
LAKEHEAD RESEARCH
EXPLORE
Lakehead
UNIVERSITY

LAKEHEAD RESEARCH. EXPLORE.

# VICE-PRESIDENT'S **MESSAGE**

The research activities described in these pages are a testament to Lakehead's growing commitment to become one of the top 25 research-intensive universities in Canada. With 7 Canada Research Chairs, 10 research centres, 31 graduate programs, and a doubling of external research funding within the last few years, Lakehead's sustained development in this area is clear. However, it is the research endeavours themselves that create the framework that will support our vision of becoming a global research leader: the people, the resources, and the partnerships that make up research at Lakehead.


RUI WANG

## PEOPLE

Lakehead's researchers conduct innovative, cutting-edge research. They are leaders in many selected areas, and our intimate campus community makes collaboration across disciplines second nature. It also means that graduate students here at Lakehead receive excellent supervision, learn to master new technologies and instruments, and quickly develop independent research careers.

## RESOURCES

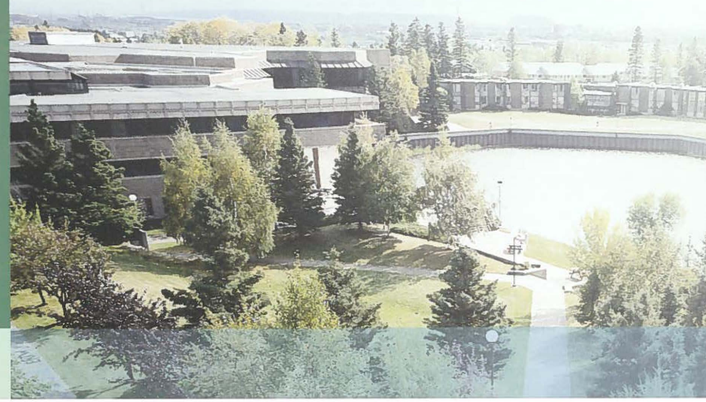
Lakehead has developed a strategic way to better leverage its state-of-the-art equipment through a multi-purpose, centralized instrumentation lab. The benefits to a smaller school are clear: universal access, reduced redundancy, and greater collaboration.

Initiatives like this, combined with our diverse natural environment and proximity to northern and rural cultures and communities, have made us a leader in core research areas like environmental sustainability. While many universities focus on the environment, few engage in research activities that cover the environmental continuum with the strength Lakehead does – from prevention to monitoring, remediation, and preservation.

## PARTNERSHIP

Comprehensive research cannot unfold in an ivory tower. Accordingly, we form innovative and productive research partnerships with industry and government, and integrate with the local and broader communities we serve.

The research successes in the pages that follow detail these efforts. From theory to practical application, the resultant innovative discoveries improve everyday life in Canada and around the world and respond to partners' needs. I encourage you to read on and explore research at Lakehead.

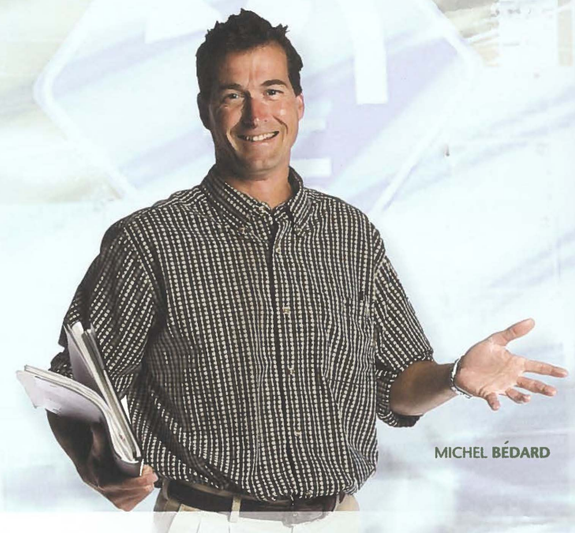


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# ENRICHING THE LIVES OF AN AGING POPULATION

Lakehead researcher Michel Bédard was named the Canada Research Chair in Aging and Health because of his leading work on the maintenance of independence and quality of life for older adults. Bédard examines issues in this area as they relate to driving and family caregiving – work that has earned him a Premier's Research Excellence Award from the Ontario Ministry of Energy, Science and Technology.

