. Hill Congregation. Buchanan Penthouse at 4:15pm. Coffee at 4pm. Call 822-3268.

### Wednesday, Jan. 26

#### Orthopaedics Grand Rounds

Dislocation Of The Knee. R.N. Meek. Eye Care Centre Auditorium at 7am. Call 875-4272.

#### Microbiology Seminar

Mechanisms Of Poxvirus Virulence. Dr. Chris Upton, Biology, U. Vic. Wesbrook 201 from 12-1pm. Call 822-3308.

#### Noon Hour Concert

Natsuko Uemura, harpsichord. Music Recital Hall at 12:30pm. Admission \$2. Call 822-5574.

#### Centre For Japanese Research Seminar

Weaving Workshops: Educational Processes/Leisure Pursuits. Millie Creighton, Anthropology/Sociology. Asian Centre Basement Music Room from 12:30-2pm. Call 822-5612.

#### French Colloquium

Les Retouches Du Francais Parle Par Les Enfants En Immersion Francaise. Marcia Santen. Buchanan Tower 799 at 2:30pm. Call 822-4025.

#### Geography Colloquium

The Lao Bai Xing Sector: A New Trend In Chinese Urban Development. Michael Leaf, Centre for Human Settlements. Geography 201 from 3:30-5pm. Refreshments at 3:25pm. Call 822-5612.

#### Women In English Meeting

Network with your peers. Please bring a friend. Refreshments served. Located at 3689 W. 11th Avenue at 7:30pm. Call 224-6494.

#### Evening Theatre

The Jewish Students Assoc. presents the play: The Night Of The Twentieth by Joshua Sobol. Asian Centre Auditorium at 7:30pm. Repeats Jan. 27th. Tickets \$8 adults, \$5 students/youths. Call Hillel at 224-4748.

### Thursday, Jan. 27

#### Opera Panel Discussion

Janacek's Jenufa In Context. Susan Bennett, Vancouver Opera; Marketa Goetz-Stankiewicz, German; Floyd St. Clair, French. Dorothy Somerset Studio at 12:30pm. Call 822-4060.

#### Symphony Concert

UBC Orchestra, Jesse Read, conductor; Cherith Alexander, piano soloist. Old Auditorium at 12:30pm. Call 822-3113.

#### Institute Of International Relations Lecture

Megatrends For The Millennium. Margaret Catley-Carlson, president, Population Council, New York. IRC #2 at 12:30pm. Call 822-9546.

#### Philosophy Lecture

The Identity Of Indiscernibles:

Can It Be True Without Being Trivial? Denis Robinson, Philosophy, Auckland U. Buchanan D348 from 1-2:30pm. Call 822-3292.

#### Physics Colloquium

Physics At The Nuclear Drip Line. S. Austin, U. of Michigan. Hennings 201 at 4pm. Call 822-3853.

#### Faculty Forum

Computer-Assisted Control Of Mobile Hydraulic Machines. Dr. Peter Lawrence, Electrical Engineering. CICS/CS 208 from 4-5:30pm. Call 822-6894.

#### Arts Lecture

Forensic Anthropology Applied To Historical Problems. Owen Beattie, Anthropology, U. of Alberta; Roger Amy, Pathology, UBC. Green College Dining Hall at 8:30pm. Call Screening of Franklin Expedition film, Frozen In Time at 5:30. Call 822-9121.

### Friday, Jan. 28

#### Paediatrics Grand Rounds

Latex Allergy: An Emerging Problem. Wade Watson, MD, FRCPC, asst. prof., Allergy/Clinical Immunology, U. of Manitoba. G.F. Strong Auditorium at 9am. Call 875-2307.

#### Health Care/Epidemiology Rounds

A Review Of The International Congress On Occupational Health, held recently in Nice, France. Dr. Joseph Nearing, Occupational Medicine consultant, Worker's Compensation Board. James Mather 253 from 9-10am. Call 822-2772.

#### Economics Lecture

Privatizing Russia I. Andrei Schleifer, speaker for the Vancouver Institute series; prof., Harvard U. Buchanan 104A from 12:30-1:30pm. Call 822-4129/4608.

#### Animal Science Seminar

Control/Management Of Ovarian Follicles To Optimize Fertility. MacMillan 260 at 12:30pm. Call 822-4593.

#### Occupational Hygiene Program Seminar

An Overview Of The Airborne Spread Of Bacteria. Dr. John Anderson, Pathology/Laboratory Medicine. Chemical/Mechanical Engineering 1202 from 12:30-1:30pm. Call 822-9595.

#### Chemical Engineering Weekly Seminar

Mechanical Properties Of Airway Soft Tissues. Lu Wang, grad student. Chemical Engineering 206 at 3:30pm. Call 822-3238.

#### Theoretical Chemistry Seminars

Domain Decomposition Methods In Computational Fluid Dynamics. Dr. H. Yang. Chemistry 402 central wing at 4pm. Call 822-3997.

## UBC REPORTS

### CALENDAR DEADLINES

Calendar items must be submitted on forms available from the UBC Community Relations Office, 207-6328 Memorial Road, Vancouver, B.C. V6T 1Z2. Phone: 822-3131. Fax: 822-2684. Please limit to 35 words. Submissions for the Calendar's Notices section may be limited due to space. Deadline for the January 27 issue of UBC Reports — which covers the period January 30 to February 12 — is noon, January 18.



