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RESEARCH, DISCOVERY AND INNOVATION AT MCGILL UNIVERSITY



Khalid Mustafa Medani's Quest

In 1989, he lived through the bloody fall of Sudan's democratic government. Now the McGill professor wants to uncover the roots of militant Islamist movements—and help defuse future global conflict.

More McGill-Africa Partnerships:

- Lake Victoria's surprising revival
- Undergraduate research
- Rethinking Kenyan land tenure

Spring 2008

headway

Research, discovery and innovation
at McGill University

Headway (ISSN 1911-8112)
is published twice a year
by the Vice-Principal (Research
and International Relations)
and the Office of Public Affairs
McGill University

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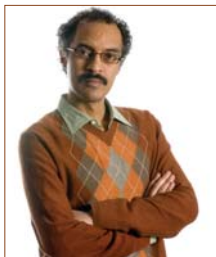
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Publication Agreement Number
40031154

Headway can be found online at
www.mcgill.ca/headway/



Cover photo: Rachel Granofsky

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Message from the Vice-Principal (Research and International Relations)

Research universities are driving forces in international affairs, acting not just as magnets for the intellectual and financial capital so crucial to innovation, but playing key roles in shaping policy. With technology rapidly shrinking geographic distances, we're becoming acutely aware that health, social, and economic issues are now international, not domestic, challenges. McGill is one of Canada's leading research-intensive universities, and certainly its most international university. As such, we have a leadership role to play in helping change this new world for the better.

McGill has a proud heritage of award-winning, cutting-edge scholarship and discovery—and it's a tradition that, happily, continues to be as robust as ever. On February 19, 2008, we acknowledged our latest research breakthroughs and award-winning researchers during an evening called "Applause: A Celebration of Research Excellence." The event's keynote speaker, former prime minister Joe Clark—now Professor of Practice for Public-Private Sector Partnerships at McGill's Centre for Developing-Area Studies—noted that "it is as important to investigate ways to extend the practical benefits of discovery, particularly to a developing world whose own status is changing, as it is to encourage discovery itself."

Fortunately, the era of developed nations imposing their infrastructures and solutions on the developing world is waning, signalling a new era of pan-cultural collaboration. In this issue of *Headway*, we focus on several such research projects, all based in various African countries. From helping bring new environmentally-friendly pesticide controls to the Kenyan market, to undergraduates applying (and, importantly, expanding) their knowledge in Uganda, to working with developing nations such as Nigeria to develop efficient public services—our researchers are joining forces with colleagues around the world to field test current knowledge and help build capacity on the ground, where it counts.

To again quote the former prime minister: "The road from 'Eureka!' to action often requires engaging governments and persuading populations—and that can be as challenging as the actual discovery." In today's global village, more than ever, universities are obligated to seize a leadership role. I am proud to present many of our outstanding researchers and our African colleagues in the following pages.

Denis Thérien
Vice-Principal
(Research and International Relations)

Discovery

Innovation

Drug Resistance Complicates River Blindness Fight

New findings by a McGill researcher may mean that a hard-fought 20-year battle with onchocerciasis, commonly known as river blindness, is about to get even tougher.

The study was led by **Roger Prichard**, James McGill Professor at the University's Institute of Parasitology, and shows a disturbing population boom among the parasitic worms that cause the disease in certain West African communities, in spite of traditional treatments. Ivermectin is the only widely available drug used to treat river blindness; an ivermectin-resistant parasite could spell disaster for people living in affected areas.

"We've found the first evidence of some resistance," reports Prichard, "where the adult parasites continue to reproduce and transmit the disease, and in some communities it seems to be getting worse."

The study, published in *Lancet*, followed 2,501 infected people in 20 communities around Ghana. Two McGill graduate students, **Mike Y. Osei-Atweneboana** and **Jeff K. L. Eng**, conducted the bulk of the research in partnership with local health authorities.

"This finding has important implications for this disease re-emerging and becoming a serious scourge," Prichard says. He

warns that, if left unchecked, resistant parasites could wreak havoc in areas where widespread treatment had previously brought river blindness under control.

The disease is caused by blackflies commonly found in highly oxygenated, swift-moving water. In addition to irreversible blindness, it also causes itching so severe that excessive scratching often results in depigmentation and blotchy, leopard-like patterns on the skin.

The World Health Organization estimates that 99 per cent of the world's 18 million infected people are in Africa, with the remainder in Latin America and Yemen. Even when effective, ivermectin merely halts the progress of the disease without killing the adult parasites, and there is no vaccine. After trachoma, river blindness is the world's second leading infectious cause of blindness.

■ *This research is funded by the UNICEF-UNDP-World Bank-World Health Organization Special Programme for Research and Training in Tropical Diseases, the Onchocerciasis Control Program, the African Program for Onchocerciasis Control, the Government of Ghana, the Canadian Institutes of Health Research and the Fonds québécois de la recherche sur la nature et les technologies.*

Courtesy of Roger Prichard

Golden Lock

Margaret Lock, the Marjorie Bronfman Professor Emerita in Social Studies in Medicine, is the 2007 recipient of the Social Sciences and Humanities Research Council of Canada (SSHRC) Gold Medal for Achievement in Research. The Council's top award, representing \$100,000 in

research funding, recognizes her 30-year commitment to studying the relationships among culture, emerging bio-scientific technology and the body. Lock has helped shape medical ethics policy and medical student education, with her work exploring the social implications of biomedical technologies such as organ transplants, reproductive technology and genetic testing. Her current research focuses on the social repercussions of advances in genetics, particularly in relation to Alzheimer's disease. ■

Margaret Lock



Owen Egan

Protein Production Implicated in Host of Diseases

McGill researchers have uncovered the long-sought-after mechanism that controls the synthesis of the Bicaudal-C protein in fruit flies. Bicaudal-C is one of the estimated 77 per cent of genes implicated in human disease that have obvious counterparts in fruit flies, making this discovery an important step toward solving the mysteries of polycystic kidney disease, cancer and mental retardation in humans.

Paul Lasko, chair of McGill's Department of Biology, led a team of researchers from McGill and France's Centre national de la recherche scientifique. They discovered that Bicaudal-C controls how much protein particular messenger ribonucleic acid (messenger RNA) molecules can synthesize, thereby affecting embryo development in fruit flies. Insufficient Bicaudal-C in mother flies produces embryos with two posteriors and no anterior, while overexpression of Bicaudal-C produces embryos with no posterior. In mammals, the counterpart protein has been linked to polycystic kidney disease; in frogs, the same protein is required for embryonic kidney development.

Thus far, there have been no studies of the human counterpart of the Bicaudal-C protein. "We hope our study will guide people working on the human counterpart gene to look for the same type of function," says Lasko, "to find RNAs that are specific to kidney development. This protein is also related quite closely to the protein which leads to Fragile X, the most common mental retardation syndrome."

The team's findings were published in the November issue of the journal *Developmental Cell*.

■ *This research was funded by the National Cancer Institute of Canada.*



Approximately 18 million people are living with river blindness, caused by a parasitic worm. Now, as the worm grows resistant to traditional drugs, those numbers may be on the rise.

QUEBEC DISCOVERIES OF THE YEAR: Controlling Messenger RNA, Breast Cancer Breakthrough

Two McGill research projects earned spots on *Québec Science's* prestigious Ten Discoveries of the Year list for 2007.

The magazine tipped its cap to McGill scientists who developed a novel system to study the control of genes in a test tube. **Nahum Sonenberg**, James McGill Professor of Biochemistry, **Thomas Duchaine**, assistant professor in biochemistry at the McGill Cancer Centre, and research leaders and postdoctoral fellows **Geraldine Mathonnet** and **Marc Fabian** used microRNA (a class of tiny nucleic acids) to control messenger RNA in a test tube. Messenger RNA relays genetic coding information from DNA to a cell's ribosomes, where protein synthesis occurs; microRNA recently emerged as a major regulator of this "translation" process. This study—funded by CIHR, the Fonds de la recherche en santé du Québec and the Human Frontier Science Program—marks the first successful assessment of microRNA control of translation outside the confines of a living cell. Researchers will now be able to study the mechanisms by which they control the flow of genetic information and, therefore, protein expression. "These microRNA control 30 per cent of all genes in a body," says Sonenberg. "They are important to cancer development and progression. If we know how to control microRNA, we can control cancer and other diseases." The team (which includes collaborators at the University of Eastern Piedmont, Case Western Reserve University, Warsaw University and the Friedrich Miescher Institute for Biomedical Research) published their findings in the journal *Science* in July 2007.

Québec Science kudos also went to **Dr. Michel Tremblay**, director of the McGill Cancer Centre and the Jeanne and Jean-Louis Lévesque Chair in Cancer Research, for his discovery that 40 per cent of breast cancer cases in women present overexpression of the PTB1b gene. At normal levels, PTB1b's enzyme helps regulate cell growth and cell division, but too much PTB1b causes unchecked cellular growth. Eight years ago, Tremblay linked the gene to obesity and diabetes. Pharmaceutical companies are already doing human trials for PTB1b-suppressing drugs, leaving him optimistic that a breakthrough breast cancer drug may be on the horizon. "Adapting these compounds is all that is needed to attack breast cancer," he explains. Tremblay's research is funded by the Cancer Research Society, CIHR, the Weekend to End Breast Cancer and Rethink Breast Cancer. ■

Chairs Galore

In September and November 2007, Jim Prentice, the Canadian Minister of Industry announced the appointment of nine McGill University professors to the Canada Research Chairs (CRC) program:

- **Tho Le-Ngoc**, broadband access communications
 - **Stéphanie Lehoux**, cardiovascular physiology
 - **Gergely Lukacs**, molecular and cellular biology of cystic fibrosis and other conformational diseases
 - **Salah El Mestikawy**, neurobiology
 - **Audrey Moores**, green chemistry
 - **Vassilios Papadopoulos**, biochemical pharmacology
 - **Thomas Quinn**, soft tissue biophysics
 - **Amir Raz**, cognitive neuroscience of attention
 - **Barbara Sherwin**, hormones, brain and cognition
- Seven McGill CRCs were renewed:
- **Jorge L. Armony**, affective neuroscience
 - **Michel Biron**, Québécois and francophone literature
 - **Derek Bowie**, receptor pharmacology
 - **Sylvain Coulombe**, non-thermal plasma processing
 - **Elaine C. Davis**, anatomy and cell biology
 - **Stephen M. Saideman**, international security and ethnic conflict
 - **Thomas Schlich**, history of medicine

The 16 CRCs have a value of \$13.4-million. The Canada Foundation for Innovation will also invest over \$2-million in infrastructure essential to the work done by the nine new Chairs. The Government of Canada created the CRC program in 2000; the program's goal is to help make Canada one of the world's top five countries for research and development by establishing 2,000 research professorships by 2008. ■

CIHR Kudos for TB Work

Michael B. Reed, assistant professor in the Faculty of Medicine, received the Peter Lougheed/CIHR New Investigator Award—Canada's Premier Young Researcher at the sixth annual Canadian Health Research Awards. CIHR, Canada's major federal agency responsible for funding health research, held the ceremony on November 20, 2007, in Ottawa. The award, given to a researcher at the beginning of his or her career, recognizes Reed's outstanding research on strain variation within the tuberculosis bacterium. Reed focuses on the unique attributes of the Beijing strain lineage that help it adapt to diverse environments within the human host; his research could potentially lead to improved treatment and risk identification. ■



Michael B. Reed

The Royal Seven

Continuing McGill's long history of research excellence, seven of the University's researchers were recently feted by the Royal Society of Canada.

On November 17, 2007, the RSC presented two McGill faculty members with some of the most prestigious honours in their fields. In recognition of her cutting-edge work on neutron stars, pulsars and supernova remnants, **Victoria Kaspi** received the Rutherford Memorial Medal in Physics, which is awarded for outstanding research in any branch of physics. Kaspi is McGill's Lorne Trottier Chair in Astrophysics and Cosmology and Canada Research Chair in Observational Astrophysics. She and her team discovered more than 20 pulsars in a single Milky Way cluster, as well as the fastest-rotating pulsar

known to science. **Roderick Macdonald**, the F.R. Scott Professor of Constitutional and Public Law at McGill, has been awarded the RSC's Sir John William Dawson Medal for his contribution to interdisciplinary research. Macdonald is generally regarded as one of Canada's most influential public intellectuals, and was among the first to explore law through disciplines as varied as philosophy, anthropology, literary theory, semiotics and history.

As well, five McGill researchers have been invited to join the RSC's ranks. The new fellows are:

- **Hong Guo**, professor in the physics department who achieved renown for his contributions in the theoretical and computational modeling of quantum transport in nanoelectronic systems;
- **Michael J. Meaney**, associate director of research at the Douglas Hospital Research Centre and one of the first researchers to identify the importance of maternal care in modifying the expression of the genes that regulate behavioural and neuroendocrine responses to stress;
- **Morag Park**, the James McGill Professor of Oncology and an international leader in understanding the mechanisms underlying the activation of human cancer;
- **A. Patrick S. Selvadurai**, William Scott Professor and James McGill Professor, who has profoundly influenced engineering modeling activities in nuclear waste management, soil-structure interaction and northern and environmental geomechanics; and
- **Isztar I. Zawadzki**, director of the radar observatory in the Department of Atmospheric and Oceanic Sciences and a major contributor to radar meteorology. ■



Acfas Honours

Four McGill researchers took home awards from the Association franco-phonique pour le savoir's 63rd annual gala, held on October 11, 2007.

■ **Donald L. Smith**, James McGill Professor in the Faculty of Agricultural and Environmental Sciences and Chair of the Department of Plant Science, received the Prix Michel-Jurdant for his work in environmental science. Smith is the scientific director of the Green Crop Network, which unites leading Canadian scientists in the quest to develop crops that reduce carbon dioxide and nitrous oxide. Smith's recent work focuses on increasing the sequestration of carbon dioxide from the atmosphere into crop plants, a crucial tool for greenhouse gas management.

■ Physics professor **Victoria Kaspi** received the Prix Urgel-Archambault. In 2005, Kaspi and her team discovered the fastest-rotating pulsar known to science; the findings promise to yield important new information about the nature of one of the most mysterious forms of matter in the universe.

■ Internationally renowned for her work on regulating cerebral circulation, **Édith Hamel** received the Prix Adrien-Pouliot. Hamel is a neuroscientist at the Montreal Neurological Institute; by understanding the mechanisms of blood flow, she hopes to aid in the development of new drugs to decrease vascular head pain.