As the Director of the Masters of Public Health Program at Lakehead, Bédard's research is applied in nature. He examines risk factors for crashes, and develops strategies such as retraining and the introduction of new technologies to help drivers remain safe longer. He also measures the impact that caregiving has on a family's quality of life, and seeks to minimize the negative psychological and health consequences that the burden presents.


MICHEL BÉDARD

# LEADERSHIP

## LEADING THE WAY TO INTEGRATED RESOURCE MANAGEMENT


ELLIE PREPAS

Ellie Prepas conducts freshwater research. In collaboration with its major industry partner, Millar Western Forest Products Ltd., her research team focuses on watershed processes that influence water quality. As the Canada Research Chair in Sustainable Water Management and the Boreal Forest, Prepas guides the development of models for use as planning tools by forest industries and provides data to regulators pertaining to landscape planning in the Canadian Boreal Forest. Her academic partners in this endeavour are from the Universities of Alberta and Saskatchewan.

She and her team, including undergraduate, masters, and doctoral students, use experimental sites to get good baseline data, apply controlled disturbances, and monitor ecosystem changes, and make reasonable projections about how these watershed systems work. The next step is linking projections to the industrial process via models to predict, for example, streamflow and water quality conditions after given harvest patterns are employed.

Overall, the goal is to improve management of forested areas in Canada. Working towards integrated resource management that considers roads, oil and gas, mining, and forestry, demonstrates that Canada is a leader in research-based forest planning, and increases the economic benefit to Canadian forest product industries.

LEARNING 2

# LEVERAGING THE **BEST** FROM THE **BEST**

Pete Hollings is one of Canada's outstanding young researchers in the Earth Sciences because he believes in creating front-line opportunities for his grad students.

In 2004 Geoff Heggie, one of those students, helped discover new resources in a platinum deposit that resulted in up to $7 million dollars of new investment in East West Resource Corporation's Seagull Intrusion near Lake Nipigon.

"You get the best results when your students are truly colleagues," says Hollings, who focuses on passing on sound research methodologies and practices to his students.

Heggie exhaustively analyzed, identified, and categorized the rock samples with a level of detail unattainable by East West, and developed a sophisticated predictive model of where mineral deposits might lie.

Heggie was one of a team named Prospector of the Year by the Northwestern Ontario Prospectors Association for his accomplishments. Hollings is pleased with Heggie's successes and points out that like his other students, Heggie benefited from a close working relationship with his industrial partners. The East West Resource Corporation was apparently pleased as well – Heggie now works for them as a staff geologist.



PETE HOLLINGS

# BUILDING PARTNERSHIP FROM THE GROUND UP



CONSTANCE RUSSELL

Assessing the benefits and challenges of school ground greening was an important part of Janet Dyment's doctoral research. Working with Lakehead scholar Constance Russell, Dyment teamed up with the Evergreen Foundation and the Toronto District School Board to facilitate her research. Her published report, *Gaining Ground*, has become a powerful tool to better understand the benefits of schoolyard naturalization, and to secure more funding to help make school playgrounds greener.

Russell, co-editor of the Canadian Journal of Environmental Education, works closely with her three doctoral students and 10 masters students, placing a high priority on their involvement in front-line work – participating in conferences and seminars as well as writing and publishing with her.

Russell asserts that she learns as much from her students as they do from her, and believes their truly collaborative experience is a great aid to her students' career development. After her Evergreen success, Dyment headed to the University of Tasmania where she is now a senior lecturer.



JOANNE ZAMPARO

# FINDING **ANSWERS** TOGETHER

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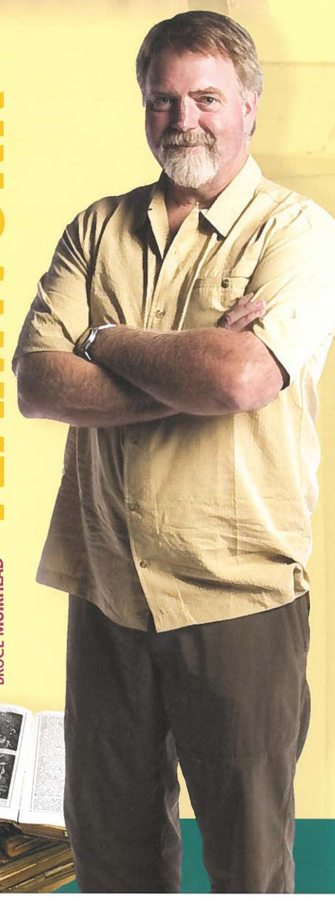
Joanne Zamparo is thrilled with the home she has found at Lakehead for her research on Inuit family kinship and well-being. "It's a collaborative environment," says Zamparo, "where it's easier to work together because of common interests and a real will to cooperate."