# Calendar

## January 16 through January 29

### Saturday, Jan. 29

#### Continuing Studies Panel Discussion

Conflict In The Clayoquot: A Comprehensive Analysis. Clark Binkley, Gordon Weetman, Hamish Kimmins, Forestry; John Borrows, David Cohen, Lynn Smith, Law; Gary Bowden, Resource Environ.; Carol Reardon, West Coast Envir. Law Assoc.; George Hoberg, Poli. Sci.; W. Stanbury, Commerce. Moderator: Vaughn Palmer, Vancouver Sun. Scarfe 100 from 8:30am-4:30pm. All welcome. Call 222-5203.

#### Vancouver Institute Lecture

Privatizing Russia. Prof. Andrei Shleifer, Economics, Harvard U. IRC #2 at 8:15pm. Call 822-3131.

## Notices

#### Student Housing

The off-campus housing listing service offered by the UBC Housing Office has been discontinued. A new service offered by the AMS has been established to

provide a housing listing service for both students and landlords. This new service utilizes a computer voice messaging system. Students call 822-9844, landlords call 822-9847.

#### Campus Tours

School and College Liaison tours provide prospective UBC students with an overview of campus activities/faculties/services. Every Friday at 9:30am. Reservations required one week in advance. Call 822-4319.

#### Disability Resource Centre

The Centre provides consultation and information for faculty members with students with disabilities. Guidebooks/services for student and faculty available. Call 822-5844.

#### Women Students' Office

Advocacy/personal counselling services available. Call 822-2415.

#### TOEFL Preparation

Jan. 18 through Mar. 10. ESL course. \$260 for an eight-week session. Auditorium Annex 221 from 7-9pm Tues/Thurs. evenings. Call 222-5208.

#### Duplicate Bridge

Informal game open to the public. \$2 person includes refresh-

ments. Wednesdays at the Faculty Club. Play begins at 7:30pm. Singles welcome but should arrive early to arrange partnerships. Call Steve Rettig at 822-4865.

#### French, Spanish, Japanese, Mandarin/Cantonese Conversation Classes

Ten-week sessions begin Sat. Jan. 22 (9:30am-12:30pm), Tues. Jan. 25 or Thurs. Jan. 27 (7-10pm) Buchanan D. Spanish immersion program in Costa Rica (Feb. 27-Mar. 19). Call Language Programs/Services, CCE at 222-5227.

#### Ergonomics Workshop

Beginning January, 1994. A Four Session Group Series: Problem Solving/Solutions/Brainstorming. Presented by Occupational Therapy Students. UBC Hospital. Times TBA. Call Lisa at 264-0305.

#### Depression/Sleep Study

Volunteers who suffer from both depression and sleep disturbances, age 18-55 required for study involving medication treatment. Honorarium. UBC Sleep Disorders Program. Call Carolyn at 822-7927.

#### Psychology Study In Parenting

Couples with a 5-11 yr. old son

are wanted for a study on parenting style. Families will be paid for participating. UBC Parenting Lab. Call 822-9037.

#### Clinical Research Support Group

Faculty of Medicine data analysts supporting clinical research. To arrange a consultation, call Laurel at 822-4530.

#### Psychology Cognition/Emotion Study

Seeking participants ages 21-60 for studies exploring the cognitive effects of emotions. Participation involves three 90 minute sessions spread over 1-2 weeks. Honorarium of \$30. Call Dawn Layzell/Dr. Eric Eich at 822-2022.

#### Drug Inter-Action Study

Volunteers at least 18 years required for participation in Pharmacology/Therapeutics study. Eligibility screening by appointment. Honorarium upon completion of study. Call 822-4270.

#### Statistical Consulting/Research Laboratory

SCARL is operated by the Dept. of Statistics to provide statistical advice to faculty/graduate students working on research problems. Call 822-4037.

#### Surplus Equipment Recycling Facility (SERF)

Disposal of all surplus items. Every Wednesday, 12-5pm. Task Force Bldg., 2352 Health Sciences Mall. Call Vince at 822-2582/Rich at 822-2813.

#### Sexual Harassment Office

Advisors are available to discuss questions or concerns and are prepared to help any member of the UBC community who is being sexually harassed find a satisfactory resolution. Call Margaretha Hoek at 822-6353.

#### Badminton Club

Faculty/Staff are welcome to join in the fun at the Robert Osborne Centre-Gym A. on Fridays now through Mar/94 from 6:30-8:30pm. Cost is \$15, plus library card. Call John at 822-6933.

#### Nitobe Garden

Open weekdays only from 10am-3pm. Call 822-6038.

#### Botanical Garden

Open daily from 11-5pm. Shop In The Garden. Call 822-4529.

## Universities team up to study sea lions

by Gavin Wilson

Staff writer

It's feeding time at the Vancouver Aquarium and five Steller sea lion pups are scrambling over each other, barking and bellowing for their turn at the bottle.

In the midst of this squirming chaos, UBC researcher Andrew Trites struggles to get blood samples, fat measurements and other growth indicators from the rambunctious pups.

Sea lion populations in the North Pacific are dropping at an alarming rate and Trites is part of the UBC-led North Pacific Universities Marine Mammal Research Consortium, which is trying to discover why.

These pups, captured off northern Vancouver Island, will be closely monitored as they grow and develop, enabling researchers to uncover facts about sea lion physiology not possible to glean in the wild.

But even studying captive sea lions is not easy. A handful now at the age of three months, they will soon grow into enormous adults. Males can reach three metres in length and weigh as much as 1,000 kilograms.

"We're trying to get as much information from them as possible because it's not likely we'll be able to repeat this type of study again," said Trites, who is director of the Marine Mammal Research Unit at UBC's Fisheries Centre.

Alaska, home to 75 per cent of the world's Steller sea lions, is where the population decline is most serious. Since 1980, the Alaskan population has fallen from 225,000 to 85,000 and is still plummeting. B.C.'s sea lion population is 7,200 and holding steady.