■ The Concours de vulgarisation de la recherche de l'Acfas recognized the work of **Marie-Ève Brault**. Brault is an anatomy and cell biology doctoral student at the Lady Davis Institute at the Sir Mortimer B. Davis Jewish General Hospital. In January 2008, her paper on the enzyme telomerase as it relates to aging and cancer appeared in the newspaper *Le Soleil*.

Founded in 1923, Acfas is a Quebec not-for-profit organization dedicated to promoting scientific activity, stimulating research and disseminating knowledge. ■

Stamping Out Superbugs

McGill researchers are one step closer to fighting bacterial infection—from the inside out.

Joint research between McGill and Oxford University uses population evolution and ecology to interpret the spread of bacteria such as *Pseudomonas aeruginosa*, dubbed “superbugs” for their tenacity. The team applied the “source-sink” theory to explain how antibiotics and disinfectants are failing in hospitals.

Andrew Gonzalez, Canada Research Chair in Biodiversity and associate professor of biology, explains that certain hospital environments, such as water reservoirs, represent excellent “source” areas for bacteria to thrive. It is the steady supply of bacteria from these source environments that allows them to infect humans. Antibiotics and hygienic practice, however, should make hospitals inhospitable “sinks” for bacteria: More microbes should drain from the “sink” than are replaced from the “source.”

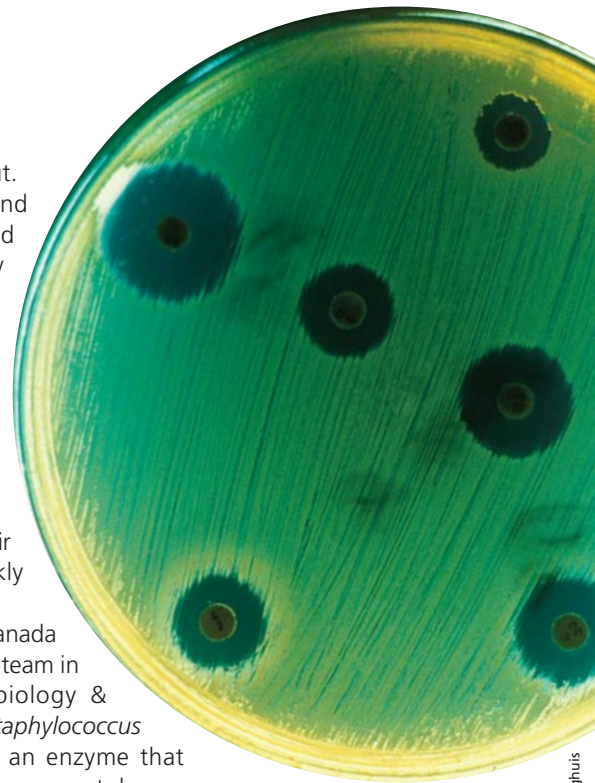
Yet superbugs thrive. The secret to their success: Superbugs need not wait for a fortuitous genetic mutation to adapt to hostile forces like antibiotics. “They can double their population very fast because useful DNA can be transferred quickly in a simple organism,” says Gonzalez.

Within that transferred material, **Albert Berghuis**, Canada Research Chair in Structural Biology, and his research team in the Departments of Biochemistry and Microbiology & Immunology have observed how one superbug, *Staphylococcus aureus*, disarms the antibiotic Synercid using an enzyme that detoxifies quinupristin, one of the antibiotic’s component drugs.

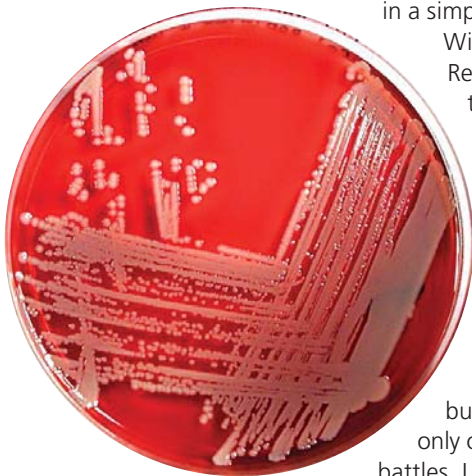
“It is only a matter of time before a superbug will be resistant to all antibiotics,” warns Berghuis. His team will focus next on developing a compound to replace quinupristin in Synercid, and explore whether a similar modification in other drugs might further slow bacteria resistance.

“There is a small selection of drugs that still work against superbugs, but bacteria are very resourceful,” says Berghuis. “What we observed is only one trick they use to develop resistance, but if we keep on winning these battles, I think we can stay ahead.”

■ This research is funded by CIHR and the Canada Research Chairs program.



Above: *Staphylococcus aureus* on an antibiotic test plate.



At left: *Pseudomonas aeruginosa* on a HiFluoro *Pseudomonas* Agar medium.

New Hope for Potential Parents

A new technique may improve the chances for women with cancer or ovarian disease to become mothers. At the 2007 meeting of the European Society of Human Reproduction and Embryology, **Drs. Hananel Holzer, Ri-Cheng Chian** and **Seang Lin Tan** from the McGill Reproductive Centre announced the birth of the first baby born from an egg matured and frozen in a test tube.

Twenty patients with polycystic ovarian syndrome (PCOS) underwent the IVF process at the McGill University Health Centre’s Royal Victoria Hospital. PCOS is a hormone disorder that affects one in 10 women of childbearing age and is a leading cause of infertility.

Live births from frozen eggs aren’t new. The McGill Reproductive Centre announced the first such birth in 2005;

an egg which had already matured inside the ovary was removed, then frozen. The ovarian stimulation required for egg maturation, however, carries potentially serious side effects, especially for women with PCOS, making this new technique a significant breakthrough. The process may also be appropriate for patients who wish to preserve their fertility, but don’t have time in the menstrual cycle to produce mature eggs before beginning cancer treatment or hormone stimulation is contra-indicated.

■ This research receives funding from CIHR, NSERC and Ton Yen General Hospital in Taiwan.



Photos.com

Prairie Prize to Epigenetics Explorer

Anybody who doubts the immense impact that moms can have on our lives need only visit **Michael J. Meaney's** lab. The associate director of research at the Douglas Institute Research Centre and a James McGill Professor of Medicine in the Departments of Psychiatry and Neurology & Neurosurgery, Meaney's research indicates that a mother's love not only soothes, it can effect changes in her offspring at the molecular level: Rat pups who receive plenty of grooming and other forms of TLC from their mothers tend to produce more receptors that control the production of stress hormones—and are therefore better equipped to deal with stress. These revelatory insights into the world of epigenetics (the study of changing gene function without changing the DNA sequence) was recently recognized by the Alberta Heritage Foundation for Medical Research, which named Meaney the inaugural recipient of the AHFMR Lougheed Prize in fetal and early childhood development.

The prize awards \$100,000 to an outstanding biomedical or clinical researcher. The AHFMR will also provide support for a postdoctoral fellow from Alberta to work in Meaney's lab for up to three years. As the Lougheed Prize winner, Meaney will present public lectures in Alberta about his work and meet with scientists in the province who are also involved in child health research. The award is named after former Alberta premier Peter Lougheed, whose government created the AHFMR in 1980 with a \$300-million endowment.

■ For more information about Michael Meaney's research, see "The Nurture of Things" in the Fall 2006 edition of *Headway*, archived at www.mcgill.ca/headway/fall2006.



Darren Kemper, courtesy of AHFMR

Epigenetics researcher Michael Meaney (left) with former Alberta premier Peter Lougheed. Meaney is the inaugural recipient of the \$100,000 AHFMR Lougheed Prize in fetal and early childhood development.

New Impressions of Depression

Depression hasn't always been taken very seriously. People used to downplay it—nothing that a stiff upper lip and a carton of Häagen-Dazs couldn't cure—but two recent studies show how this profoundly debilitating and complex condition can influence, and be influenced by, how our bodies function.

According to a recent study co-authored by scientists from McGill and Université de Montréal, patients with coronary artery disease who are also experiencing depression or high levels of anxiety run twice the risk of suffering a repeated heart hospitalization. "On average, cardiac patients without these disorders had about a 13 per cent chance of a repeated cardiac event over two years, compared to 26 per cent of those with either major depression or generalized anxiety disorder," explains principal investigator **Nancy Frasure-Smith**, a professor with McGill's Department of Psychiatry and a researcher at the Montreal Heart Institute and the Centre Hospitalier de l'Université de Montréal.

The study, published in *Archives of General Psychiatry*, focused on patients with stable coronary artery disease—not those recently hospitalized for severe conditions such as a heart attack. "This is the first study to demonstrate that anxiety and depression can have a strong impact on people with stable coronary artery disease," notes Frasure-Smith's research collaborator, Université de Montréal psychiatry professor François Lespérance.

The research team interviewed more than 800 patients with stable coronary artery disease who were being monitored by a doctor. "Now that we know that anxiety and major depression are both markers of increased cardiac risk, it is imperative that these patients receive the best treatment for both their cardiac and psychiatric conditions," the study concludes.

In another recent study, also published in *Archives of General Psychiatry*, researchers at McGill's Montreal Neurological Institute

have identified the neurological basis of depression in male athletes who have suffered concussions. In addition to other symptoms (such as attention and memory problems and fatigue), athletes recovering from concussive injuries frequently experience depression. While only about 5 per cent of the general public experiences serious depression, up to 40 per cent of head trauma patients may suffer from symptoms of depression.

"Until now, very little was known about the neurological basis of the depression frequently reported by athletes following concussion," says MNI neuropsychologist **Alain Ptito**, the lead investigator for the study. Ptito's team used functional MRI (fMRI), a computerized imaging technique that measures blood oxygen levels, to examine 56 male athletes, 40 of whom had concussions, and 16 who were concussion-free. Concussed athletes with depression presented with the same pattern of brain activation as that seen for patients with major depression, specifically in the dorsolateral prefrontal cortex and striatum and attenuated deactivation in medial frontal and temporal regions consistent with a limbic-frontal model of depression. The researchers suggest that symptoms of depression following head trauma may share the same underlying neural mechanism as major depression. Ptito believes this finding indicates a close link between the concussion-inflicted brain damage and post-concussion depression and has important implications for pharmacological and/or psychological treatments.

■ Frasure-Smith's research is supported by CIHR, GlaxoSmithKline, the Charles A. Dana Foundation, the Foundation of the Montreal Heart Institute, the Pierre David Fund and the Fondation du Centre Hospitalier de l'Université de Montréal. Ptito's study is funded by CIHR and the Fonds de la recherche en santé du Québec.



Matthew Forsythe

Diabetes and Cellular Sloth

A new study, led by **Ciriaco A. Piccirillo** of McGill's Department of Microbiology and Immunology and Centre for the Study of Host Resistance (McGill University Health Centre), proves a longstanding hunch that waning immunosuppressive T-cells, called regulatory T-cells, play a key role in the onset of type 1 diabetes. The team's findings were published in the January 2008 issue of the journal *Diabetes*.

Working with non-obese diabetic mice, Piccirillo's team discovered that the CD4+ T-cells, expressing the *Foxp3* gene, which regulate autoimmune reactions, may lose their effectiveness and become "lazy" over time. These regulatory T-cells normally suppress various immune responses, but when they lose their potency with age they're no longer able to curb certain autoimmune responses—thus allowing the body to destroy insulin-producing beta islet cells in the pancreas.

The genetic and cellular mechanisms behind this immune system malfunction have long been a mystery. "For the last several years, it's been postulated that non-functional regulatory T-cells are the critical mechanism," says Piccirillo, who is the Canada Research Chair in Regulatory Lymphocytes of the Immune System, and a leader in this research area. "Now this study proves it."

Piccirillo says it's likely that certain genetic predispositions, possibly coupled with external environmental factors or infections, could alter regulatory T-cell function in susceptible individuals and trigger a full-scale diabetic autoimmune reaction in the pancreas. "Once they start," he says, "these immune responses are like a car without brakes."

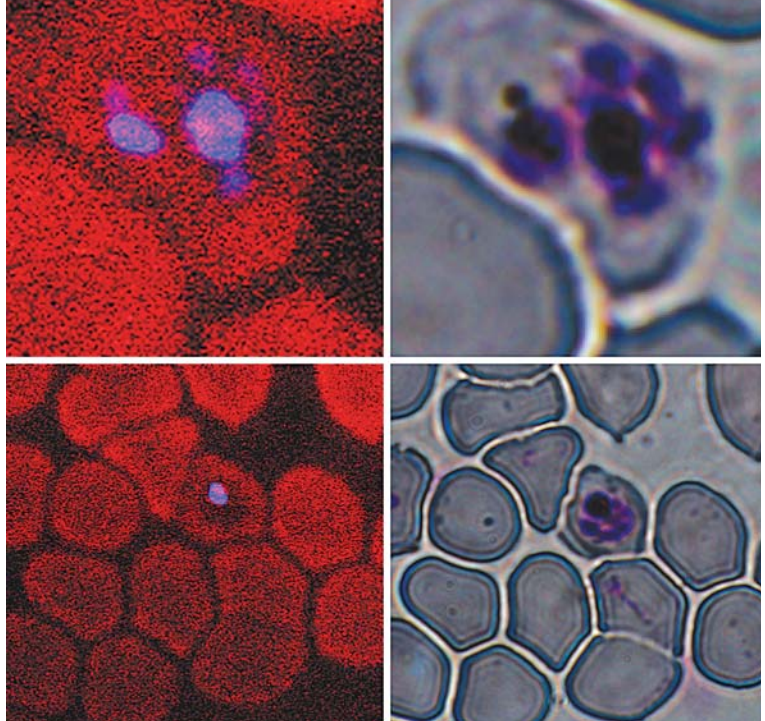
Type 1 diabetes patients must regularly inject insulin to avoid potentially fatal diabetic shock; secondary health problems include blindness, heart attack and stroke. Piccirillo is optimistic that his team's discovery may lead to the development of new immune system-based therapies for the disease, and a host of other autoimmune and chronic inflammatory disorders. "We believe that these regulatory T-cells may represent a kind of master switch, and by understanding how they are made, how they function and how they survive, we may be able to stop disease from occurring."