The Centre for Northern and Rural Health Research at Lakehead brings together researchers from across disciplines in order to better support colleagues' research, win competitions for grants, and share discoveries. Part of Zamparo's long-time work in the north was a partnership of researchers and two Inuit organizations brought together by the Centre. The team worked together to document Inuit traditional knowledge and incorporate it into the health policies and programs of the Nunavut government.

Currently Zamparo is working with fellow Lakehead researcher Margaret Johnston from Outdoor Recreation, Parks and Tourism on the 2007 Canada Winter Games. The team is looking at volunteer motivation, experiences and contributions, and opportunities for sustainable social capital in Whitehorse, Yukon – site of the Games. They aim to determine volunteering benefits in the community before and after the games, what peoples' hopes and aspirations are for the games, and what kind of legacy a special event like this can possibly leave behind.

Zamparo lauds her colleagues' expertise, their interest in the North and their relationship with it, and the capacity to grow their common knowledge base when they work together. The spirit of teamwork, she says, is alive and well.

TEAMWORK



BRUCE MUIRHEAD

# MAKING **RESEARCH** MEANINGFUL

Lakehead researcher and award-winning author Bruce Muirhead collaborates with students in a way that makes research part of everyday life.

Currently on a SSHRC (Social Sciences and Humanities Research Council) grant tracing the history of Canada's post-war overseas development assistance, Muirhead identifies support for graduate students as one of the pillars of a strong research community.

He feels that graduate students in the History department at Lakehead get one-on-one time they might not get at other institutions. He and his students talk everyday about the challenges they are facing and the common connections in their work – sometimes just over coffee. He currently supervises two students: one on an Ontario Graduate Scholarship studying Canada's wheat aid to India, and the other on a SSHRC grant studying the context and influence of a recent Safeway strike in Thunder Bay.

Muirhead is unequivocal. "I find the interaction with students most compelling. There are so many common themes in our work. I'm able to support them and they push and motivate me in all sorts of ways."

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WORLD-CLASS NEW KNOWLEDGE



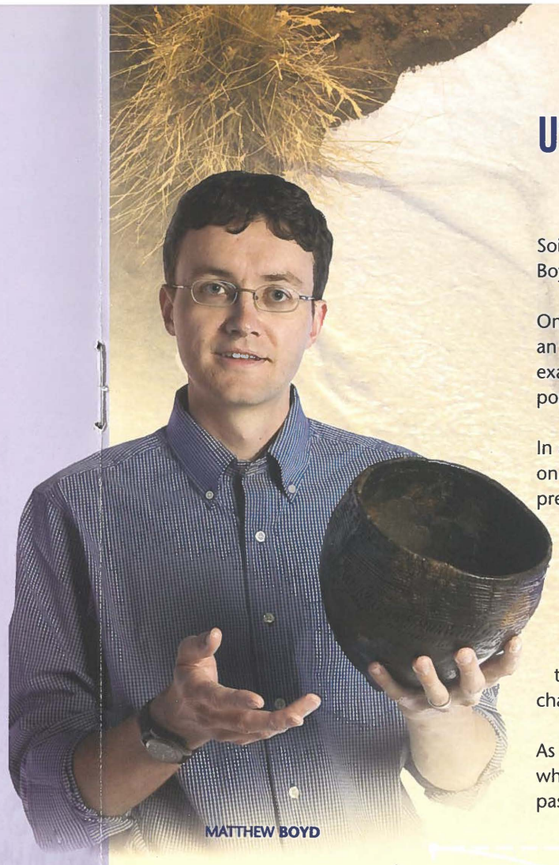
AICHENG CHEN

## SOLVING **BIG** PROBLEMS WITH **TINY SOLUTIONS**

Super hydrophobic tin oxide nanoporous flowers with a high surface-to-volume ratio fabricated by Chen's research team are extremely promising for a new class of gas sensor. Aicheng Chen is a leading expert in the art and science of creating such well-defined and precisely controlled nanostructured materials. He was awarded an Ontario Premier's Research Excellence Award in 2003.