"By the mid-1980s it became apparent that something was seriously wrong in the North Pacific," Trites said. "Sea lions were disappearing from areas where they had once been numerous."

In response, U.S. authorities declared the Steller sea lion a threatened species and, fearing that commercial fishing was to blame for depleting fish stocks sea lions need for food, began to restrict commercial fishing in the Bering Sea and the Gulf of Alaska.

The move has sent shock waves through Alaska's billion-dollar fishing industry.

If sea lions are declared an endangered species, the industry could face further restrictions or complete fishing closures. This despite the fact that studies have not discounted other factors in their decline, including natural predators, toxic pollutants, environmental change, diseases and parasites.

"If the fishing industry is the cause, they want to know why," Trites said. "Is it the type of fish they catch, the location of the fishery, the time of year, the gear they use?"

To find out, the industry commissioned a \$400,000-a-year independent research program. UBC University Prof. Emeritus Peter Larkin was asked to put the consortium together. Other members include the University of Alaska, the University of Washington and Oregon State University.

"The consortium was our idea," Larkin said, "and it was an idea that appealed to the people supporting the research. Bringing together four universities allows us to draw on more talent and expertise than any one institution could muster."

Trites said there are three major aspects to the program.

The first involves monitoring the growth and eating habits of the five captive pups, who are now fed a formula specially developed for them with assistance from Sheila Innis, an associate professor of pediatrics.

Once they are weaned, they will be fed different types of fish to see how much food they need and whether they have



Gavin Wilson photo

**UBC researcher Andrew Trites, right, takes fat measurements from captive sea lion pups as a Vancouver Aquarium volunteer distracts them with a formula bottle. Trites is part of a team studying the pups' metabolism in an effort to discover why sea lion populations are in rapid decline in parts of the North Pacific.**

preferred fish species. Scientists also suspect that the calories from some fish are metabolized better than those from others.

The pups will be trained to breathe into a metabolic chamber so that their energy requirements and metabolic rates can be measured.

Researchers also hope to find techniques to pinpoint the seal lions' diet using blood and feces analysis.

"If we can find techniques that are proven to work with captive animals, we can apply them to animals in the wild," Trites said.

This will help researchers determine the quantities of various species of fish that wild sea lions are eating, information that will be used by U.S. officials in setting fisheries regulations.

The captive sea lions will be studied for five years, first at the Vancouver Aquarium's marine mammal research pool and then at the Bamfield Marine Station, before being returned to the wild.

A second part of the project involves studying sea lions in their natural envi-

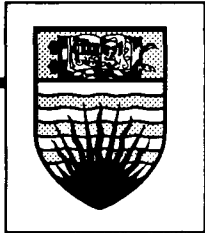
ronment at two Alaskan sites, a healthy colony on one island, and a declining one on another.

Graduate students will observe feeding behavior, analyze feces and use radio tagging to track the animals to sea to determine where and what they are feeding on.

The third component of the project is data analysis and lab studies. Ray Gosine, an assistant professor of Mechanical Engineering and holder of an NSERC chair in industrial automation, is overseeing attempts to automate the counting of sea lions using video images.

Eventually, researchers hope to expand the scope of the study to include harbour seals, killer whales and other species that are part of the same ecosystem.

"This project is in its early stages," Larkin said. "There are major changes occurring in the oceanography of the North Pacific associated with climate trends and we want to learn more about them."



# THE UNIVERSITY OF BRITISH COLUMBIA

## FINDINGS FROM AN ENVIRONMENTAL SCAN

### Disability Resource Centre



THE UNIVERSITY OF BRITISH COLUMBIA

January 13, 1994

Dear Colleague:

The Disability Resource Centre was established in 1991 to facilitate the full and self-directed participation of persons with disabilities in post-secondary education, particularly here at UBC. Since that time, the Centre has been working with the faculty, staff and administration at UBC towards the achievement of this goal. As part of this process, CS/RESORS Consulting Ltd. was commissioned to complete an environmental scan.

The following document, an Environmental Scan - UBC Faculty Survey, provides information on faculty awareness of activities of the Centre and of disability-related issues. The results of this survey will assist the University in developing new strategies to eliminate access barriers for students with disabilities.

Comments on the results of this study are invited. Please contact Ruth Warick, Director of the Disability Resource Centre, at 822-4677.

K.D. Srivastava  
Vice-President  
Student and Academic Services

*Presented to Disability Resource Centre, University of British Columbia, prepared by CS/RESORS Consulting Ltd.*

#### FINDINGS FROM AN ENVIRONMENTAL SCAN - U.B.C. Faculty Survey

##### I. INTRODUCTION

This report presents the findings of a survey of faculty and staff of the University of British Columbia regarding selected issues related to students with disabilities and the Disability Resource Centre. It was conducted to supplement the Environmental Scan - Directors of Student Services' Offices and DRC Staff completed by CS/RESORS Consulting Ltd., in August, 1992. Both studies were commissioned by the Centre.

The study was designed to obtain information and opinions regarding:

- the nature of faculty respondents' interactions with students with disabilities on campus
- the nature of respondents' interactions with the DRC
- the awareness of current types of classroom/laboratory accommodations for students with disabilities
- suggestions for future roles of both the DRC and the University in order for both to respond more effectively to students with disabilities

The respondents were a randomly selected sample from the over 2,100 current members of the Faculty Association of UBC. This approach was chosen over sampling all faculties or departments/schools within faculties, or stratifying the sample to reflect the proportions of students with disabilities within the various faculties. It was felt that this approach would yield information from a broad range of individuals and areas, representing those who have a great deal of contact and/or knowledge of the Centre as well as those who have not.