■ *This research is funded by CIHR and the Canadian Diabetes Association.*



Courtesy of Ciriaco A. Piccirillo

Ciriaco A. Piccirillo of McGill's Department of Microbiology and Immunology and Centre for the Study of Host Resistance (MUHC)



Courtesy of Paul Wiseman

The optical effect called third harmonic generation causes malaria secretions to glow blue in infected blood cells (left), promising a faster, more efficient diagnosis than traditional microscopy imagery (right).

Changing the Look of Malaria

The traditional wisdom on malaria: quick to contract, slow to detect. A new invention, however, promises to change at least part of the malaria rulebook by giving the disease a colourful makeover.

Technicians currently detect malaria in the clinic by staining slides of blood smears with giemsa dye, which marks the DNA of the malaria parasites. They then painstakingly examine the stained blood samples under an optical microscope. The process is laborious—technicians manually count all the visibly infected blood cells to determine if the count exceeds the detection limit—and requires a very specific skill set. A research team led by **Paul Wiseman** of McGill's Departments of Physics and Chemistry, however, has developed a faster, more user-friendly technique. The new process relies on a known optical effect called third harmonic generation; THG causes hemozoin, a crystalline substance secreted by the malaria parasite, to glow blue when irradiated by an infrared laser.

In a study published in *Biophysical Journal*, the researchers say the new technique could eliminate the need for specialized training, slides, staining and microscopes—spelling the welcome end of a labour- and time-intensive process. Moreover, the faster a person is diagnosed with malaria (first symptoms don't appear until 10 to 15 days after infection), the faster they can get treatment; early treatment not only prevents complications, it dramatically reduces the risk of death.

Each year, upward of 500 million people contract the malaria parasite—principally spread by the female anopheles mosquito—and one to three million die from the resulting disease. Most of the fatalities are concentrated in sub-Saharan Africa, where diagnosis is often stymied by a dearth of trained personnel and equipment. The disease is also found in parts of Asia, Europe, Latin America and the Middle East.

Wiseman and his colleagues now hope to adapt existing technologies, including fibre-optic communications lasers and cell sorting technology, to quickly move the technique from the laboratory to where it's needed most. "We're imagining a self-contained unit that could be used in clinics in endemic countries," he says. "The operator could inject the cell sample directly into the device, and then it would come up with a count of the total number of existing infected cells without manual intervention."

■ *This research is funded by the Natural Sciences and Engineering Research Council of Canada, the Network of Centres of Excellence—Canadian Institute for Photonic Innovations, CFI and CIHR.*



The Life A

By James Martin

Each year, Lake Victoria fishermen (above, below) catch, for export, over \$200-million worth of Nile perch.

Lauren Chapman (opposite) studies how low oxygen levels lead to morphological, physiological and behavioural changes in Lake Victoria's native fish population.

Lake Victoria was a haven for haplochromine cichlids and heaven for evolutionary biologists; over time, the small fish evolved into more than 500 related, yet distinct, variations not found elsewhere, making the lake irresistible to researchers. Then, on a fateful day in 1954, a few non-native Nile perch were dumped into Victoria's waters. The idea was to bolster a flagging fishing industry with a hearty new species. From the shore, the experiment appeared to fail, but a bloody revolution churned slowly, silently beneath the waves. By the 1980s, the world's largest tropical lake swarmed with insatiable six-foot, 300-pound predators.

While the three countries that share Victoria's waters (Kenya, Tanzania, Uganda) enjoyed a booming Nile perch export market, the World Conservation Union, an international network of government agencies and NGOs, ranked the voracious fish among the top 100 "worst invasive alien species." The problem isn't just that Nile perch devour cichlids and the lake's other native species (although the upsurge of Nile perch in the 1980s coincided with the demise of about half the cichlid populations): The perch's higher than most oil content also set off a calamitous domino chain. Fishermen need to build bigger fires to dry their oily catch. Bigger fires require more firewood. Fewer trees increase erosion. Erosion boosts the lake's nutrient level (eutrophication) as soil tumbles into the water. Eutrophied waters nurture an unnaturally dense plant population, which dramatically upsets the delicate eco-balance. The result: an economically lucrative, ecologically devastating situation. But does a fisherman's bonanza necessarily spell curtains for biodiversity?

Lauren Chapman sees a light, albeit faint. There's no doubt Lake Victoria has seen catastrophic loss in recent years, but she believes a balance can be struck between environmental conservation and maintaining an industry that annually exports over \$200-million in perch.

Twice a year since 1990, the McGill professor of biology has been setting up camp at the Makerere University Biological Field Station in Kibale National Park. Established in 1970 by Uganda's leading research university, MUBFS does more than just give international researchers access to a wide variety of ecosystems. "In Uganda at least, there's a lack of

training resources," explains Chapman, who works with several Ugandan grad students each year. "So international academics play a really important role in conservation by training graduate students—especially students who already have a position they're going to return to and make a difference."

From her MUBFS base, Chapman makes expeditions to the Lake Victoria basin, as well as the region's swamps, crater lakes and rivers. "One of the things that brought me to Africa was my interest in environmental stressors in aquatic systems and adaptations of fishes to extreme environments," Chapman recalls. "I'm particularly interested in low-oxygen (hypoxic) stress, which occurs naturally in some systems, like heavily vegetated swamps or the bottoms of deep lakes or flooded forests in the Amazon or the Congo."

East Africa's bountiful papyrus swamps are extremely hypoxic—and, for Chapman, a very useful model system for exploring adaptations to low-oxygen stress. There, her team discovered novel responses to extreme hypoxia; the researchers are now exploring the role of oxygen in the evolution of biological diversity in fish. By rearing fish under different oxygen conditions back at McGill's Stewart Biological Sciences Building, she can detect hypoxia-induced changes in morphology, physiology and behaviour.

Chapman's initial interest in how fish adapt to naturally extreme environs is very relevant to Victoria's crisis. "Human-induced changes to the watershed—increased population density, expanding agriculture, deforestation—are becoming a real problem in the Lake Victoria basin, which serves 30 million people," says Chapman. "Large pieces of the lake bottom are permanently anoxic; these sometimes upwell, leading to fish kills."

However, low oxygen has its advantages. Some fish have actually used hypoxia to sidestep the Nile perch: During the 1990s, Chapman and her colleagues discovered that Nile perch are sensitive to hypoxia, allowing some native fish to find refuge in hypoxic wetlands bordering the lake. Over time, as the Nile perch is heavily fished, she's also watched certain cichlids recover. In Lake Nabugabo, a Victoria satellite lake touched by the Nile perch, Chapman has seen the

Courtesy Lauren Chapman

Courtesy Lauren Chapman



Lake Victoria is Africa's single most important source of inland fishery production, but radical changes to its ecology have rendered much of the deep water anoxic (no oxygen) or hypoxic (low in oxygen) and dramatically altered the food web. Other, more recent changes in the lake, however, are giving respiratory ecologist Lauren Chapman renewed hope that fisheries sustainability and biodiversity conservation can be reconciled.

NOXIC

cichlid population go from almost nothing in the early 1990s to regaining their place as a major player in the food web. "Now we're seeing even more changes to the system," she says, "changes to the distribution of the wetland, and changes in ecology of the Nile perch. It's really important to look at these systems for a long time, which is hard to do these days when a lot of funding is directed toward shorter-term projects."

Chapman's work has contributed to a growing awareness of the importance of wetlands as both refuges for native fish and nursery areas for commercially important fish. In 1995, Uganda issued a national wetlands policy, curtailing drainage and insisting that all users adopt sustainable practices. Community-based conservation efforts focus on specific wetlands, working on ways to use these habitats in sustainable ways (e.g., fishing, harvesting plant materials for use in construction, ecotourism) rather than large-scale conversion to agricultural land.

The Nile perch, meanwhile, continues to respond to the cascading effects of its own introduction. When they first entered the Lake Victoria system, the perch fed on haplochromine cichlids. In fact, they liked eating cichlids so much that young perch fast-tracked the transition from an insect diet to a fish one, making the leap when they were a mere 5 to 15 centimetres long. When cichlid levels got too low, the perch were forced to feed on *Rastrineobola argentea* (a native minnow), *Caridina nilotica* (a native shrimp) and even their own young; faced with this B-list fish diet, young perch tended to stick to insects until they were over 30 centimetres long. "It's thought that the perch grow fastest when they're feeding on haplochromine cichlids," says Chapman.

The last 10 years have seen Victoria's cichlid population on the upswing (possibly due to heavy perch fishing, thus reducing the cichlid's predator population), and the Nile perch are once again feeding on their preferred prey. This makes for an interesting relationship between the lowly cichlid and big business. "If haplochromines are what perch like best to feed on," says Chapman, "then haplochromines are good for the Nile perch industry. So, if you want to reconcile biodiversity loss with fishing, there may be an optimal

level where the Nile perch are at a certain level, but you're also allowing a haplochromine resurgence. That's something that has renewed interest in a marriage of biodiversity conservation and fishery sustainability."

Chapman and her colleagues are now exploring the pace at which native fish respond to environmental factors (hypoxia, Nile perch), and have found evidence for rapid morphological change (increase in gill size, change in body shape) in response to decades of stress. "This is adaptive change on a contemporary time scale; some of the Victoria fishes have changed very, very quickly in response to these strong selective pressures." A major goal now is to understand the mechanisms underlying the changes. "Are we seeing heritable change—changes passed down to the next generation—and/or environmentally induced change within the lifetime of an individual? What happens when the stressors are relaxed?"

Uganda may prove a valuable role model for the rest of the world. "Due to the increasing influx of municipal wastes and fertilizers, hypoxic stress in fish is really becoming a global issue," says Chapman. As an example, she cites the Gulf of Mexico, where springtime fertilizer run-off creates an annual oxygen-starved "dead zone" (estimated to be the size of New Jersey, and growing) unable to support ocean life.

"I think the work we do in the wetlands of Uganda has important implications for just how mosaics of wetlands can affect fish distributions and divergence. We've made some strides in understanding adaptations of fishes to low-oxygen stress and we can now apply that understanding to fishes that are going to experience that. The consequences for fishes of hypoxic stress need to be more fully understood, and there's a big interest in doing this."

■ *Professor Chapman is the Canada Research Chair in Respiratory Ecology and Aquatic Conservation. Her research has received funding from the National Science Foundation, USAID, the Wildlife Conservation Society, the National Geographic Society and the Natural Sciences and Engineering Research Council of Canada.*



Owen Egan



Fighting the Violet Vampire



In the fields of sub-Saharan Africa, Alan Watson and McGill's Weed Research Group are battling devastating parasites—naturally.

By Mark Reynolds

Something big was happening in these agricultural fields of Mali, anyone could see that. Two plots of sorghum, a staple crop across sub-Saharan Africa, reached up to the clear blue sky.

While one plot was unremarkable—sturdy green stalks in orderly rows—the other was shot through with violet flowers, the hue in vibrant contrast to the yellow and brown stalks of dying sorghum around them.

"It was quite pretty," says Alan Watson. "It was like night and day." Day, in this case, was the less flashy but much healthier plot. That stolid green patch represented a significant victory over striga, a parasitismal plant that causes incalculable misery to farmers.

Watson, a plant sciences professor and head of the Weed Research Group at McGill, specializes in finding natural curbs to weed infestations. Working closely with Adolphe Avocanh, a researcher at the International Institute of Tropical Agriculture (IITA) in Cotonou, Benin, and Djibril Yonli, a phytologist at Burkina Faso's Institut de l'environnement et de recherches agricoles (INERA) and Centre de recherches environnementales, agricoles et de formation (CREAF), he has been searching for insects and pathogens that selectively prey on striga while leaving crops unharmed.

The quest has been long. Watson had been investigating weed-plagued rice paddies in Southeast Asia in the early nineties when the International Development Research Centre, a Canadian Crown corporation, invited him to tackle sub-Saharan Africa's striga problem. Watson immediately got on the case, traveling through Kenya in search of a suitable candidate while his research assistant, Marie Ciotola, collected diseased striga samples in Mali, Niger and Burkina Faso.

The weed is a formidable foe. Once striga (appropriately, its name is derived from a vampire of Roman legend) infects a farmer's field, it can cause crop losses ranging from 40 to 100 per cent. But striga does not make its presence known until the host crop begins to grow. (Its tiny seeds are almost impossible to detect, let alone remove.) As soon as that crop flourishes, however—or, at least, attempts to flourish—striga gets busy, infecting the host's roots, draining it of water and nutrients. Like all good parasites, striga does not kill its host directly, but it weakens crops, making them more susceptible to droughts or disease. Herbicides are ineffective against striga, and infestation can't be detected until it's too late: Striga's violet petals are not a warning, but a victory banner—by the time the plant breaches the soil surface, its victim is thoroughly infected.

According to some estimates, striga annually decimates over 4 million tonnes of food crops. In addition to the sizable economic costs, there's also a human element driving Watson's quest for a cure: The infested crops force farmers to move further and further away from home as they search for unspoiled soils—which, according to the International Labour Organization, a specialized agency of the United Nations, dramatically increases their risk for HIV infection. (According to the ILO, social exclusion, loneliness, anonymity and poverty—all hallmarks of itinerant farm life—are significant factors in increasing the likelihood of contracting HIV.)

Fortunately, Watson believes he has found the proverbial stake to drive through the heart of this botanical Dracula: a humble fungus known as *Fusarium oxysporum*. The vampire-slayer was located in Mali, though it, like striga, is common throughout Africa.



Owen Egan

Alan Watson searches for insects and plants that selectively prey on destructive agricultural parasites.



Finding *Fusarium oxysporum* was a messy job but Watson, his research assistant Julien Venne and IITA's Avocanh were up to the challenge. "We got on our hands and knees and looked—right down in the dirt," recalls Watson. "We tried to find striga specimens that were diseased, and then see if we could use what was attacking them as a bio-control agent." To ensure that Watson's mycological man-at-arms would not turn mercenary and wreak havoc on other plants, it was put through a two-year testing process in McGill's quarantined labs at Macdonald campus.

Fusarium oxysporum is easy to grow (just take ground-up sorghum and add a few extra nutrients and water), but the trick is marrying the fungus to the crop seed. Through trial and error, Watson's team discovered that *Fusarium oxysporum* spores can be mixed with liquefied gum arabic (a natural adhesive readily available in sub-Saharan countries) without harming the fungus. Crop seeds are then coated with this mixture and left to dry. When the seeds are later planted (the fungus remains viable for long periods, making the treated seeds amenable to storage), the crops grow free from striga infestation.