Chen has secured over $1 million dollars in funding since arriving at Lakehead in 2002 – from NSERC, FedNor, the Canada Foundation for Innovation, and the Ontario Innovation Trust to establish a state-of-the-art electrochemistry lab at Lakehead.

The nanomaterials he builds aid in the integrated management of energy and the environment, encompassing some of the major issues in green chemistry and materials that are critical to the mining and pulp and paper industries and to the sustainable development of natural resources in Canada. He is undertaking his work with industrial partners like Bowater and Inco who value his proven ability to develop new innovations – from initial concept to real-world application.



MATTHEW BOYD

## USING **THE PAST** TO UNDERSTAND **THE FUTURE**

Soil studies may not be intuitively connected to climate change, but Matthew Boyd is revealing how human history is encoded in the sediment itself.

One of the few researchers operating with both NSERC and SSHRC funding – an indication of how much true crossover potential lies in his work – Boyd examines drill cores and archaeological artifacts to discover how human populations adapted to environmental change in the ancient world.

In a country that faces frequent drought on its prairies, Boyd's research on historical climate/vegetation patterns could help Canada build valuable predictive models for the future.

Although the comparison operates only on the level of historical analog, he has demonstrated that ancient Aboriginal populations had a well-developed understanding of how some regions underwent major geomorphic changes while others experienced virtually none. In contrast to European settlements – which remained tied to the land they deemed most fertile no matter the cost – these populations sought and found stability in the face of rapid climatic changes.

As human society faces the environmental challenges of the twenty-first century, what better way to prepare than to intimately understand the challenges of the past?

## DETECTING **DISEASE EARLY** WITH **NON-INVASIVE TECHNIQUES**

Brian Ross is investigating the potential for identifying a range of deadly diseases with simple, fast, and inexpensive breath tests.

Ross is putting his background in nutrition, psychology, and pharmacology to work at Lakehead's new Northern Ontario School of Medicine – using its new state-of-the-art labs, while also taking advantage of Lakehead's multi-purpose, centralized instrumentation lab.

The non-invasive technology he is working on relies on the SIFT–MS, which in only half a minute can identify individual disease markers at incredibly low concentrations. The same cutting-edge technology is being used to quickly identify bacteria in blood; find patients in intensive care that are at risk of kidney failure; determine exposure levels to volatile chemicals in the workplace; and find hidden explosives.

"The fact of the matter is that healthy people just don't get tested," says Ross, "and that's a problem." This might change with a process that allows non-invasive monitoring of body bio-chemistry, and can detect early warning signs for cancer, pneumonia, or diabetes in a single puff of human breath. Its speed and convenience mean that people could be easily tested before they're ill – increasing their chance of survival and decreasing the cost and discomfort of other testing methods.



BRIAN ROSS

## DEFINING **CONTEMPORARY LAWS** USING **HISTORICAL PERSPECTIVE**

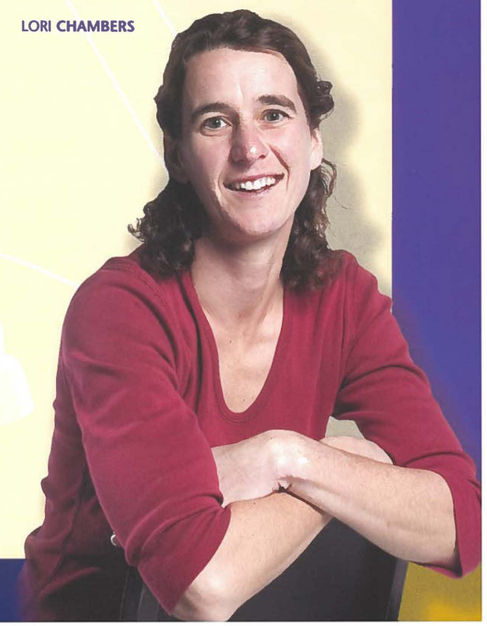
Lori Chambers is conducting the most exhaustive historical inventory of legal definitions of legitimacy and cohabitation ever undertaken in Canada.