Letters of introduction (see Appendix I) were sent by the Vice President, Student and Academic Services and Vice President Academic and Provost to the random sample, comprising 190 faculty and staff (the latter mainly composed of librarians) and 25 heads of departments.

These letters explained the purpose of the survey and asked for their participation.

Interviews were conducted by telephone with a total of 122 individuals (109 faculty and staff and 13 department chairs) during March, 1993. (The list of interview questions is presented in Appendix II.) This represents 57% of the original sample, and 5% of the total number of Faculty Association members.

The information from the interviews contained some quantitative data, such as faculty position, primary responsibilities, and whether or not the respondent had any interaction with the Centre. This information was aggregated to form a series of frequency distributions. The qualitative data, made up primarily of respondents' perspectives of issues, was subjected to content analysis in order to determine commonalities and differences, and to note significant anecdotes. The findings of all respondent groups (faculty, staff, department chairs) are combined in this report because they do not differ from one another to any significant degree.

The survey was meant to be a snapshot of faculty perceptions about access issues for students with disabilities at UBC. It was not meant to be exhaustive or necessarily conclusive, but nonetheless useful in providing information for guiding the Centre and the University in fostering the participation of students with disabilities on campus.

##### II. FINDINGS OF THE SURVEY

The report on the findings is organized according to the major research questions explored in the interviews. A brief description of the types of respondents is presented first. This is followed by a discussion of respondents' experience with and knowledge of selected disability-related issues. Also discussed are findings involving respondents' interactions with the DRC and of any changes they have noted since its inception involving students with disabilities. The section ends with a summary of respondents' suggestions for priorities of both the DRC and the University for facilitating the full participation on campus of

persons with disabilities.

##### A. Respondent Profile

During March, 1993, a total of 122 interviews were completed. Table 1 indicates the proportion of respondents within the different faculties on campus, as well as the number of different departments or schools within those faculties that were represented. The largest proportion of respondents was from the Faculty of Arts (26%) and represented 18 of the 23 different departments or schools within that faculty. The second largest proportion of respondents was from the Faculty of Science (22%) and represented 10 of the 11 different Science departments. The only faculty from which there were no respondents was the Faculty of Dentistry.

Table 2 indicates the percentages of respondents in terms of the position(s) they currently hold at the University. Full professors made up the largest proportion of respondents (36%). The Other category included those who worked as librarians, library service coordinators, library publication coordinators and education program coordinators.

Table 3 (next page) shows the nature of the work respondents carry out at the University. The majority of department heads indicated their responsibilities included teaching, research, and administration. Teaching and research activities were indicated most often by other faculty members. Significantly smaller numbers of faculty indicated they had only teaching duties, or combinations of, for example, teaching and administration.

##### B. Respondents' Experience With and Knowledge of Disability-Related Issues

##### Departmental guidelines for students with disabilities

Almost half of the respondents (47%) were unsure about whether their department had formal guidelines for accommodating the needs of students with disabilities. Approximately 35% of the respondents indicated their departments did not have such guidelines, while the remaining 18% said their departments did have guidelines and/or that the department used those developed by the DRC (i.e., Teaching Students with Disabilities Guidebook).

While some faculties or departments have formal guidelines for students with disabilities, this fact was not consistently noted by all respondents from these particular faculties or departments. Those who indicated their faculty had guidelines were from Law (e.g., "...special elevators, power doors, schedule classrooms that are wheelchair accessible") and several departments within Science (e.g., "...formal, written policy developed....keep doorways open, make room for wheelchairs"), and from the Department of English (e.g., "...regular procedure for exam accommodations").

Ten respondents made reference to UBC's "general policy" regarding students with disabilities. Although the nature or details of this policy were not pursued during the interviews, it is presumed that respondents were referring to the state-

Table 1. Respondents' Faculty/Centre and Number of Departments/Schools within Faculties Represented in Sample

Faculty/Centre	Number of Different Departments/Schools Sampled	% of Total Survey Respondents
Arts	18	26
Science	10	22
Applied Science	6	12
Education	6	10
Medicine	4	7
Forestry	3	6
The University Library	1	5
Commerce and Business Administration	2	4
Law	1	3
Graduate Studies	1	2
Agricultural Sciences	1	2
Centre for Continuing Education	1	1
Pharmaceutical Sciences	1	1
TOTAL	55	101%*

\* Figures add to more than 100% due to rounding.

Table 2

Respondent's Position at UBC	% of Total Survey Respondents
Department Head	11
Professor	36
Associate Professor	20
Assistant Professor	20
Instructor/Sessional	7
Other	7





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ments contained in the UBC Calendar. Further, it was often stated that regardless of any specific formal or informal guidelines, respondents would handle all situations concerning students with disabilities on an ad hoc basis. For example:

"...no formal guidelines. If student needs wheelchair accessible classroom, an appropriate classroom would be chosen."

"Don't get many [students with disabilities]....Deal with on an ad hoc basis."

"Informal accommodations take place."

"Unwritten...try to accommodate these students where possible."

"We will deal with students on an individual basis."

Numerous respondents also commented that the Guidebook developed by the DRC was useful to them in understanding and responding to needs of students with disabilities. For example:

"I don't know if our department has guidelines, but I've read the [DRC's] Guidebook."

"The very existence of the DRC and the Guidebook has increased general awareness and sensitivity to disability issues."

"The Guidebook has been very beneficial."

### Experience in classes or other work with students with disabilities

Table 4 shows that over half of the respondents (56%) indicated they did not have any students who asked for disability-related special assistance or accommodations during the past two academic years. Of those that did, the majority had responsibilities covering both teaching and research or teaching, research, and administration.