For the past two years, Venne has been conducting field tests with Avocanh in Benin and with Yonli in Burkina Faso; initial results indicate that the treated seeds are between 80 and 100 per cent effective at suppressing striga. But there's still one more hurdle. The African seed industry is still very much in the development stage, but Watson's team has been working with nascent Nigerian companies to make the treated seeds commercially available. In the meantime, they've also been teaching Mali farmers how to create their own bio-control treated seeds (a relatively simple and inexpensive process)—because there's no sense waiting to vanquish the violet vampire.

"Striga is probably the single greatest constraint to African agriculture," he says. "Now all we need to do is get the seeds into the hands of the farmers."

■ Professor Watson's research is funded in part by the International Development Research Centre and the Canadian International Development Agency.

What

Drives Militant

By Jonathan Montpetit

When an Islamic fundamentalist-backed military regime overthrew Sudan's democratically elected government in 1989, Khalid Mustafa Medani followed the lead of the thousands of pro-democracy Sudanese activists who had previously toppled military regimes: He took to the streets in peaceful protest. But tear gas, the once-standard response to civil disobedience, soon gave way to unprecedented levels of widespread human rights abuses across the country. "In the north," Medani recalls, "the new regime established secret prisons—where suspected dissidents were tortured, starved and denied access to legal counsel—and initiated widespread repression of civil society organizations. In the south, aerial bombardments and scorched earth policies claimed the lives of thousands of innocent civilians."

Soon after the regime came into power, Medani left Sudan to continue his studies, earning a PhD in political science at the University of California, Berkeley. He then joined Stanford University's Center for International Security and Cooperation, where he continued the research he had begun in Sudan. It was primarily during his time at Stanford that Medani realized the developments he had witnessed in Sudan in the late 1980s—including the pattern of militant recruitment—actually represented "a microcosm of a larger phenomenon concerning the politicization of Islam in Africa and the Middle East." Consequently, he focused his own research on a number of countries which, in the language of political science, represent "most similar" cases: Sudan, Egypt and Somalia. Having witnessed the potential ramifications of the politicization of Islam in Sudan, Medani keenly realized that "an in-depth comparative study of the economic and social factors driving fundamentalist and militant Islamist movements is essential if Sudan and other Muslim majority countries are to transition into more democratic forms of regimes that uphold and protect the human rights of all their citizens."

This objective led Medani into what has become one of the most topical fields of academic study: the

Allen McInnis



It's been almost 20 years since a fundamentalist Islamist regime unleashed unprecedented levels of violence and terror on Sudan. Now Khalid Mustafa Medani is exploring the socio-economic conditions that gave birth to this dark period in his homeland's history—and continue to drive the worldwide politicization of Islam in the 21st century.

Islam?

roots of militant Islam. In 2007, he was among 21 scholars awarded prestigious Carnegie Scholarships from the Carnegie Corporation of New York, a philanthropic organization dedicated to “the advancement and diffusion of knowledge and understanding”; all of the 2007 Carnegie scholars were chosen because their work explores themes relating to Islam and the contemporary world.

“The rise of Islamic movements was important in Sudan and the Middle East and East Africa at the time,” says Medani, now an assistant professor of political science and Islamic studies at McGill, “but I had no idea how important it would become to the world after September 11, 2001. Sudan was the first Arab Sunni country to be taken over by fundamentalists, who overthrew a weak, but democratic, regime via a military *coup d'état*. Many people in Sudan and the Middle East, myself included, have long been aware of the danger of Islam in its militant form, but—although nobody could have predicted the events of 9/11—most analysts in the United States underestimated how these developments, far away from the West, would eventually engender global potential conflict.”

The Carnegie money—\$100,000 (U.S.) over two years—will allow Medani to perform the necessarily lengthy periods of extensive ethnographic fieldwork in Sudan, Somalia and Egypt. Over the course of his almost 20 years of research in the region, Medani has built a wide-ranging network of contacts and informants—including members and leaders of Islamist movements, disenchanted ex-Islamists and government bureaucrats—that will prove crucial to his ability to safely conduct interviews and engage in participant observation. “The Islamist movement is not monolithic in Sudan,” he explains. “Contrary to popular misconceptions, *jihadists* remain a minority in Muslim countries, so it is possible to conduct this kind of research with a careful eye toward avoiding the dangers that are present. But to do so requires having established long-term trust.”

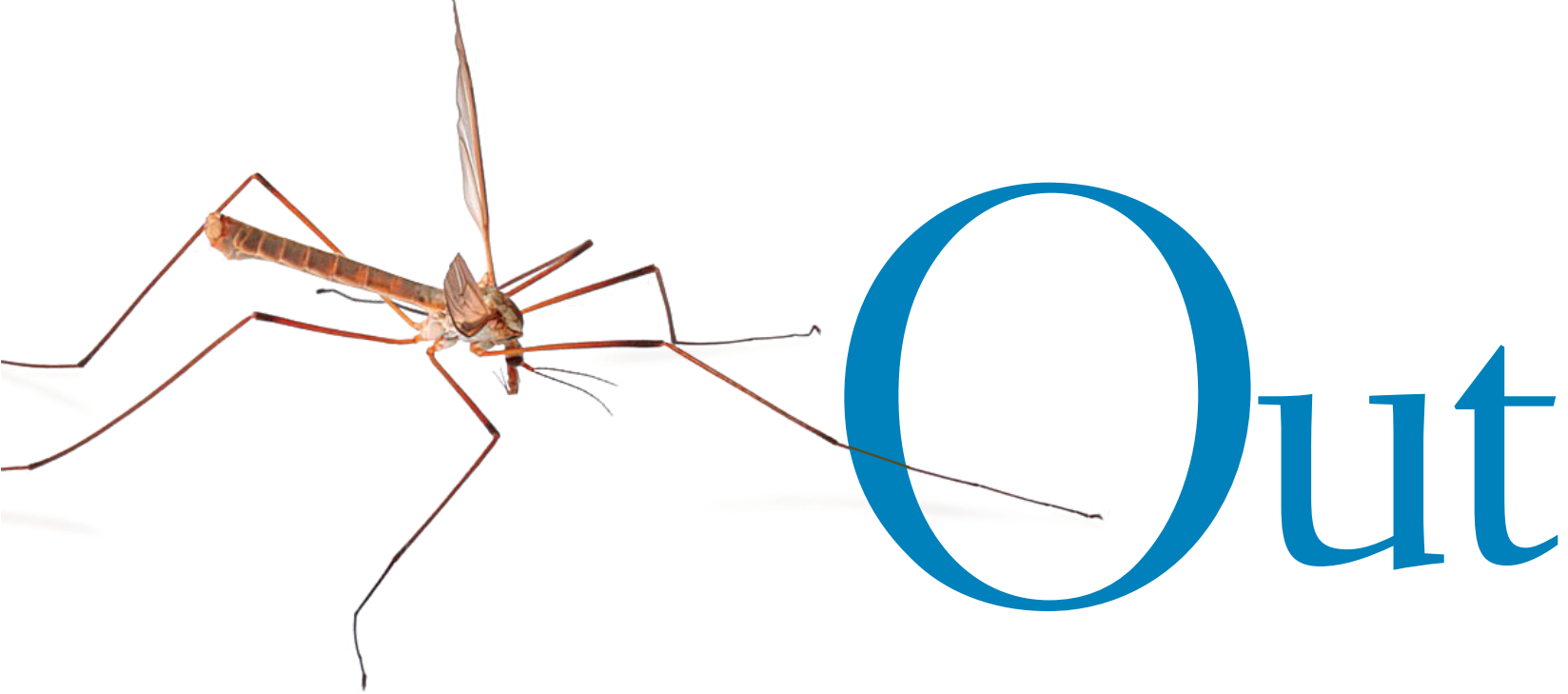
Medani disagrees with the essentialist, orientalist view that something inherent to Islam drives people to

violence. “The notion that Islam stands in opposition to Western values and outside global norms of rationality has been exaggerated,” he says. “There’s a long tradition in the academy of this paradigm, but it’s inaccurate. For one thing, it underestimates historical change—such as the increasingly dense political and economic cooperation between Islamic and Western countries—and the simple fact that the majority of Muslims practise their religion without recourse to violence or even engagement with politics. More crucially, it obscures the very real socio-economic roots of this movement and ignores issues of social inequity and the decline in the quality of life among many Muslims. Such misinformation is leading to a great deal of conflict between the West and Muslim countries, and it is dangerously obstructing any efforts toward international cooperation and security following the tragic events of 9/11.”

Medani is therefore focusing his attention on political economy. During the 1990s he was among the first scholars to stress the link between the expansion of informal economies and informal financial flows (i.e., the black market) and the financing that buoyed the successful rise of Islamist politics. (The Sudanese black market, for one, represents upwards of 30 per cent of that country’s economy—and was essential to bankrolling the 1989 coup.)

Such an approach is not always popular. “When you talk about the socio-economic roots of terrorism,” he says, “many assume that you are, in some way, an apologist for political militancy or even terrorism.” But he is undeterred by such accusations because of his passionate belief that his work will help promote political and cultural pluralism in the Muslim world—and make at least a modest contribution to improving understanding between Western and Muslim communities. Some years ago, Medani told his parents in Sudan that he wanted to write about more optimistic political developments. He has never forgotten their answer: “One should write about what is important to others, and what provides a genuine public service.” ■

Khalid Mustafa Medani (opposite) witnessed first-hand the devastation caused by Sudan's militant Islamist government. Now he wants to learn about the conditions engendering the politicization of Islam.



A semester in Africa offers students the chance to do hands-on research and critically engage with real-world challenges.

By Mark Reynolds

At the edge of a watery pit, university undergrads watch a Kenyan entrepreneur dig for clay. The clay will be used to make bricks, but bricks aren't the only thing the pit will produce: The standing water is an ideal breeding habitat for malaria-carrying mosquitoes. As the students draw in details—the water, the mosquitoes, the children playing nearby—they begin to make crucial connections.

From January to March, students travel in Kenya, Uganda and Tanzania as part of the annual Canadian Field Studies in Africa, a program designed to introduce them to current thinking on the interlinked nature of environmental and human problems. "Standing by the brick pits, we see the small end, the human end, of the funnel of Canada's interest in foreign aid," says McGill geography professor and CFSIA instructor Thomas Meredith. "We realize that the children are the ones made vulnerable to spreading malaria—the students ask if the children have or use bed nets. In classes on campus, we often consider why Canada seems so unable to reach even half of the 0.7 per cent GNP aid target that it has agreed to. On campus, it is an abstract discussion of policy and priorities. By the brick pit, we see the discussion with a human face."

Meredith has been going to Africa with CFSIA students since 1998. "It's an opportunity to teach in the field," he says. "Even with all the improvements in classroom learning—from PowerPoint to webcasts—there is nothing like being in the field with students. We're seeing things in their proper context, with all their links extrapolating out into the distance. In a classroom at home, we might learn that malaria takes 3,000 young lives per day in Africa. Here, we see villages struggling against environmental change, economic needs, failing policies—malaria is part of a complex picture of daily life."

Although McGill has been involved with the CFSIA for almost a decade, the University's role changed radically in 2004 when British Columbia's Langara

College transferred the program to McGill; the CFSIA was seen as a way to complement McGill's internationalization efforts, adding to the University's existing field research programs in Panama and Barbados.

Recent years have seen the CFSIA grow to become a model for honing the research skills of undergraduates. "The idea is that we're training future researchers," says Meredith. "It exposes students to real challenges, and to creative ways of thinking." The CFSIA curriculum has students learn in six modules of social and biological sciences, grouped around themes like water conservation, biodiversity and urban development. In addition, students work with African-based scientists, government agencies and non-profit research institutes (including UN-HABITAT and the International Centre of Insect Physiology and Ecology, both based in Nairobi, Kenya). Working with these institutional partners, students design their own research projects; topics are shaped by the UN's Millennium Development Goals, which include increasing access to education and reducing poverty and AIDS by 2015. The CFSIA students are "playing a part in a global agenda to meet these goals," explains Meredith. "It elevates what might be seen as simply an academic exercise into something much more serious."

For her research program last winter, Rachel Steed, a final-year international development studies student, studied access to health care in Kenya. She and her teammates interviewed a cross-section of Kenyans—in villages, in urban slums, in pastoral environments—to determine what Africans felt were the main barriers to accessing health care.

Many of the obstacles she discovered confirmed previous suspicions: poor infrastructure, too few doctors, high costs. But education proved to be a problem as well; some people won't seek health care because they do not realize they have a medical problem, or they would prefer to turn to spiritual or traditional remedies.



of the Classroom

"One of the main reasons was distance: It can take hours, sometimes, to reach a clinic," says Steed. She found that prospective patients often bring along family members, meaning both individuals lose a day's work: "That can affect the whole community."

Steed is using the data she gained on the ground for her honours thesis on barriers to health care in Kenya. She says the face-to-face contact was irreplaceable: "Their views about existing problems are often very different from those in the books."

While Steed took her African experiences home with her, other students have become so enthusiastic about their work that they've stayed beyond the three-month program. Alexandre Corriveau-Bourque first arrived as part of the CFSIA in January 2006 and plans to remain in Africa until March 2008. The international development studies graduate has devoted himself to

organizing a series of grassroots projects, at the behest of chiefs Calvin Ariko and Justus Ochwedo from the Lake Victoria community of Gembe East, Kenya.

"The chiefs had seen well-meaning NGOs flock by the dozens to the island of Rusinga, dumping obscene amounts of funding, providing temporary employment, but fuelling corruption," says Corriveau-Bourque. Compounding the problem was the fact the NGOs rarely provided feedback from knowledge they gained from their projects with the locals.

Ariko and Ochwedo asked Corriveau-Bourque and two other CFSIA students, Kathrin Gottwald and Katie Zulak, to gather data on incidence of disease, water and sanitation, infrastructure (schools, medical services, roads), food security and institutions able to coordinate development projects in the community. The students interviewed over 400 households and 100 local leaders

Professor John Galaty and McGill doctoral candidate Stephen Santamo Moiko give an open-air lecture on Masai culture to CFSIA students.



Courtesy of John Galaty

“

The professors not only considered us students, but also engaged us as colleagues and equals. They challenged us to critically analyze situations, and engage in discussions at a professional level.