Chambers feels the current rapid and controversial change in Canada's marriage laws lacks a true understanding of the underlying issues that have made such reform necessary. "A narrow focus on the redefinition of marriage is coming at the expense of looking at the wider issue of the nature of domestic partnership and what it means to become interdependent – for both sexes."

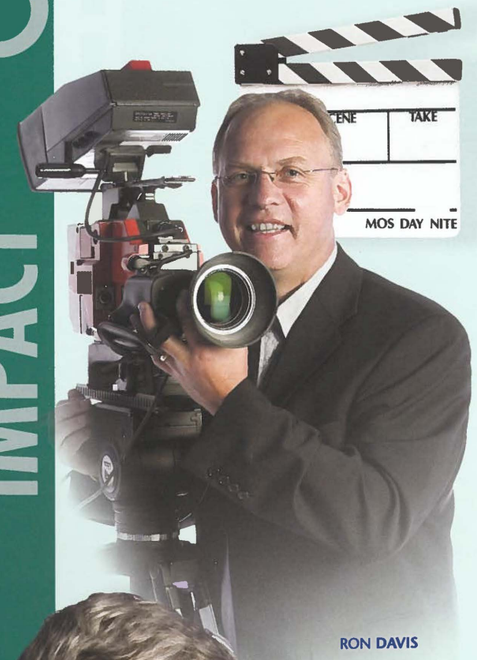
Beginning with the late nineteenth century, Chambers is looking at every piece of legislation to deal with cohabiting couples. She has found wide variations and many contradictions, and is concerned that such discrepancies can place families – particularly women and children – in tenuous legal positions.

Chambers' assertion is simple – in order to formulate current law reform that will affect our everyday lives, we need to understand the mistakes and problems imbedded in earlier legislation. In other words, a little perspective goes a long way.

LORI CHAMBERS



IMPACT




RON DAVIS

# PROMOTING **HEALTHY CHOICES** FOR YOUNG WOMEN

Ron Davis is tying the science of psychology to the very real world of young women at high risk for eating disorders.

Funded by the Ontario Ministry of Health, he's developing a therapeutic video program targeted at promoting healthy lifestyle choices among young women with regard to body image, physical activity, and eating behaviours.

Teens and young adults are often disenfranchised from receiving the psychological help they need, but this problem is exacerbated in a geographically expansive province like Ontario.

To address this, Davis' applied research program takes therapeutic help directly to young people where they spend their time: high schools, colleges, and universities.

"It's simply not practical to duplicate in smaller communities the full range of health care resources that are available in larger centres," Davis reflects. "So let's put the video in the hands of clinicians that are already there, to empower them to help, and help quickly. That's what continues to drive my enthusiasm for this research."



PETER LEE

# USING **NATURE** TO HELP PROTECT **NATURE**

Peter Lee, head of the Lakehead University Environmental Laboratory and the Aquatic Toxicology Research Centre, keeps Northwestern Ontario's water clean, and its primary industries running.

Identifying and reducing the potential toxic effects caused by industrial effluent may be required by Environment Canada – but it's expected by the population.

Lee and his team develop early-warning toxicological identification and evaluation (TIE) procedures for the pulp and paper and mining sectors – the largest industries in the region.

"We're seen as a key technical resource here in Northwestern Ontario," says Lee. Companies like Bowater, Inmet Mining, Rocksmark, Barrick Gold, US Steel, and Abitibi are or have all been clients of the Centre.

One of Lee's grad students is working on a particularly innovative system that places an organism – in this case a fish – between two small electrodes and measures its physiological response to an effluent. As the effluent passes through, the output reveals whether or not the fish coughs.

TIE methods like this are the first of their kind in Canada, and will be made available commercially in conjunction with the Pulp and Paper Research Institute of Canada in 2006.

# GETTING MORE OUT OF OUR **FOREST** RESOURCES

In a Canadian lumber industry faced with unprecedented international competition, some companies are becoming innovative leaders with the help of Lakehead's Mathew Leitch.