Of those respondents who did have occasion to assist students with disabilities in one or more ways during this period of time, Table 5 (next page) shows that most interactions related to exam accommodations. Other accommodations often made involved having sign language interpreters in class and having students who used tape recorders during lectures.

Adaptations mentioned once by respondents included:

- assistance in obtaining funding;
- referring student to the DRC;
- extending deadlines for project;
- allowing for absences;
- modifying laboratory requirements;
- providing tape-recorded material;
- referring student to Crane Library and Resource Centre;
- assistance in preparing for exam; and
- adapting written material.

Fifty-seven per cent of those interviewed indicated that they were aware that other members of their faculty or department had assisted a student with a disability during the past two academic years. This assistance most often involved arranging for other formats for exams or exam times for students. Changing a classroom to accommodate mobility aids was another accommodation frequently indicated, as was permitting time extensions for both class assignments and examinations.

### Awareness of accommodations/modifications for students with disabilities at UBC

As indicated in Table 6 (next page), respondents most often indicated an aware-

Table 3

Nature of Respondent's Work	Total Number of Survey Respondents
<b>Department Head</b>	
Teaching/Research/Administration	11
Administration	1
Research/Administration	1
<b>Other Faculty</b>	
Teaching/Research	74
Teaching/Research/Administration	11
Teaching	12
Teaching/Administration	3
Teaching/Administration/Other	1
<b>Staff</b>	
Administration	4
Other	3
Administration/Other	1

Table 4. Interactions with Students with Disabilities Across Respondents' Responsibility Areas

Nature of Respondent's Work	Number Respondents	
	Interaction	No Interaction
<b>Department Head</b>		
Teaching/Research	2	9
Administration	0	1
Research/Administration	0	1
<b>Other Faculty</b>		
Teaching/Research	27	47
Teaching/Research/Administration	11	0
Teaching	5	7
Teaching/Administration	2	1
Teaching/Administration/Other	1	0
<b>Staff</b>		
Administration	4	0
Other	0	3
Administration/Other	1	0
<b>TOTAL</b>	<b>53</b>	<b>69</b>

ness of accommodations or modifications at UBC regarding mobility aids. Some of these modifications included: retro-fitting older buildings with ramps, elevators, washroom modifications, and widening of doorways and aisles. In addition, over half (35 of 60 individuals) of these particular respondents had at one time during the previous two years either a) relocated to classrooms that accommodated wheelchairs; b) supplied computers; or c) provided special exams.

Other types of accommodations or modifications also were noted. Several respondents commented that most students with visual and hearing impairments brought "their own solutions" to the lectures (e.g., sign language interpreters, note-takers, tape recorders, guide dogs).

Other faculty and staff respondents indicated they have sometimes accommodated students who have psychiatric disabilities or chronic diseases by referring the student to psychiatric counseling and allowing deadline extensions on course assignments and examinations.

Finally, when discussing learning disabilities with the respondents, the most common learning disorder they had encountered among students was dyslexia. Several faculty noted that this type of disability was most concerning because, according to one respondent, "so often it goes tragically undetected by both the student and [the faculty member], often needlessly short-circuiting the student's academic career."

### Barriers on campus

The majority of respondents (88%) felt the greatest barrier faced by students with disabilities at UBC was the inaccessibility by wheelchairs of buildings, classrooms, and washrooms. The vast layout of the campus was a close second, especially for those utilizing mobility aids. One example, cited by eight different survey participants, involved students in wheelchairs attempting to move from a lecture hall at one end of the campus to another lecture hall at the opposite end — in the ten minutes allotted between classes. Apparently, this is quite a feat for students without disabilities, let alone students with disabilities.

Another significant barrier mentioned by several respondents was the lack of awareness or education on campus about disability-related issues on campus. Some respondents commented that they thought there was a fair amount of literature about disability issues available for all those attending UBC (e.g., brochures and materials from the DRC, statements in the UBC calendar), but that much of it seems to go unnoticed. That is, people do not seem to be aware of disability issues unless they become directly involved in some way.

Further, a few respondents commented that a student's refusal to identify a disability (learning or otherwise) to the faculty or staff creates an unnecessary barrier. This lack of communication often leads to a frustrating relationship for both the professor and the student, especially if the disability could have

been accommodated easily.

Other barriers mentioned by respondents included:

- a lack of braille in the elevators;
- poor lighting and sound systems in lecture halls;
- heavy doors;
- lab tables that are too high;
- the heavy workload and rigid time frames for some courses;
- the degree of competitiveness common within certain departments;

and

- a lack of technology provided to the student with a disability (e.g., braille texts, portable computers, assistants).

### Suggestions for additional services/procedures

With few exceptions, respondents generally felt that UBC should continue its efforts to improve physical accessibility — to buildings, classrooms, laboratories, washrooms, and elevators. This was specifically suggested by 94% of respondents.

Some respondents (15%) suggested that the University should direct its efforts to increasing not only the awareness of disability issues throughout campus but to providing tangible solutions to many of the difficulties experienced by students with disabilities. A few of these respondents suggested that the most effective manner to accomplish this goal would be through the DRC developing workshops, seminars, and forums where people with and without disabilities could meet to bridge the often "unspoken gap" between the two groups.

Other respondents (25%) felt that a general sensitivity toward students with disabilities would go a long way in furthering the full participation of these students at UBC. This included awareness of the fact that some students with disabilities will complete their work and their university experience at a different pace than others students.

Further suggestions from respondents for UBC to give priority to included:

- increasing available technical assistance (i.e., note-takers, signers, mouth-operated computers, portable computers, braille texts, video-taped lectures and a large screen, public access catalog);
- providing adaptations to laboratory worktables (they tend to be too high for students in wheelchairs); and
- developing a comprehensive fire safety plan to assist people with disabilities in the event of an emergency.