”

– ALEXANDRE CORRIVEAU-BOURQUE



Courtesy Rachel Steed



Courtesy Alec Blair

McGill student Alec Blair (above, left) met with pastoralist Jackson Ngayami in Enosupukia, Kenya, to discuss issues of human-wildlife conflict.

Undergraduate Rachel Steed (above right) studied issues impeding health care access in Kenya.

to determine how the community perceived their conditions of life. During his final year at McGill, Corriveau-Bourque analyzed the resulting data and wrote a report which the community could use to prioritize the use of local resources. Immediately after he graduated from McGill, he returned to broaden this project, presenting his findings to the community and engaging in advocacy with local NGOs and government ministries. He began working with community leaders to help them identify and coordinate projects with locally available institutions and resources based on the report. Today, he is living in Nairobi, doing conflict research on an internship with the International Crisis Group, an NGO that uses field research and advocacy to prevent and resolve deadly conflicts. None of his activities, he says, would have been possible without the professors of the CFSIA.

“The professors not only considered us students, but also engaged us as colleagues and equals. They challenged us to critically analyze situations, and engage in discussions at a professional level.”

Alec Blair, currently pursuing a master’s in geography, is another old Africa hand. He signed up with the CFSIA in 2005, while on exchange to McGill from UBC. With an undergraduate degree in animal science, Blair was drawn to the conservation aspects of the field semester. He returned to Kenya in spring 2007 to gather the data that has become the basis for his thesis on conservation conflicts.

Using the Laikipia district as a base, Blair studied human-wildlife conflict, and its impact on conservation

management. Laikipia is home to hundreds of ranchers, co-existing, uneasily at times, with large populations of elephants, black rhinos and many other species. His goal was to interview locals about their wildlife conservation concerns, and learn what motivates their cooperation with efforts to protect the same animals that often threaten their livelihood and even their food sources.

In his first week of independent study in Africa after the field semester, Blair’s newly hired research assistant had returned to his home for a couple of days. “While he was there a hyena came to his home and killed one of his goats,” says Blair, adding that his assistant had to kill the hyena to protect the rest of his herd. “It was a real eye-opener for me—it really drove home how common these problems are.” Blair has found that local pastoralists are willing to participate in conservation efforts, if not for their own sake, then with the expectation that it will improve their lives. For ecotourism entrepreneurs, refraining from killing a troublesome elephant begins to make good business sense if visiting tourists are willing to pay to see the beasts.

Blair’s epiphany—and his desire to return to Africa—is typical, according to Professor Meredith, and a measure of the CFSIA’s success.

“It’s a germination process that has no ending,” he says, pointing out that the CFSIA students’ work directly supports the operations of their partner organizations, which, in turn, often invite the students to return. “There’s a real exhilaration with students when they stray from the classroom. They feel—correctly—that they are important actors in finding solutions for the global challenges they have studied at home.”

■ *The CFSIA is administered and supported by McGill’s Faculty of Science, in partnership with the Faculty of Agricultural and Environmental Sciences and the Faculty of Arts, and with contributions from the Redpath Museum, the School of Dietetics and Human Nutrition and the Departments of Anthropology, Biology, Geography, History and Natural Resource Sciences. The University of British Columbia is an official CFSIA partner; Queen’s University faculty and students also participate. Funds for student research are available through the Ministère de l’éducation du Québec, and the International Centre of Insect Physiology and Ecology provides in-kind and institutional support.*

Payam Akhavan
believes genocide can
be predicted—and prevented.

War Crime

Stopper

By Jeff Roberts

Payam Akhavan sips coffee amidst student chatter in a downtown Montreal cafe. Gentle eyes and salt-and-pepper hair complement the gracious voice that has persuaded everyone from first-year law students to the United Nations about his very big ideas on conflict resolution and genocide.



As chair of the October 2007 Global Conference on the Prevention of Genocide, Payam Akhavan helped bring together an unprecedented array of politicians, academics and people who know first-hand the horrors of genocide. On the final day of the conference, René Provost (left), director of McGill's Centre for Human Rights and Legal Pluralism, moderated a panel discussion on post-genocide nation rebuilding. Participants included Lt. General (ret.) Roméo Dallaire (middle), survivor and activist Esther Mujawayo (right) and—via videolink—some of Mujawayo's fellow survivors at the Kigali Memorial Centre in Rwanda.

Since his seminal article "Beyond Impunity: Can International Criminal Justice Prevent Future Atrocities?" was published in the *American Journal of International Law* in 2001, Akhavan has been regarded as one of the most influential human rights thinkers. "The world is the ultimate human rights laboratory," says the associate professor in McGill's Faculty of Law. His efforts to bring about reconciliation in Rwanda, Uganda, Bosnia, Cambodia, Guatemala, East Timor and other countries ripped apart by war and genocide have been integral in developing new frontiers for international justice. Driven by his personal encounters with survivors of atrocities, Akhavan is adamant that genocide is not an inevitable part of the future.

"Crimes like genocide are not spontaneous outbursts of ethnic hatred," he insists. "They are calculated expressions of political power." Akhavan points out that the 1994 extermination of Rwandan Tutsis required considerable preparation, and that the notorious RTLM radio station was the only source of information for a largely illiterate population. RTLM was instrumental in inciting people to hatred and genocide; had the world community jammed those transmissions, it might have defused the toxic political climate that begat large-scale massacres. "Genocide is not a natural disaster. It is a manmade disaster, a political choice, that can be predicted and stopped."

For Akhavan, early, low-cost interventions—combined with a world community attuned to the warning signs of genocide—are crucial for averting future atrocities. He believes that multilateral organizations like the UN, the North Atlantic Treaty Organization and the African Union can make significant contributions through simple steps, such as preventing hate propaganda or militia activity from metastasizing into organized atrocity.

When these interventions occur too late (or, as has so often been the case, fail to materialize altogether), Akhavan advocates turning to international criminal tribunals to punish the perpetrators of genocide. As the first Legal Adviser to the Prosecutor's Office of the International Criminal Tribunals for the former Yugoslavia and Rwanda, Akhavan played a key role in holding military and political leaders (including Slobodan Milosevic) accountable for their actions. He has also made significant contributions to the work of the recently founded International Criminal Court, the world's



first permanent institution dedicated to prosecuting individuals for genocide and crimes against humanity.

Akhavan's recent scholarship includes an article describing how the ICC has already been instrumental in rousting Uganda's murderous Lord's Resistance Army, whose 20-year insurgency victimized thousands of child soldiers. In response to a request from the Ugandan government, the ICC issued arrest warrants for four LRA figures based in neighbouring Sudan. The ensuing international pressure resulted in Sudan withdrawing their protection of the fugitive leaders and, as a result, the gradual collapse of the LRA.

As the ICC emerges as a forceful new tool to capture war criminals, its long writ also offers new possibilities for moving toward peace. Akhavan believes the ICC and its powers of arrest can act as an essential tool for marginalizing dangerous extremists. The Court's presence facilitates both the physical removal of war criminals and their stigmatization in the political arena. This in turn creates space in the victimized society for the re-emergence of peaceful political platforms and a civil social consciousness.



“

Genocide is not a natural disaster. It is a manmade disaster, a political choice, that can be predicted and stopped.

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— PROFESSOR PAYAM AKHAVAN

justice in a manner that accounts for local cultural traditions and information channels. In Rwanda, where there is high illiteracy and limited media, an appropriate means of reconciliation may, for instance, entail assembling large crowds in a soccer stadium to witness a trial, or to supplement international tribunals with *gacaca*, a form of grass-roots community justice based on village assemblies.

His unrelenting but pragmatic commitment to human rights has allowed Akhavan to transcend familiar divides between legal idealists and real-world power brokers; through face-to-face meetings and his scholarship, he is recasting the protection of human rights in *realpolitik* terms. This combination was on display in October 2007 at the Global Conference

“It is important to focus on the role elites play in creating what I call aberrant contexts of instigated hatred,” he says, “in which lawful people are swept into a vortex of self-perpetuating violence and reprisal. Since political leaders resort to hatred and violence as instruments of power, we must change the cost-benefit calculus and send the message that crimes do not pay, that gains made by ethnic cleansing and genocide will not be legitimized after the fact.”

Although a strong champion of international tribunals and the ICC, Akhavan is candidly realistic that their primary strength is the ability to warn political elites that genocide can no longer be perpetrated with impunity. Helping victims to heal—and to feel justice has been served—is more complicated and requires a measure of local participation and ownership.

“For the people of Rwanda, many of whom have never left their villages, the Tanzania-based tribunal might just as well be in Vladivostok,” he says. “Justice must be done, but it must also be seen to have been done by those directly affected.” International bodies and civil society, he continues, must help implement

on the Prevention of Genocide, held at McGill. As the conference chair, Akhavan helped bring together renowned figures from politics, academia and the military—as well as genocide survivors—to discuss human rights. The conference was an exceptional meeting of those on the front lines of atrocities and more remote decision-makers who have the means to prevent such violence. An International Young Leaders Forum also brought together 35 outstanding youth from around the world in a conversation with contemporary leaders to consider a future free of genocide. The conference gave rise to numerous initiatives, ranging from leadership seminars in Ethiopia to reform of the UN mandate on the prevention of genocide.

“The challenge for human rights remains to change what is a reactive culture into a preventive culture. The most important measure of success for the United Nations in the next decades will be what does not happen.”

■ *The Global Conference on the Prevention of Genocide was sponsored by the Echenberg Family.*

This Land is *Your* Land?

Courtesy of Jon Unruh

As migration, a burgeoning ecotourism industry, and even the growing international conservation movement have stepped up pressure on the land and its people, concern over environmental fallout in Zambia and Kenya is increasing—but a solution may lie in a new way of thinking about land tenure.



Claudio Calligaris



By Andy Blatchford

Over half of Zambia's estimated 12 million people live outside urban centres—and, with low-to-none net rural out-migration, issues surrounding rural land use remain extremely germane to many Zambians. Case in point: the country's southern woodlands on the outskirts of Kafue National Park. There, black rhinoceros, wild dogs and elephants have found a place to feed. Humans have found something in those woods, too. Clinging to the hope of starting a new life, migrants from the overpopulated and severely degraded lands around Lake Kariba, which straddles Zambia and Zimbabwe, have been flooding into the region. As each year brings more people, the natural haven is being consumed.

What is, on the surface, an ecological issue has unexpected roots: land tenure policy, or the rules governing who has the right to occupy a specified area. The Kafue region, like much of rural Zambia, is divided into chiefdoms in which chiefs and their headmen allocate land to would-be settlers. Settlement cannot occur without this approval, but the headmen are often inconsistent in their methods, applying different rules to different groups of applicants. An indigenous farmer, for example, might be given land whenever it is needed, while a migrant farmer may only receive a one-time allocation of land.

Having successfully gained access to land, settlers still don't "own" it—in the traditional Zambian mindset, land isn't a commodity—but indigenous settlers generally feel secure in their holdings. Their migrant counterparts, on the other hand, live in the very real fear that the headmen will subdivide, and reallocate, property they believe is unused. Subdividing properties increases a chiefdom's population, which boosts the chief's power on the Zambian government's Council of Chiefs—and, with large numbers of migrants entering the Kafue region, there is no shortage of potential settlers eager to snatch up these newly liberated plots. Migrant settlers are therefore anxious about ceding portions of their land to other newcomers—so anxious, in fact, that they're driven to the extreme measure of hacking down all their trees to show every inch of the plot is needed, even when it's not. The deforestation resulting from "clearing to claim" has helped make Zambia the country with the fourth largest annual net loss in forest area, according to the UN's *Global Forest Resources Assessment 2005*. In the vicinity of Kafue National Park, such deforestation decimates the habitats of already endangered species, such as the wild dog and black rhino.

"A significantly large percentage of total deforestation is due to what we call tenure insecurity," says Jon Unruh, an associate professor of human geography specializing in international development. Unruh also sits on the Zambian Association of Geographic

Information Systems, a group of university researchers and government officials which offers input into the Ministry of Lands' reconstitution of land tenure policy. "The question is, what form of tenure security for migrants might exist other than clearing to claim?"

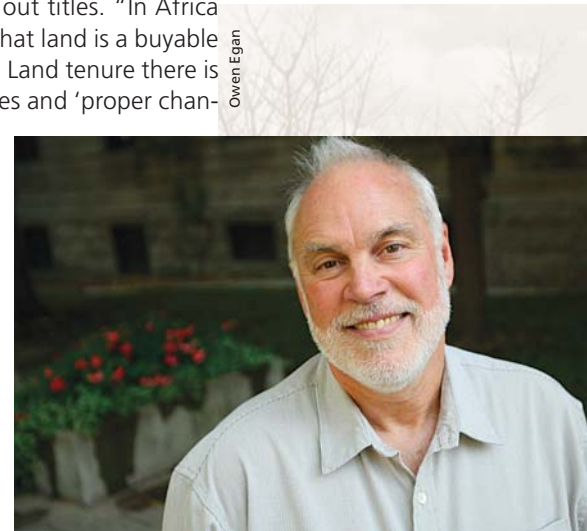
There's a philosophical gap between Western formal land law and customary or indigenous property rights, he says, that makes solving tenure insecurity a lot more complicated than handing out titles. "In Africa and the Middle East, the notion that land is a buyable or sellable thing doesn't connect. Land tenure there is not based on paper titles, registries and 'proper channels.' It is based on complicated things like world view, culture, identity, food security, personal security and group belonging."

A Kenyan research project, conducted over several years, found that handing out titles did not lead to privatized holdings or the flourishing of a Western-style land market. "We've learned that superimposing titles on the land doesn't work," Unruh says. "This Western idea of a land title really isn't all it's cracked up to be

in terms of solving large social problems. Titles are meaningless unless an entire land system is in place, and widely accepted by the population. The communal system of land economy can't be changed simply by handing out pieces of paper."

Working with colleagues at the University of Zambia and Uganda's Makerere University, Unruh is searching for "middle-ground ways that an outside settler and the local community, which holds the land, can both find security in the land tenure arrangement." Unruh's team conducted a rural household survey of more than 600 randomly selected migrant and non-migrant households, looking at land tenure security and the different kinds of evidence held, presented and needed for making and retaining claims to land. He's hopeful that a hybridized form of land tenure, which incorporates indigenous and formal law, could be the system of the future. In this model, land allocation would still be approved by chiefs and headmen, but there would also be an opening for the state to settle disputes. "It would add an extra degree of security, and subtract a degree of capriciousness from the whole arrangement, so there's something other than just the headman's feeling, from one day to another, about whether you're going to keep your land.