Thunder Bay-based Superior Thermowood is using the Lakehead Wood Science Testing Facility (LUWSTF) to test the properties of lumber fired in its unique kiln process. The process adds value to under-utilized tree species by improving aesthetic and physical properties.

These properties are precisely measured by Leitch and a state-of-the-art universal wood testing machine to discover what end-use products the altered wood will be suitable for.

"Superior Thermowood, like many companies, looks to Lakehead for answers to complex project problems," says Leitch. For him, it's all part of a wider Centre for Analytical Services' mindset. He stresses, though, that finding good answers for partners is only the beginning. The process gives his students more direct experience, improves the quality and currency of the LUWSTF, and brings unique insight to the forest industry as a whole.

"Canada has to start looking closely at better resource utilization," says Leitch. Extensive property testing can segregate logs based on physical and mechanical properties – using half the tree for one product, and another half for another. This better utilization leads to greater efficiency, and eases pressure on forest resources. What country – or company – wouldn't want to cut less wood to make more money?



MATHEW LEITCH

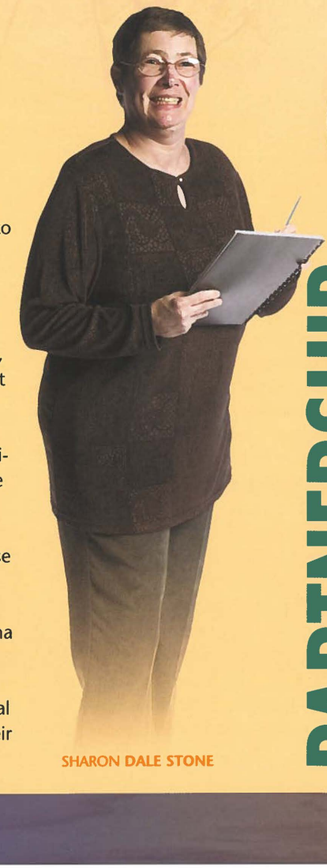
# MEETING THE NEEDS OF INJURED WORKERS

Sharon Dale Stone works with community organizations to help those with disabilities understand they're not alone.

She partnered with the injured workers community in Northwestern Ontario through the Canadian Injured Workers Alliance, the Ontario Network of Injured Workers, and the Thunder Bay and District Injured Workers Support Group to produce informational brochures and booklets.

The access to the well-organized injured worker communities allowed for in-depth interviews and surveys, and wide dissemination of the resulting literature. The partnership is helping medical and rehabilitation professionals – and workers themselves – better understand the needs of those who have been left with residual disability.

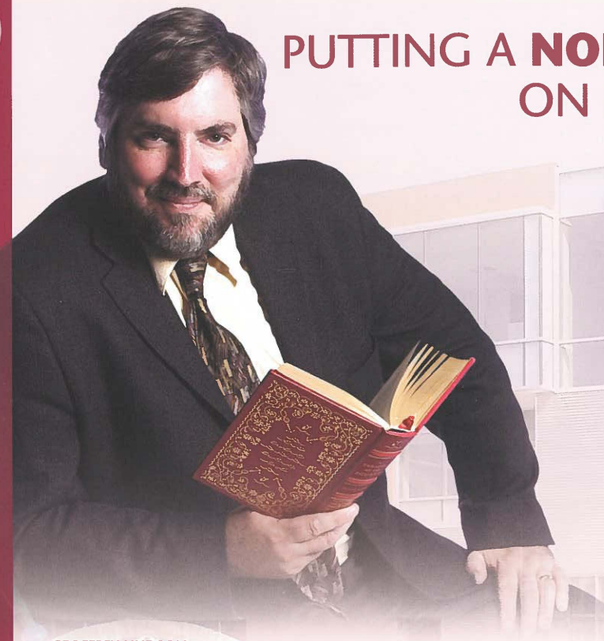
Stone has learned that the best way to confront the stigma often faced by injured workers is for them to learn about the experience from those who have already faced it – to know that it's not uncommon to be treated as a peripheral part of the community when injured, and that it's not their fault.



SHARON DALE STONE

PARTNERSHIP

# PUTTING A **NORTHERN PERSPECTIVE** ON **NORTHERN MEDICINE**



GEOFFREY **HUDSON**

The Northern Ontario School of Medicine is the first new medical school in Ontario in over three decades, and the first one specifically created to respond to the difficulties and challenges of practicing medicine in northern Ontario.