### C. Respondents' Interactions and Perceptions Regarding the Disability Resource Centre

Virtually all of the survey respondents indicated an awareness of the DRC, although 77% have had no specific interaction with the DRC. Of the 23% who did have contact, most involved the DRC arranging special exams for students with disabilities. Other interactions included the Centre obtaining sign language interpreters, providing technical consultation for using assistive devices (e.g., FM radio system for students with hearing impairments), and outlining safety and evacuation procedures for persons with disabilities. Six respondents had attended a workshop or seminar hosted by the DRC. Each of these respondents said they had found such presentations both informative and professional.

Overall, respondents were generally positive about both their interaction with and



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the efforts of the DRC. Selected quotes from respondents illustrate this attitude:

- "We appreciate the DRC's efforts in raising the profile of disabled students."
- "The DRC is successfully assisting disabled students achieve self-esteem and self-believing systems that will see them through the many barriers that they will confront on a daily basis at UBC."
- "The DRC booklet is most valuable."
- "The DRC is doing a good job and needs to be complimented."
- "The DRC is providing services to assist faculty in understanding specific needs through their seminars and publications."
- "The President's office has been very good working in this area considering the financial problems UBC faces at large."

D. Changes on Campus Regarding Disability Issues

Approximately three-quarters of the respondents feel that the degree of awareness, sensitivity, and acceptance of persons with disabilities has significantly increased in recent years. Approximately 10% of the respondents mentioned that the existence of the Disability Resource Centre has gone a long way in increasing awareness and acceptance of students with disabilities, as has the presence of Rick Hansen on campus. Fifty-five percent thought that attitude changes at UBC reflect an overall increase in the awareness of society in general. They believe that even though there have been positive steps taken to ensure greater integration of students with disabilities at UBC, much more remains to be done.

One-quarter of the respondents appeared to be more sceptical of the attitude change of those without disabilities and feel that much of the apparent acceptance is superficial. Some commented that students with disabilities are often quite invisible to the majority of the UBC population.

While most respondents agreed that physical accessibility on campus was certainly improving, just under one-third thought these changes were not happening quickly enough. It was mentioned, for example, that the older buildings are virtually inaccessible to most students with disabilities, especially above the first floors. Another example was that the Main Library is inaccessible from the front for persons using wheelchairs. Despite this, respondents noted that many buildings have actually been retro-fitted with ramps, automatic doors and elevators, and newer buildings are required to be more accessible to people with disabilities. Outside, curbs have been lowered for easier and safer travelling by those using mobility aids, and numerous parking spots have now been designated for the persons with disabilities.

Other than the Disability Resource Centre's Teaching Students With Disabilities Guidebook and various bulletins and notices, the respondents did not feel that there was any significant increase in official actions or regulations vis-a-vis disability issues and persons with disabilities. Again, most adaptations to procedures made by faculty while dealing with students with disabilities are informal and handled on an individual basis.

E. Suggestions for Future Directions Regarding Disability Issues

University priorities

Respondents were unanimous in citing

Table 5

Types of Interactions Between Respondents and Students with Disabilities	Number of Respondents
Monitoring exam (at Crane Library or DRC)	8
Extra exam time	8
Rescheduling of exam(s)	5
Use of sign language interpreter	5
Use of tape recorder	5
Modification of exam(s)	5
Individual assistance/tutoring	4
Special written material	3
Use of FM system	3
Use of overhead projector	2
Presence of guide dog for blind students	2

Table 6. Awareness of Modifications/Accommodations Available for Students With Disabilities at UBC

Type of Disability	Number of Respondents
Mobility/Dexterity	60
Chronic Illness	35
Visual	33
Learning	33
Deaf and Hard of Hearing	31
Psychiatric	26

increasing physical accessibility as UBC's number one priority. Second to access was an increase in education regarding disability-related issues for faculty, staff, and students at large. Several (7%) suggested that the University link up with those at the Disability Resource Centre to develop workshops, seminars, and forums where both people with and without disabilities could meet to discuss concerns and solutions.

Three survey participants would like to see the University commit itself to providing additional technological support for students with disabilities, especially those who have visual and/or hearing impairments. They feel that it is these students who are likely to have the most difficulty in the academic environment on campus.

Several respondents also suggested that the University:

- clarify fire safety procedures for people with disabilities;
- improve the lighting and sound quality in lecture theatres;
- supply the Disability Resource Centre with additional funds for research purposes;
- supply sign language interpreters and braille texts; and
- undertake a comprehensive needs assessment for students with disabilities to truly understand the exact nature of the barriers faced by these students each day at UBC.

Finally, it was suggested by two faculty members that UBC develop an advertising campaign that would encourage secondary school students with disabilities to attend university. The message should note that sometimes the only real barrier standing between the student with dis-

abilities and an academic education might be the student's own perception of their potential being limited.

Three respondents, however, expressed some concerns about the degree of the University's commitment to the DRC and to students with disabilities:

- "Perhaps there is a disproportionate investment in these people [students with disabilities] already."
- "People with disabilities should have access to the same education but not if that means severely limiting the activities of the abled."

Priorities for the Disability Resource Centre

Just over 75% of those interviewed felt the roles played by the DRC should be that of mediator (between students with disabilities and faculty), advocate, and educator. Approximately 10% of respondents indicated that the DRC is in a prime position to raise awareness throughout UBC by the development of

workshops and seminars, and the dissemination of up-to-date literature. Often, too, respondents commented that they see the DRC as a problem solver in offering faculty members tangible options to help overcome the barriers faced by a student with a disability.