"Such an arrangement needs to be enticing for the local leadership, and in step with customary ways of dealing with identity and relationship to the land," he explains. "At the same time, there needs to be a state



Owen Egan

In a traditional Zambian chiefdom, property demarcation—denoted by removing a chunk of tree bark (opposite, top)—is often subject to the whimsy of headmen. Human geography professor Jon Unruh (opposite, bottom) says such capriciousness contributes to settler insecurity. Anthropology professor John Galaty (above) is also studying land tenure issues, focusing on issues of subdivision in Kenyan rangelands.

presence—but if the state is too heavy-handed, the chiefs will disengage. It’s a difficult balance.”

On the eastern side of the continent, McGill researchers are also taking a close look at the effects of land tenure on the usage and conservation of environmental resources. Research pursued over the last decade by John Galaty, professor in McGill’s Department of Anthropology, has shown that two innovations in land holding have had significant effects on the last 20 years of wildlife conservation in the rangelands of Kenya.

The first factor: subdivision. Many relatively large group ranches, held by communities, have been subdivided into family holdings; this fracturing results in increased crop cultivation (and, consequently, a

reduction in grazing lands) and fencing (disrupting the free movement of wildlife). Galaty observes a conflict between reducing land holdings to smaller parcels and ensuring rancher-pastoralists the flexibility to move their livestock across sufficiently large areas of land to accommodate the extreme variation in rainfall found in Africa’s drylands. For this reason, larger-scale ranches tend to be more self-sufficient, producing better results in livestock production and less environmental damage. “As subdivision occurs and people are using smaller and smaller parcels,” he says, “degradation tends to follow.”

With the help of McGill doctoral students, Galaty has studied what happens when complaints arise after land is allocated among group ranch members, then sold to outsiders. The researchers discovered how, in the absence of disinterested government oversight, the local committees that oversee subdivision are readily bribed to favour outsiders or politically influential people over local herders. “It’s been terribly disruptive in terms of land holding, in terms of conservation, in terms of the local economy.”

Subdividing group lands has also created sub-economic units that are simply too small. “They’re ecologically unstable or insufficient,” Galaty says. “As much as they are able to keep these ranches undivided, the better off they will be.”

At the same time that the government was encouraging subdividing, many individual and group holdings were converted into wildlife trusts, providing more expansive areas for wildlife migration and facilitating the participation of communities in conservation and tourism. Ecotourist companies and

international conservation groups, such as the World Wildlife Fund, forged agreements with community conservation groups that provided communities with revenues, support for community projects, jobs and tourist infrastructure (such as tent-camps, lodges, roads for game-viewing).

The Kenya Wildlife Service manages protected areas, but is also responsible for wildlife wherever it is found. Thomas Meredith, associate professor in McGill’s Department of Geography and director of the undergraduate Canadian Field Studies in Africa program (see story on page 14), points out that, in principle, the KWS is guided by conservation principles consistent with international scientific norms, and its programs tend to focus on national and global objectives. But, Meredith stresses, programs must be managed “on the ground,” where local objectives are important. Local needs and expectations can vary considerably, presenting real challenges for wildlife managers. For example, pastoralists bear the burden of human-wildlife conflicts: Protected wildlife cannot be fully confined to the parks, threatening crops, livestock, property and people when it wanders into settled areas. “Elephants cause the most damage to crops, but predatory animals—lions particularly—will kill domestic animals and injure people,” Meredith says. “It’s a very significant cause of potential conflict and it can mean very real losses to the people who have what they see as an historic right to the land.” What’s more, pastoralists receive little or no compensation for their losses, and—although there is some ecotourism revenue-sharing—they may enjoy few benefits from wildlife conservation and tourism. Meredith observes that if more of the profits from tourism were allowed to reach locals, those living on intensively used agricultural plots or pastoral holdings would lend stronger support to the ecotourism industry and the conservation movement. His graduate and undergraduate students have been examining damage to farmland, mitigation for losses and how best to involve locals in decision-making processes for land use, property access and resource issues.

“I think our work could help reduce the conflict between the people who feel that they’re victims of the conservation agenda and people who recognize that there are real benefits of having successful conservation programs in Kenya,” he says. “The local inequity of the distribution of resources is increasingly evident and, I think, increasingly volatile.”

■ *This research is funded by the United States National Science Foundation, the Social Sciences and Humanities Research Council of Canada, the Fonds de la recherche en santé du Québec and the Fonds pour la formation de chercheurs et l’aide à la recherche.*



Owen Egan

Geography professor Thomas Meredith is exploring ways to reduce land tenure conflict between Kenyan pastoralists and conservationists.



Photo: Paul Myhill

HIV/AIDS is a global scourge. According to UNAIDS, the Joint United Nations Programme on HIV/AIDS, an estimated 33.2 million people are infected with the human immunodeficiency virus. The countries of sub-Saharan Africa, however, bear a disproportionately high burden: Although SSA has slightly more than 10 per cent of the world's population, it is home to an estimated 68 per cent of all people infected with HIV; the mortality rate is even more unbalanced, with the region claiming some three-quarters of all AIDS-related deaths. Between 20.9 and 24.3 million people are living with HIV in SSA, and an additional 1.4 to 2.4 million people were newly infected with the virus in 2007 alone.

Africa does not have an AIDS epidemic—it has many, and they vary in intensity from country to country, from region to region. Some of these epidemics, particularly in the southernmost countries, are exploding. Others are in decline, evidence of a gradual,

but no less significant, turning of the tide. Uganda, for example, initiated effective prevention efforts (such as campaigns to promote condom use) specific to local cultural contexts, contributing to a recent drop in adult national HIV prevalence. In laboratories, researchers have created better, simpler antiretroviral treatment regimens now able to keep a person with HIV healthy for decades—and these drugs are slowly (much too slowly, many would argue) becoming more affordable and available. Without a doubt, there is much work to be done, and the challenges are great. But, where there was once only suffering, there is now also hope.

The following pages profile seven of McGill's many HIV/AIDS researchers who are working with African colleagues to reduce risk, decrease vulnerability and lower the impact of this most harrowing disease. ■

From Despair to

By Andrew Fazekas

The numbers are indisputably grim—the *UNAIDS AIDS Epidemic Update 2007* reported that AIDS annually claims more than two million lives—yet, in the past 25 years AIDS has moved from a guaranteed death sentence to a serious chronic illness. Three McGill virology and immunology investigators, all longtime AIDS researchers, are working to understand how HIV is transmitted, how it evolves to foil drug treatment and how to best disseminate crucial knowledge—and increase hope in a once hopeless situation.

THE BOTSWANAN SUBTYPE

As an advocate for HIV/AIDS policy reform, Mark Wainberg isn't afraid to make noise. Whether debating Kenyan president Daniel Arap Moi on the subject of condom promotion, or waving a placard proclaiming "Put the Sex and Drugs Back in HIV Prevention" at the 2006 International AIDS Conference, his is a very public battle. But there's another side to this firebrand scientist. In the McGill University AIDS Centre's new \$5-million high-security biocontainment lab at the Jewish General Hospital, Wainberg and his colleagues have been waging a quieter war—on the microscopic scale.

Wainberg is the director of research at the hospital and director of the AIDS Centre—and recognized as a world expert who has made multiple contributions to the field of HIV-fighting drugs. His late-eighties identification of the anti-viral properties of the 3TC drug, for one, was a revelation; today 3TC is a vital part of a drug cocktail that delays the onset of many of AIDS' worst symptoms. But, because today's drug may prove useless against tomorrow's virus, HIV is a moving target. To zero in on the growing problem of drug resistance, Wainberg is working jointly with the Harvard AIDS Institute to establish study sites in Botswana. "It's an extremely important subject because HIV mutates all the time and is capable of becoming resistant to every single drug that we've developed," says Wainberg. "HIV changes even faster than the influenza virus, making it a huge problem for researchers." But time is not on their side. Worries are that we may be on the verge of a dramatic surge in cases of drug resistances among those currently taking the antiretroviral therapies throughout Africa.

That's why Wainberg and his team's discovery of a unique genetic variability in the HIV virus in Botswana is all the more timely. By sampling the blood of thousands of infected volunteers, they sequenced the DNA of the virus and revealed that the specific subtype of the virus (known as subtype C) circulating in Botswana is different from that which dominates Europe and North America. The mutation process and the effect of

drugs on that process, researchers are learning, appear to vary from one subtype to another. The virus found in Botswana may be one of the most genetically variable of all the subtypes, but the nature of those specific drug-resistant mutations remains a mystery.

Wainberg speculates that the implications of this ground-breaking project (primarily funded by the Canadian Institutes of Health Research, with additional funding from the International Partnership on Microbicides—which includes researchers from Kenya, Mozambique, Namibia, Nigeria, South Africa, Tanzania, Uganda, Zimbabwe—and the Fonds de la recherche en santé du Québec), may be far reaching. "These findings could potentially have important ramifications on how we can bring treatments not only to the entire African arena, but beyond." He next hopes to expand the study northward to Cameroon and the Ivory Coast.

ZIMBABWE'S INFORMATION GOLDMINE

Working on HIV/AIDS tests patience and perseverance. For Dr. Brian Ward, the potential for making huge positive impacts—both on patients and the overall health care community—keeps him coming back. A world authority in infectious diseases and immunology, Ward is the past chief of the McGill University Health Centre's Division of Infectious Diseases and is also associate director of the McGill Centre for Tropical Diseases.

Starting in 1996, Ward and his colleagues at Johns Hopkins and at the University of Zimbabwe began tracking mothers and babies in and around Harare, Zimbabwe. The two-year study, one of the largest of its kind, explored the protective effects of administering vitamin A to newborns and their mothers. While the results unfortunately did not show the expected protective effect, a veritable goldmine of data was collected in the form of breast milk, blood and DNA samples from more than 14,000 women and their babies; these precious samples filled 15 freezers. Ward believes these samples may hold the key to understanding the mechanisms that underlie mother-child HIV transmission.

The country's political and economic turmoil over the last decade, however, has spilled over to directly affect Ward's planned follow-up research projects. The increasing tensions within Zimbabwe have made it difficult even to maintain the safety and integrity of the sample archive, let alone use it to full scientific advantage. Any attempt to transport the archive out of Zimbabwe would likely be met with serious resistance; like many others in the developing world, the government of Zimbabwe has decreed that Zimbabwean samples should not leave the country. This factor, compounded by political uncertainty, makes



Hope

On the virology and immunology front lines, McGill researchers are working to help turn the HIV tide.

it difficult to impossible to work with the archived samples both inside and outside the country.

While the archive awaits more detailed genetic and immunologic analyses, Ward and his principal collaborator, Jean Humphrey from the Johns Hopkins Bloomberg School of Public Health, have forged on. The researchers have developed a community-focused program that integrates mother-to-child HIV transmission prevention into established maternal and child health units at a steadily growing number of Zimbabwean mission hospitals. This program, funded by the Canadian International Development Agency and the United Kingdom Department for International Development, is based on their observation that early mixed feeding (adding anything to a child's diet other than breast milk) can markedly increase HIV transmission. They are currently exploring ways to support women to breastfeed exclusively for the first six months and then wean abruptly to alternate foods, a "simple" intervention made very difficult by rapidly rising inflation rates. Their program also incorporates the administration of anti-retrovirals around the time of birth, nutritional supplementation and efforts to bring the entire community together to slow the spread of HIV. These investigators are currently helping more than 20 hospitals reduce vertical transmission of HIV.

REMOTE CARE

If Dr. Christos Tsoukas gets his way, soon HIV patients in remote regions will have access to the world's best health care, thanks to the broad reach of telemedicine. Using electronic communications technology, consultative, diagnostic and treatment services can be transmitted across great distances, bridging once-prohibitive geographic gaps. "Teaching—educating both patients and their local doctors—is all part and parcel with telemedicine," says Tsoukas, professor of medicine and experimental medicine, associate director of the McGill AIDS Centre and head of the Division of Allergy and Clinical Immunology. "It's all about conveying information to keep people alive in a timely and concise fashion."

The internationally renowned AIDS researcher has just wrapped up a three-year, CIHR-funded feasibility study to develop artificial intelligence tools to determine the best course of treatment for HIV patients. The project involved nine research centres located on five continents, making it readily apparent that innovative ways of capturing data and communicating with his colleagues was required. The solution: link the McGill University Health Centre, the Benghazi HIV Children's Centre (Libya), the Postgraduate Institute of Medical

Education and Research (Chandigarh, India), a public hospital in Athens, Greece, and a clinic in Brazzaville in the Republic of the Congo in real time using the Internet.

The idea to use telemedicine came to Tsoukas three years before, when he had a rare opportunity to examine an HIV outbreak among 427 Libyan children. Because of diplomatic sanctions and a trade embargo, very few outside physicians were allowed to visit the North African country and medical supplies from the West were limited. Tsoukas noticed that the Libyan staff, although professional, lacked the knowledge of how to manage patients and use available treatments. These deficiencies had the potential to hinder the children's well-being. "They had to treat patients from scratch because the centre didn't have an ongoing program of education," he recalls. "The staff had no means of attending international conferences, limited access to the important medical journals and no knowledge of new therapies that were in current use in the West."

By integrating technological elements of broadband Internet communications and information technology, Tsoukas's multidisciplinary McGill team hopes to provide patient care, training and coaching of medical workers so that those infected can be managed efficiently over the long term.

"This can be a chronic disease and people are going to have it for the rest of their life, thus we want to make sure that they're controlling the virus for years, not days," says Tsoukas. "But laboratory tests, monitoring and graphical representation of data are required to allow doctors to easily identify any developing trends and thus improve long-term management."

Tsoukas first encountered the deadly virus back in 1982 when he was one of the first scientists to show that hemophiliacs who were receiving blood products were at high risk of developing AIDS—and, therefore, that the general population was also in danger of contracting HIV through transfusions of donated blood. Before anti-HIV treatments were available, he remembers seeing a patient die every three days. "It was depressing during those bleak early years of the epidemic," he recalls. "We had little to offer our patients. Today, many people with HIV are living normal lives because of the availability of new anti-HIV drugs. Despite this progress, I find it necessary to continue my work on HIV vaccine development and to focus on teaching young doctors, both at McGill and abroad. I want to make sure that one day soon no one in my care will die from the disease." ■

A photograph of a person standing with their back to the camera, looking out of a window in a wall. The wall is made of a textured, reddish-brown material. The person is wearing a light-colored sweater and shorts. The background behind the wall is a patterned, light-colored surface.