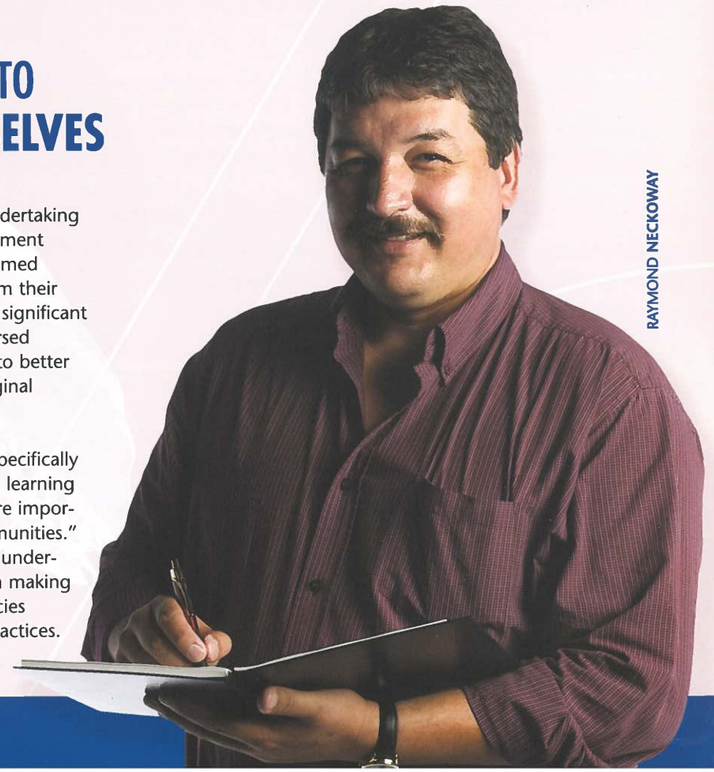
Geoffrey Hudson, an Oxford-educated medical historian, has come on board. He is conducting research and helping to ensure, among other things, that the history of Aboriginal health and medicine, the effects of epidemics and colonization, and the relationship between western biomedicine and Aboriginal traditions of healing are taught alongside traditional medical and clinical foundations.

Hudson believes the case-based approach will prove enormously helpful to graduates' northern practices. "It's completely focused on northern Ontario communities – the rural and Aboriginal communities that are so close to Lakehead."

## **HELPING** COMMUNITIES TO HELP THEMSELVES

Keith Brownlee and Raymond Neckoway are undertaking an examination of cross-cultural issues of attachment theory. Spawned from a court decision that deemed Aboriginal children should not be separated from their foster parents with whom they had formed too significant an attachment, the two researchers have immersed themselves in Ojibwe communities in an effort to better understand the meaning of belonging in Aboriginal cultural knowledge, traditions, and values.

"Lakehead is perfectly positioned to deal with specifically northern issues like this," says Brownlee. "We're learning that general community belonging may be more important than individual relationships in many communities." It is the researchers' hope that this type of new understanding could ultimately contribute to decision making in child welfare cases and help Aboriginal agencies develop better culturally specific policies and practices.



RAYMOND NECKOWAY

# WHERE **RESEARCH** MEETS **PRACTICE** IN NORTHWESTERN ONTARIO

Mary Lou Kelley believes that research done in isolation fundamentally fails. As Director of the Centre for Education and Research in Aging and Health (CERAH), she is committed to promoting collaboration among the university, community and regional partners. "We're the urban centre in a very large area of rural and remote communities, so it's incumbent upon us to support the needs of the region – whether educating, or undertaking research." Mary Lou's research is dedicated to improving care for seniors and people who are dying, with a focus on rural health, long-term care policy and delivery, and palliative care. It is currently funded by the Canadian Institutes of Health Research (CIHR) as part of a team on End-of-Life Care for Seniors that links her with researchers in Ottawa and Hamilton.

Kelley has found that the end-of-life profile of elderly people is often radically different from the cancer experience. Cancer has a well understood and well defined trajectory so it's easier to define care needs. Older people, on the other hand, are frequently suffering from multiple chronic illnesses, and their move from illness to death is very gradual. When older people who are dying have an elderly spouse and children who do not live locally, the challenge of providing them excellent palliative care is apparent. This is especially true in rural and remote areas.