In addition, some respondents suggested that the DRC could provide emotional support and guidance to students with disabilities who may be finding the integration process difficult. Other respondents felt the DRC could play a role in encouraging students to inform their faculty or department about any disabilities in order to facilitate assistance.

Other activities for the DRC suggested by respondents included:

- carrying out a needs assessment of persons with disabilities at UBC;
- identifying new technology to assist those with specific disabilities (in other words, staying on the leading edge of technology);
- monitoring the environment of acceptance, sensitivity and awareness throughout UBC;
- enrolling volunteers to assist students with disabilities on campus; and
- continuing to facilitate, help and promote a supportive environment for those disabled students studying at UBC.

III. SUMMARY

Survey participants appeared to be generally knowledgeable about and sensitive to the needs of students with disabilities, while not always aware of specific programs and services. Although the majority of respondents had not had any such students in their classrooms or offices, they indicated an overall awareness of what accommodations were available and how to go about obtaining them.

The issue that most often appeared in interviews with survey participants, regardless of the particular focus of the question, involved physical accessibility. For example, respondents frequently noted an awareness of changes that have occurred in many buildings on campus, as well as the many barriers that still exist. In addition, the majority of these interactions involved physical access issues, such as changing classrooms to accommodate a wheelchair or arranging an adapted exam. Further, increasing physical accessibility was the issue suggested as the highest priority for University action related to people with disabilities.

This survey of UBC faculty was the first such study conducted by the Centre, and as such will provide a useful baseline of information on faculty and staff awareness of the activities of the DRC and of disability-related issues. As mentioned at the beginning of the report, the study was not meant to be exhaustive or statistically representative of the University's faculty, but simply to provide a brief picture of the general knowledge environment regarding disability issues in which the DRC is operating.

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### Miscellaneous

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Those with access to Internet will be able to find general information on the author, book price, number of pages, number of illustrations, and reviewers' comments.

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For more information on this service call 822-4546.

## People

by staff writers

Oceanography Prof. **Tim Parsons** is the winner of the G. Evelyn Hutchinson Medal from the American Society of Limnology and Oceanography.

Parsons received the award in recognition of a career spanning many aspects of oceanography.

In his research, he has tried to make ecology predictable by finding and accurately measuring parameters to describe the relationships between organisms.

During his career he has influenced some of the major changes that have occurred in the theory, practice and education of oceanography.



Parsons

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**Bernard Bressler**, head of the Dept. of Anatomy, has been named a director of the Medical Research Council's (MRC) newly formed regional network.

A one-year pilot project, the network was created to strengthen links between the MRC and the health research community.

Bressler joined UBC in 1976 and served as associate dean of research and graduate studies in the Faculty of Medicine between 1987 and 1990 and as associate vice-president, research (health sciences) for the past three years.

His areas of research include the biophysical and structural alterations of skeletal muscle in neuromuscular disorders such as Muscular Dystrophy.

• • • • •

Honours Political Science student **Laurel Baig**, 22, is the winner of a Rhodes Scholarship for British Columbia. The 1993 Wesbrook Scholar will use the award to study law at Oxford University starting in September.

Raised in Ontario, Baig is one of 19 B.C. students who applied for the scholarship and among 11 recipients from across the country. Each winner has travel and study expenses paid for two years with an option for a third year.

In 1990, Baig transferred to UBC's political science department from a general science program at the University of Ottawa. As part of UBC's Education Abroad Program, she is spending the current academic year at the Chinese University of Hong Kong studying Mandarin. While overseas, she also volunteers as an intern and research assistant at Asia Watch, a division of Human Rights Watch.

An accomplished athlete, Baig has been a competitive cyclist at the provincial and national levels. She has also been a member of UBC's varsity rowing and cross-country skiing teams and actively involved in theatre.

• • • • •

Mechanical Engineering Prof. **Clarence de Silva** has been chosen to chair the Expert Systems and Artificial Intelligence Committee of the Dynamic Systems and Control Division, American Society of Mechanical Engineers (ASME). He is the first person to serve in the position from outside the United States.

De Silva is chair of the B.C. section of the ASME and is also chair of the Control Systems Society of the Vancouver section of the Institute of Electrical and Electronic Engineers.

He is also the Natural Sciences and Engineering Research Council Professor of Industrial Automation in the Dept. of Mechanical Engineering.



de Silva

• • • • •

Ophthalmology Prof. **Max Cynader** has been named to the eighth annual Maclean's Honour Roll, a salute to extraordinary Canadian achievers by the nation's weekly news magazine.

Cynader was cited for helping to unlock the secrets of the human brain. He is internationally renowned for his research on how the brain processes visual and auditory information. Cynader is currently searching to identify the genes that induce the brain to learn and to copy their effect.

Robert Lewis, editor of Maclean's, said that the honour roll was chosen by a panel of the magazine's editors who focused on the singular acts of men and women working away from the spotlight to better the lot of others.

• • • • •

**Keith Bowler**, director of Purchasing, was recently elected president of the Canadian Business Travel Association (CBTA).

The CBTA is dedicated to improving the standards of transportation, accommodation and travel-related services for the business traveller.

Bowler, who joined UBC in 1987, also serves as a board member of the International Business Travel Association, a leading advocate of passenger safety and improvement of the global air transportation system.

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## Profile

# Susan Kieffer

## Looking below the surface

by Gavin Wilson

Staff writer

When people ask Geological Sciences Head Susan Kieffer how she first became interested in scientific research, she often tells the story of a "slimy old ditch" in rural Pennsylvania.

As a young girl she passed by the ditch every day on the way to school. She'd stop by to probe its depths with her hand or the nearest stick, but could never reach the bottom. One day her innate curiosity got the better of her — and in she jumped.