Children of HIV

Researchers are looking to sociology, education and social policy to help slow the spread of AIDS among young people in southern Africa.

By Chris Atack

The children and youth of today never knew a pre-AIDS world. In 2007, UNAIDS reported that between 2.2 and 2.6 million children under 15 years old were living with HIV worldwide, with an estimated 420,000 of them having been infected within the year. While virologists strive to make the disease history for future young people, three McGill researchers are taking a hard look at today's reality by exploring the social factors contributing to the rate of HIV transmission among youth in Malawi, Rwanda and South Africa—and how to better care for those whose young lives have already been shattered by AIDS.

THE MARITAL DISCONNECT

Controlling the spread of HIV in many sub-Saharan African countries continues to be a major challenge. Part of the problem may be faulty assumptions about how the virus is transmitted, according to Shelley Clark, associate professor of sociology and the Canada Research Chair in Youth, Gender and Global Health.

“Until recently, governments and aid agencies assumed that HIV was being spread largely through high-risk behaviour such as participation in the sex industry,” explains Clark. “They devised prevention campaigns based on this assumption. In some regions of sub-Saharan Africa, however, marriage may be one of the biggest risk factors for acquiring HIV. When I began studying girls in SSA who marry before age 20, I found they were at far higher risk of HIV infection than single, sexually active girls.

“In some ways this was predictable. Where AIDS has become a generalized epidemic a large and growing proportion of new HIV infections occur within marriage, and so the ABC approach to prevention—abstinence, being faithful to one partner and condom use—breaks down. Abstaining isn't a serious option, not every husband or wife is faithful, and condom use within marriage is difficult, especially if a couple is trying to have children. Obviously, we need to rethink our approach to protecting people within marriage.”

Clark also found what she calls “a disconnect” in the research on premarital and marital sex in SSA. “In North America and Europe, we tend to think of premarital sex as a preliminary step towards marriage,” she says. “The idea isn't that you'll marry any particular partner but that you are working towards a more permanent union. In sub-Saharan Africa, however, many AIDS researchers, and hence AIDS prevention policies, do not view premarital sex as part of the process of looking for a marriage partner. Rather, they tend to focus on so-called ‘high-risk’ transactional sex, motivated by financial gain, and largely ignore the importance of marital aspirations. To understand the role of marital aspirations in governing premarital sexual behaviours, I'm looking at how adolescents in Malawi view their premarital partnerships and what this tells us about HIV risk.”

GENDER RISK

While many people are infected by their spouse, in countries such as South Africa, rape is also an all-too-



common means of HIV transmission. Claudia Mitchell, James McGill Professor in the Faculty of Education and a specialist in gender-related violence, has worked in South Africa for many years; she reports that the rates of HIV there are four to five times higher in women, largely because of their social vulnerability.

"Many young women's first sexual encounters are likely to be non-consensual," she explains. "This means gender is a risk factor for HIV. Girls' inability to negotiate safe sex and their lack of power in most sexual relationships mean that gender violence is a critical feature of the epidemic."

Mitchell has published her findings about the scope and nature of gender violence in her book *Combating Gender Violence*. Now she is working with colleagues in Africa to develop effective interventions. "In Rwanda, we're working with health care professionals to encourage young women to report rapes and to have follow-up HIV testing," she says. "Involving teachers, parents, young people and health care workers in the documentation process is the beginning of intervention."

"In some areas with high levels of gender-based violence, we set up workshops and ask participants to think about the critical features of their lives and about the challenges and possible solutions to the AIDS epidemic. We give them cameras or encourage them to draw. Over and over again they show that gender violence and AIDS are big problems. The photographs they take or the drawings or the videos they produce help raise awareness in their own communities. When 14-year-olds in a local community create posters in their own language saying 'this is a problem,' people find this more effective than a poster from a large international aid organization.

"For example, one dramatic picture shows a group of children simulating the hanging of a young boy. The caption is 'I'm HIV positive. I might as well be dead.' Another group of girls were allowed to take pictures of anything in their community. They took pictures of the toilets. Why? Because the toilets are so far in the bushes that they are critical sites for gender violence. We showed these pictures to the teachers and they said, 'We know toilets are in disrepair but we never thought girls would actually see them as a major source of violence.'"

Beyond empowering people to discuss the problems of HIV and gender violence, Mitchell and her colleagues are studying ways to ensure local people have a strong voice in policy making.

"Recently, I traveled around Rwanda with two local consultants, bringing together groups of women and children and asking them to talk about issues that they thought needed to be addressed in a policy on gender-based violence and violence against children," says Mitchell. "We gathered data to help inform policy making by senior ministry people. As much as possible,

we tried to use the words of the participants themselves as a way to draw attention to the issues. We're now training government officials to involve participants, especially children and young people, in policy making around critical issues such as gender violence, HIV/AIDS, poverty and the vulnerability of orphans."

ORPHAN CARE

A child need not be infected to have his or her life turned upside down by AIDS. Orphans are one of the most tragic byproducts of the epidemics. Studying their plight—and what to do about it—is a research focus of Dr. Jody Heymann, founding director of the Institute for Health and Social Policy at McGill University and Canada Research Chair in Global Health and Social Policy.

"I've been involved in AIDS-related research in Africa for two decades now," says Heymann. "At the Institute, in addition to working to reduce risks of HIV transmission and increase access to treatment, we're currently focused on how best to help meet the needs of the 15 million children in sub-Saharan Africa who have been orphaned by AIDS. Raising and educating these children, and helping the families who are caring for them to survive economically is an enormous challenge.

"To help tackle this challenge, we have studied a number of projects aimed at helping families exit poverty while caring for orphans. While there is no single 'right' answer, our goal is to work with program leaders and policy makers seeking to provide the supports that millions of families living with HIV, caring for HIV-infected family and friends, and caring for orphans need."

■ *Funding for this research includes the Social Sciences and Humanities Research Council of Canada, the National Research Foundation (South Africa) and the Population Council in New York.*

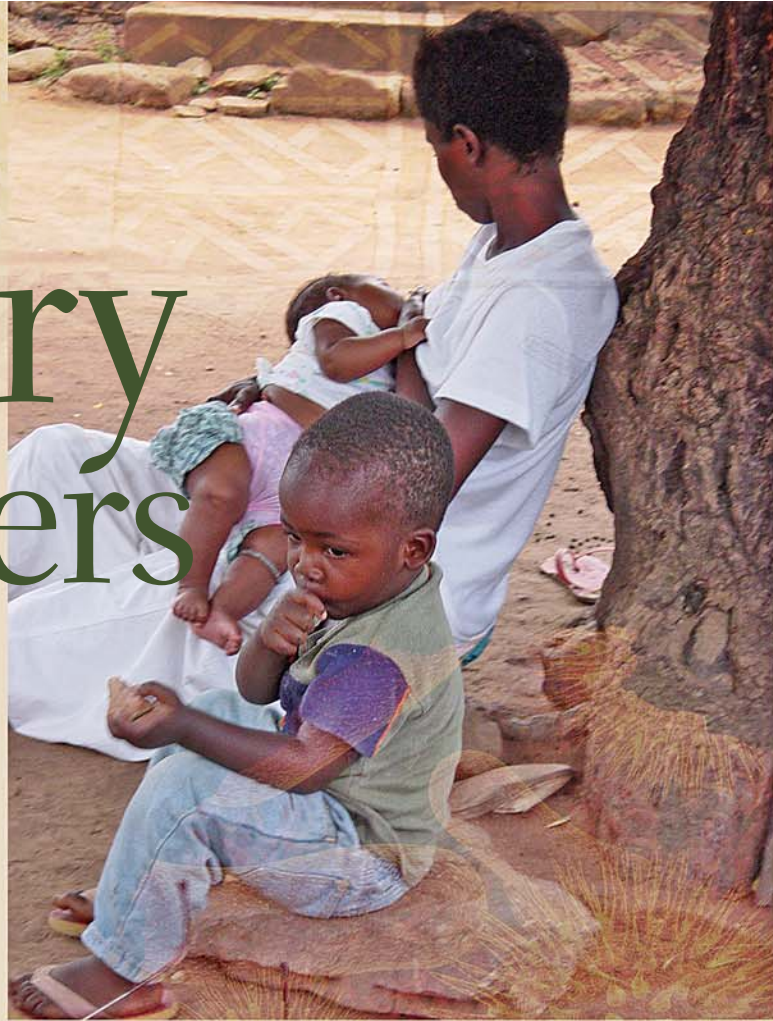
Education professor Claudia Mitchell (below, top) explores issues of gender violence and HIV among Rwandan youth. One project involved having teenagers express their concerns through art, such as the photo on the opposite page. "This girl is standing alone because she is HIV positive," explained the teenage photographer, "and her friends have left her because they think she might infect them or other children."

When it comes to HIV prevention, it's important to understand cultural differences concerning topics such as pre-marital sex, says sociology professor Shelley Clark (below, middle), who has conducted extensive research in sub-Saharan African communities.

Jody Heymann (below, bottom), founding director of the Institute for Health and Social Policy, is helping policy makers better support families living with HIV.



Hungry for Answers About HIV



In Ghana, Grace Marquis is exploring the relationship between infant health, HIV-positive mothers and breast milk. And it's not what you think.

By Andrew Mullins

When one thinks about infant mortality due to malnutrition, chances are good that archetypal media image of famine spring to mind: the pictures of children bereft of fat or muscle, the proverbial collection of "skin and bones." But, according to Grace Marquis, associate professor in the School of Dietetics and Nutrition and the Centre for Indigenous Peoples' Nutrition and Environment (CINE), such extreme cases actually account for only 17 per cent of child malnutrition deaths in developing countries. It's mild to moderate malnutrition, she's learned, that kills more kids. "You look at these children and think they're perfectly fine," she says. "For many, their weight may be low but, because they also are stunted—they have a low height for their age—the malnutrition is not so obvious." This is not the only surprising revelation stemming from Marquis' current work in Ghana.

A BIG RIING

Marquis is collaborating with researchers from the University of Ghana, Iowa State University and the University of Connecticut to study how the HIV status of mothers in eastern Ghana can affect the diet and care of their children. The \$1.5-million, five-year Research to Improve Infant Nutrition and Growth

(RIING) project is part of a U.S. National Institutes of Health campaign to strengthen the research capacity of sub-Saharan institutions. The RIING team's findings may eventually save lives and promote healthier childhoods for millions.

The RIING research is ambitious, recruiting 450 mothers from the Manya Krobo district of eastern Ghana. The region has the country's highest incidence of HIV—around 4.7 per cent—and poverty is the norm. The mothers are equally selected from three groups: HIV-positive, HIV-negative and women of unknown HIV status. Beginning during pregnancy, and lasting until the child turns one year old, the researchers gather painstakingly detailed data. They collect demographic basics (age, sex, education level, occupation) about each occupant, as well as socio-economic information (including indicators of cumulative wealth and notes about the housing's physical quality). The researchers also monitor the family's agricultural practices and household food security as defined by the Food and Agriculture Organization. (According to the FAO, "Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life.")



COMPREHENSIVE MONITORING

The stigma attached to HIV is strong in Ghana. Although there is generally a good understanding about true transmission routes (sexual behaviour, needle sharing, mother-to-child), there remain misconceptions that HIV can be spread through direct contact; religious beliefs, gender biases and notions equating HIV with infidelity also contribute to the confusion. As a result, HIV-positive women risk being kicked out of their houses by their partners or family, losing access to secure living quarters and food for themselves and their children. Researcher-subject confidentiality is therefore crucial. The RIING staff stress that the study is related to child growth and health; HIV is never publicly mentioned, and only the field supervisor knows the participants' health status.

RIING field workers, all women mostly from the region (and fluent in at least one of Manya Krobo's nine official languages and numerous dialects), visit the households twice weekly to collect information on the health of both mother and child. Once a month they gauge how well the children are growing by measuring weights and heights, and the circumferences of their heads, arms and chests. The team also carefully monitors each child's diet, tracking daily nutrition and noting whether the child is breastfed or has received water, dairy products or other foods. Every three months, the researchers conduct a 24-hour monitoring of dietary intake, which includes weighing the breastfed child before and after feedings to measure the intake of milk.

The comprehensive monitoring of the women sounds invasive, Marquis admits, "but what we've found is that once a mother has participated in the process, the next day they're asking, 'When are you coming back?'" The field workers provide a level of companionship and camaraderie that is very attractive to the moms.

MAXIMIZING MOTHER'S MILK

Breastfeeding is of particular importance to the researchers. The World Health Organization has recommended that if HIV-positive women do not have access to safe water and can't afford adequate formula, they should practise exclusive breastfeeding—no water or food other than breast milk—for a full six months. The WHO's advice may seem to be counterintuitive, notes Marquis, but is medically sound.

"You would think less breast milk from an HIV-infected mother would be better," she says, "but when you exclusively breastfeed, your child has a healthy gut. When you introduce non-breast-milk foods to young children before the age of six months, you increase the risk of damage to the gut mucosa [the inner lining of the gastrointestinal tract], so the children are more susceptible to infection." The child's risk of HIV infection therefore actually decreases when the child is exclusively breastfed by an HIV-positive mother. Further,

when this breastfeeding is combined with the drug nevirapine during childbirth, and a postpartum regimen of anti-retroviral drugs, the risk of mother-to-child transmission of HIV can be reduced dramatically.

There has been a concerted, nationwide effort by the Ghana Health Services and NGOs working in the area of child health to encourage exclusive breastfeeding and continued breastfeeding with complementary feeding. As a result, Ghana's overall breastfeeding rate is high: A 2003 national survey reported one-third of mothers exclusively breastfed at six months, and the mean duration of any breastfeeding was 23 months. (In North America, only about 10 per cent of women breastfeed beyond 12 months.) Still, RIING's preliminary findings indicate that the early breastfeeding practices of HIV-positive women in Manya Krobo remain less than ideal. "They're more likely to practise mixed breastfeeding—alternating breast milk with traditional porridges such as koko—a corn-based gruel low in energy and nutrients—in comparison to the mothers who are HIV-negative," says Marquis. "This mixed feeding behaviour is the opposite of that which is recommended because of the increased risk of diarrheal diseases, malnutrition, as well as HIV transmission. So you need to make sure that the message you're giving about exclusive breastfeeding is reaching those most at risk: your HIV population."