Kelley takes her specialized knowledge to the multiple boards and steering committees on which she serves, working with them to plan appropriate, integrated programs to care for Seniors. She passes on the same information through continuing education for healthcare professionals at CERAH, hosting seminars for practitioners, many working in rural and remote communities. The knowledge sharing continues in her research partnerships with Hospice Northwest, the Kenora Rainy-River Palliative Care Association, and the Kenora Chiefs Advisory Council. First Nations, service providers and researchers collaborate to collect data in the field and bring the results back to those who can use them in their daily lives and work.

According to Kelley, Lakehead is viewed by the community as very approachable, evidenced by the fact that she is consistently sought out as a source of information, and asked to conduct research on a particular issue. Far from a feeling of isolation, Kelley feels her work is woven into the very fabric of the community.



MARY LOU **KELLEY**

## **CONTACT** INFORMATION

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# LAKEHEAD UNIVERSITY
## RESEARCH CENTRES AND FACILITIES

- **Centre for Education and Research on Aging and Health (CERAH)**
- **Centre for Northern Forest Ecosystem Research (CNFER) Ontario Ministry of Natural Resources**
- **Centre for Northern Studies**
- **Centre for Parks, Recreation and Tourism Research**
- **Centre for Rural and Northern Health Research (CRaNHR)**
- **Centre of Excellence for Children and Adolescents with Special Needs**
- **ICR Discoveries – Institute of Cancer Research**
- **Lakehead Social History Institute**
- **Lakehead University Centre for Health Care Ethics**
- **Lakehead University Centre for Analytical Services (LUCAS)**
  - Aquatic Toxicology Research Centre (ATRC)
  - Forest Soils Laboratory (FSL)
  - Lakehead University Environmental Laboratory (LUEL)
  - Lakehead University Instrumentation Laboratory (LUIL)
  - Lakehead University Mineralogical and Experimental (LUMINX) Laboratory
  - Lakehead University Nutrient Ecology Laboratory (LUNE)
  - Lakehead University Wood Science Testing Laboratory (LUWSTL)
  - LEVTEK
  - Paleo-DNA Laboratory (PDNA)
  - Resource Centre for Occupational Health and Safety (RCOHS)

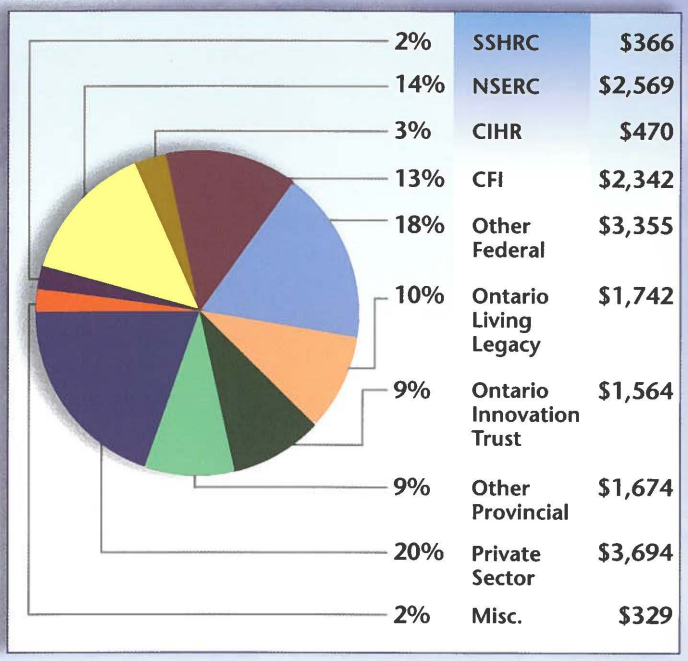
- **Lakehead University Centre for the Application of Resource Information Systems (LU-CARIS)**
- **Lakehead University Geographical Information Systems (GIS) Research Laboratory**

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UNIVERSITY

## RESEARCH GRANTS & CONTRACTS
in thousands of dollars




## SOURCES OF RESEARCH FUNDING
2004-2005 in thousands of dollars




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