"It never occurred to me that I probably shouldn't be wearing my best dress and brand new shoes when I did this," she says now. "Whatever I found at the bottom of that ditch was very benign compared to what I found when I got home."

The curiosity and risk-taking Kieffer showed at an early age has stayed with her, propelling an unorthodox, but highly successful, research career that recently brought her to UBC from Arizona State University, Tempe.

A geological fluid dynamicist, she is noted for her work on large and rare geological events such as river floods, meteorite impacts and volcanic eruptions from Mount St. Helens to the moons of Neptune and Jupiter.

"My world," she says, "is a world of boiling water and nasty, rock-laden gases."

A woman in the macho domain of miners, and a theoretician in a field as practical as a pickaxe, Kieffer has always been a bit of an outsider, despite many years spent in experimental laboratories and in the field. Her theoretical bent has forced her to take chances and make intuitive leaps of logic.

In the early '60s, when Doris Day and June Cleaver were the paragons of womanhood, Kieffer was studying to be an astronaut. There was one small problem: NASA only hired men with military backgrounds. Her dream, however, did lead to a summer job at the Goddard Space Centre and a graduate degree in geology and planetary sciences from Cal Tech.

It was while doing her PhD thesis on Arizona's Meteor Crater that her supervisor got her interested in the fluid mechanics of volcanoes, a field in which she had no expertise.

Later, while an assistant professor of geology at UCLA, Kieffer found her entree into vulcanology in an unusual place — Ansel Adams' famous photo of the Old Faithful geyser in Yellowstone National Park.

In the play of light and dark in the photo she recognized surges in the geyser's plume of boiling water and steam. Her early training as a musician told her that the conduit was acting like an organ pipe and the surges reflected the conduit's resonances.

"At that instant, I realized that I could study volcanoes and volcanic processes without knowing a thing about rocks," she said.

Undeterred by a lack of credentials in fluid dynamics or vulcanology, she packed up her car one summer and



Martin Dee photo

"My world is a world of boiling water and nasty, rock-laden gases."  
- Susan Kieffer

drove to Yellowstone. With her nine-year-old son acting as a research assistant, she started gathering data by filming Old Faithful's eruptions with a super-8 movie camera.

"Unfortunately, I soon found that, like that Pennsylvania ditch, the most interesting things were happening below the surface."

Undeterred, Kieffer learned some seismology and lowered instruments and cameras deep into the geyser's conduit.

There were setbacks — she broke a leg slipping on black ice, and her attempts to get samples from the plume of boiling water that roared out of the ground at 250 kilometres an hour bordered on slapstick — but her work paid off with major insights and opportunities.

Based on her work at Old Faithful, NASA scientists invited her to work on

a thermodynamic theory for geyser and volcanic eruptions elsewhere in the solar system. The Voyager spacecraft had just discovered huge volcanic plumes on Io, one of Jupiter's moons. This study, and another conducted 10 years later when Voyager observed eruptions on Neptune's moon, Triton, gave an interplanetary perspective that changed the way volcanoes are defined.

Her next chance to observe a volcano was a little closer to home. In the spring of 1980, an obscure mountain in Washington State — Mount St. Helens — had started a series of small eruptions. Within hours, Kieffer was on a plane, super-8 camera in hand.

Prohibited from joining the official group of geologists, Kieffer found her own observation site. She drove a rented car through a snowstorm and set up camp in the darkness. The next

morning, her temerity was rewarded.

Kieffer awoke to the sound of thunder, although the sun shone brightly. She wriggled out of her sleeping bag and emerged from the tent. Before her, lightning flashed in a huge column of dust and ash that billowed from the mountain.

"There was lots of yelling and screaming and thanking the volcano gods. It was a joyous and fulfilling experience to see a volcano erupting," she said.

The euphoria turned to awe and then to distress with the gargantuan blast that blew the mountain apart on May 18, 1980, killing 60 people and causing widespread devastation. The campsite she had left just six weeks earlier lay buried under several metres of ash.

What exactly had happened inside that massive maelstrom of ash and rock that caused such cataclysmic destruction? Kieffer believed the pattern of the trees on the ground, blown over like matchsticks for hundreds of square kilometres, held the key.

She spent months doing fieldwork and poring over aerial photos of the region, studying the patterns of fallen trees, trying to decipher what she calls "the counter-intuitive world of super-sonic plumes."

Kieffer's next major project was investigating river hydraulics in the Grand Canyon, where a six-metre standing wave in the Colorado River had become a hazard to boating. She believed that the wave was not caused by a boulder, as was widely believed, but had more in common with the fluid dynamics of the Mount St. Helens explosion. Her hunch proved right.

Kieffer's research has earned her major awards and honours over the years, including the Spenidiarov Award from the USSR Academy of Sciences and the Day Medal from the Geological Society of America. She is also one of about only 150 geologists invited to become members of the National Academy of Sciences and fellows of the American Academy of Arts and Sciences.

At UBC, Kieffer intends to set up a computing and visualization lab to continue research into the role of fluids in heat and mass transfer in the crust of the Earth and on other planets.

She is delighted to be heading a department filled with young, enthusiastic faculty members and to join the large community of fellow earth scientists who work at UBC and in Vancouver.

It is an exciting, challenging time to be a geologist, she says.

"The context of geology is changing rapidly. In the past, society demanded that we help develop resources and offer protection from local hazards. Now, as well as meeting those demands, our role as geologists is in the larger global context of saving the earth as a habitable planet.

"B.C. is a microcosm of these global changes. It has a combination of the minerals we need to sustain economic growth and a spectacular environment that people want to see conserved. It is a fantastic challenge."