GIVING BACK

There is still much data to gather and analyze, and several years before all of the results are available. "Maybe what we'll find is that food supplementation programs are needed for children of HIV-infected mothers, regardless of the child's HIV status," suggests Marquis. "Or it could be that social systems are falling apart and there need to be interventions to support the mothers. It could be that agricultural practices are changing dramatically—as when households choose to produce crops that require less energy to plant and harvest—and mothers need help with that."

Downloading information back into the community is crucial. Throughout the project, RIING researchers have given periodic updates to the Ghana Health Services, local HIV clinics and the Queen Mothers Association (a local group of traditional women leaders who have worked actively on the problem of HIV). Upon completion, the researchers will also hold a final workshop to inform community leaders, other researchers and program implementers of the study results. Once they are armed with hard data, says Marquis, "governments, NGOs and communities will be able to make decisions about when and how to intervene and provide effective support or training to help all of these families that are affected by HIV."

■ *Grace Marquis is the Canada Research Chair in Social and Environmental Aspects of Nutrition. The RIING Project is funded by the U.S. National Institutes of Health.*

Professor Grace Marquis (below, top) is collaborating with colleagues in Ghana and the U.S. on RIING, a research project to explore the optimal breast-feeding practice for HIV-positive Ghanaian mothers. Each month, RIING researchers collect information on infant growth and health (below, bottom).

Claudio Calligaris



Courtesy of Grace Marquis





Making GOVERNMENT Work

By Kristian Gravenor

As chief adviser to the British Prime Minister, Wendy Thomson was at the centre of reforming U.K. public services such as health, education and local government. Since returning in 2005 to her alma mater, McGill's School of Social Work, she's been working to improve governance in developing democracies.

For Wendy Thomson, policy is not only about having the right ideas, it's about delivering the right outcomes. In 2004, after working with the Nigerian government to develop public services more responsive to citizens—and less prone to delays and “extra payments” for basic services—she paid a visit to a school in the country's southern district. She was surprised to be greeted by a community group that introduced themselves as the Parent Teachers Association, “a pretty middle-class anglo-Western phenomenon one wouldn't expect to transport well into rural Africa.” Never missing an opportunity for showing generosity, they presented her with a wheelbarrow filled with yams and live chickens as thanks for visiting their school. The improbability of Thomson having the skills to turn these gifts into dinner brought laughs all around. “That was just one of the many humbling experiences of working with people in the developing world,” she says.

Thomson has always insisted on bringing together intellectual analysis and real-world problems. She was born in the working-class Montreal neighbourhood of Verdun, and spent her formative years working with community groups such as Head and Hands and Elizabeth House and volunteering at Centraide (the Quebec equivalent of the United Way). “I've always wanted to make the world better,” she says. She was one of the first generation in her family to secure a university education, obtaining a BSW and MSW at McGill before receiving her PhD from the University of Bristol. She continued her career in public service at the Greater London Council in 1985, working with the infamous “Red Ken” (Ken Livingston, now mayor of London), eventually rising to a top job advising Prime Minister Tony Blair on public service reform.

Thomson left 10 Downing for McGill shortly after Blair's third election, in 2005. Having turned around the performance of major state-run programs, she next focused on matters of governance and public service



reform in Africa and the Middle East. “Health and education are at the top of the public’s concerns in countries around the world,” she says, “and effective governance, not just a robust market economy, is now recognized to be the most important element in successful development in poor countries. No longer can these governments rely on a deferent population to accept graciously whatever services are offered—nor can they avoid the intense media interest and political debate about who should pay and what can be afforded.” Many developing countries, however, have a recent history of dictatorship or armed conflict that has destroyed key governance institutions (parliament, the civil service, departments of state, local council) and eroded the capacity required to make them work. Thomson’s work addresses how modern institutions of government and civil society can be built and successfully sustained.

In 2005, she began working with President John Kufuor in Ghana, Africa’s first independent state. Based in the Office of the President at the “Castle” on Benin Bay, Thomson’s work involved assessing the ability of the office to effectively hold ministers and government departments accountable for delivering policy priorities. This project established the functions necessary to support Ghana’s equivalent of the West Wing or Downing Street—functions such as strategic communications, making use of both traditional local networks as well as modern media. Kufuor is committed to diversifying Ghana’s economy and bringing the country to middle-income status, which requires a very different civil service and departmental capacity from the more statist approaches of the past. Because it is crucial for the President to align the budget with priorities and closely monitor their implementation, a performance management system is being established.

Ghana gives some reason to be optimistic about development in sub-Saharan Africa. It is on track to becoming a middle income nation (as defined by the UN), achieving most of its Millennium Development Goals. Along with ambitious economic projects, Kufuor’s government has introduced a national health insurance scheme, reforms to strengthen universal basic education and economic diversification away from reliance on the shaky cocoa market (cocoa was once Ghana’s top export). Thomson’s work is not only about strengthening accountability to the current President, but also about creating the permanent institutions of governance necessary to support a democratic succession when Kufuor’s mandate ends in December 2008. The work dovetails with her ongoing interest in performance management in the UK—pursuits united under the theme, as she puts it, of “making government work in rather different settings.”

Thomson believes ambitions for governances such as Kufuor’s involve major changes in the relationship between Africans and their governments. “The concept of the state as a service provider is a new one in Africa, and one that’s not seen with much credibility,”

she says. “We have provided some analysis of the state of public services, examined user perspectives and found some predictable results. There remains a lot to be done.”

But some major movement is afoot in Ghana, including a national health insurance system which would help treat a fair portion of the citizenry. “It’s a simple system,” Thomson explains. “People register and pay a modest amount of money, they get a card and are entitled to certain medical services. Universal health care is a huge endeavour but they’re making good progress.

“Most Western democracies are moving to what’s referred to as ‘positive welfare,’ where the government develops the capability of its population to make personal choices and deal with the rapid changes brought about by globalization. Positive welfare is about investing in education and health care, and removing obstacles to participation in employment and civil society. It’s a shift that seeks more to empower, rather than to ration state-designed goods and income support.”

Thomson participated in the 2007 United Nations’ Global Forum on Reinventing Government, which brought together over 3,000 delegates. Inspired by some of the same dynamics fueling Kufuor’s presidency, many governments are seeking to renew their approach to governance, introducing more evidence-based policy making, and strengthening accountability for on-the-ground delivery to citizens who now expect something personally tangible to come from democracy.

“Often the problems are huge,” she says. “These countries face overpowering and overwhelming challenges. The World Bank tells them to diversify their economy, reduce state expenditure and privatize more functions. That’s almost too big to even think about, and very difficult to deliver in an electoral system. Taking limits off the price of oil, trying to introduce people to paying taxes ... that’s not exactly vote-winning material.”

Thomson believes that her experience in Ghana and elsewhere enriches her research and teaching at McGill, and brings some fresh perspectives to public service delivery in Canada. “Hands-on international work brings a real authenticity to teaching and research,” she says. “Often students will hear a depressing view of Africa, that it’s a continent filled with conflict, disease and poverty. I’m committed to portraying a more complex and optimistic picture of the capacity and potential. International experience gives us no reason to be complacent about the standards of performance citizens enjoy in Canada.” ■



During her time working with the British government, Wendy Thomson revolutionized the performance of major state-run programs. Now she’s using her wealth of real-world experience to address issues of governance in African democracies.



The Winds of Democracy

Interview with the Right Honourable Joe Clark by James Martin

Joe Clark's deep relationship with the people of Africa began when, as prime minister of Canada, he visited Cameroon while en route to the 1979 Commonwealth Heads of Government Meeting in Zambia. In 1984, as Canada's secretary of state for external affairs, he was the first politician from a developed nation on the ground during the Ethiopian famine. His unwavering support of economic sanctions distinguished Canada in the battle against apartheid. Now Professor of Practice for Public-Private Sector Partnerships at the McGill Centre for Developing-Area Studies (CDAS), Clark continues his dedication to Africa's development challenges.

Joe Clark reviews the candidates during the 2006 Democratic Republic of the Congo elections.



The Carter Center

You've recently observed elections in Cameroon, the Democratic Republic of the Congo (DRC) and Nigeria. From the CDAS perspective, does governance take precedence over poverty?

It's not a choice; you have to pursue both paths simultaneously. When the DRC election results were coming in, the CBC asked me—to my surprise—"Look at all the money the UN is spending on this election. Why aren't you curing poverty?" Well, you can't cure poverty in the midst of conflict. The only long-term response to conflict is to have institutions that can be accepted in the community and add some stability.

Now, obviously, if those institutions are only used to enrich the powerful, that's counterproductive. But what, in fact, is quite consistently happening is that when those institutions work, poverty alleviation becomes a policy priority. If you leave the violence and try only to deal with the evidence of the poverty, that poverty will persist. If all you do is create an electoral system, and don't have a society deal with its real issues, then that electoral system is not much use. The two must go together. And there's an obligation to be sure that the things we're doing in the name of governance work.

What steps can be taken to better ensure that success?

It's very important to incorporate indigenous models. One of the people CDAS works with is Howard Wolpe, who heads the Africa Program of the Woodrow Wilson International Center for Scholars. His thesis is that Western models are too much based on conflict among interests, whereas the society in Africa is much more cooperative. That's among the issues we want to look at during a conference we're holding in mid-March.

While I was in the DRC, I worked with Apollinaire Malu Malu, the extraordinary priest and civil society activist who became the chair of the electoral commission of DRC. He's coming to McGill as a visiting fellow during the Fall 2008 semester; he'll be networking with various organizations—including the Canadian International Development Agency (CIDA) and Elections Quebec—and NGOs, giving public and classroom lectures and, very importantly, recording his experience in running the DRC election.

Why is it so important for Malu Malu to tell his story?

The Congo elections were one of the most trouble-free elections that I've ever seen. It's been 40 years since they've had an election, they've just come through an internal conflict that took more lives than any conflict since the Second World War, and yet they brought themselves together. There were killings—not as many as one feared, but any killing is too many, obviously—but the system worked very well. This was because it was designed by a transition government that had no incumbent, so the electoral law was written for the simple purpose of conducting a fair election—and the transition government was carefully constructed from the actual militia leaders and political leaders of the groups that had been killing one another. The success was also because of Malu Malu's extraordinary skills. His record of how he did it will be important historically, and also in terms of governance now that DRC has had elections but is a long way from being a whole state. And it will be a very useful model for other developing countries.

In 1960, then British prime minister Harold Macmillan talked about the winds of change blowing through Africa. He might have foreseen a higher velocity of wind, but there has been extraordinary positive change—including the kinds of breathtaking political decisions we've seen in the DRC.

■ *The McGill Centre for Developing-Area Studies receives funding from McGill University and CIDA.*

Making Headway

McGILL RESEARCH FACTS

Turning Point 1963



Dr. Douglas Cameron, director of McGill's educational program with University College Nairobi, speaks with one of the Kenyan doctors who studied at McGill.

Kenya was transitioning from British colony to independent country and Dr. Njoroge Mungai, the newly appointed Minister of Health and Housing, faced a daunting task: the creation of a system of government-run hospitals in the country's 74 districts. To complicate matters, he first needed to establish a medical school that would train doctors to work in these facilities. He turned to McGill for help.

At the invitation of Mungai, Dr. Douglas Cameron, chair of the Department of Medicine and physician-in-chief at the Montreal General Hospital, and Dr. Alan Ross, chair of the Department of Pediatrics at McGill, visited Kenya to assess the

situation. In response to their recommendations, the Canadian government formally requested McGill to help University College Nairobi establish two medical departments: pediatrics and internal medicine. Each department would be staffed by a team of four doctors (one associate professor, two assistant professors and one lecturer) responsible for a teaching unit of 40 to 50 beds at Kenyatta National Hospital. Arrangements were also made to give Kenyan postgraduates extra training to become clinical teachers.

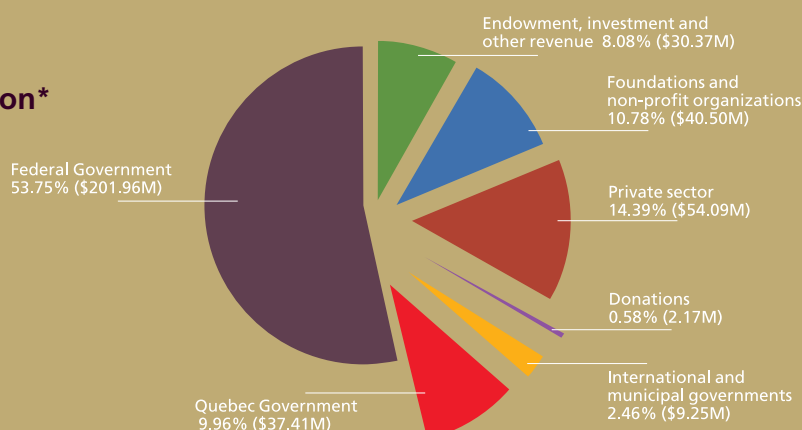
Cameron was appointed director of the program and, with support from McGill's dean of medicine, Dr. Maurice McGregor, he selected a team of doctors. In July 1968 they arrived in Kenya to begin their two-year assignment. Cameron's Kenyan counterpart was Dr. Arthur T. Porter, Vice-Chancellor and Principal of University College Nairobi. (His son, Dr. Arthur Porter, is now the director general and CEO of the McGill University Health Centre. "My first pediatrician was a doctor from McGill," recalls Dr. Porter Jr.)

The McGill team approached their new responsibilities with gusto and even gave the wards a much-needed coat of paint—much to the astonishment of their Kenyan colleagues.

"All of our staff fell in love with Kenya and would have stayed indefinitely had we not insisted on their return," said McGregor, who traveled to Kenya on a number of occasions to visit the project.

In 1972 the first group of doctors graduated from Kenya's medical school. The school is still going strong; now named the College of Health Sciences, it turned out 100 graduates in 2006 alone. ■

McGill's research funding sources 2006-07: \$375.75 million*



*McGill and affiliated hospitals



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