University of Guelph
Changing Lives Improving Life

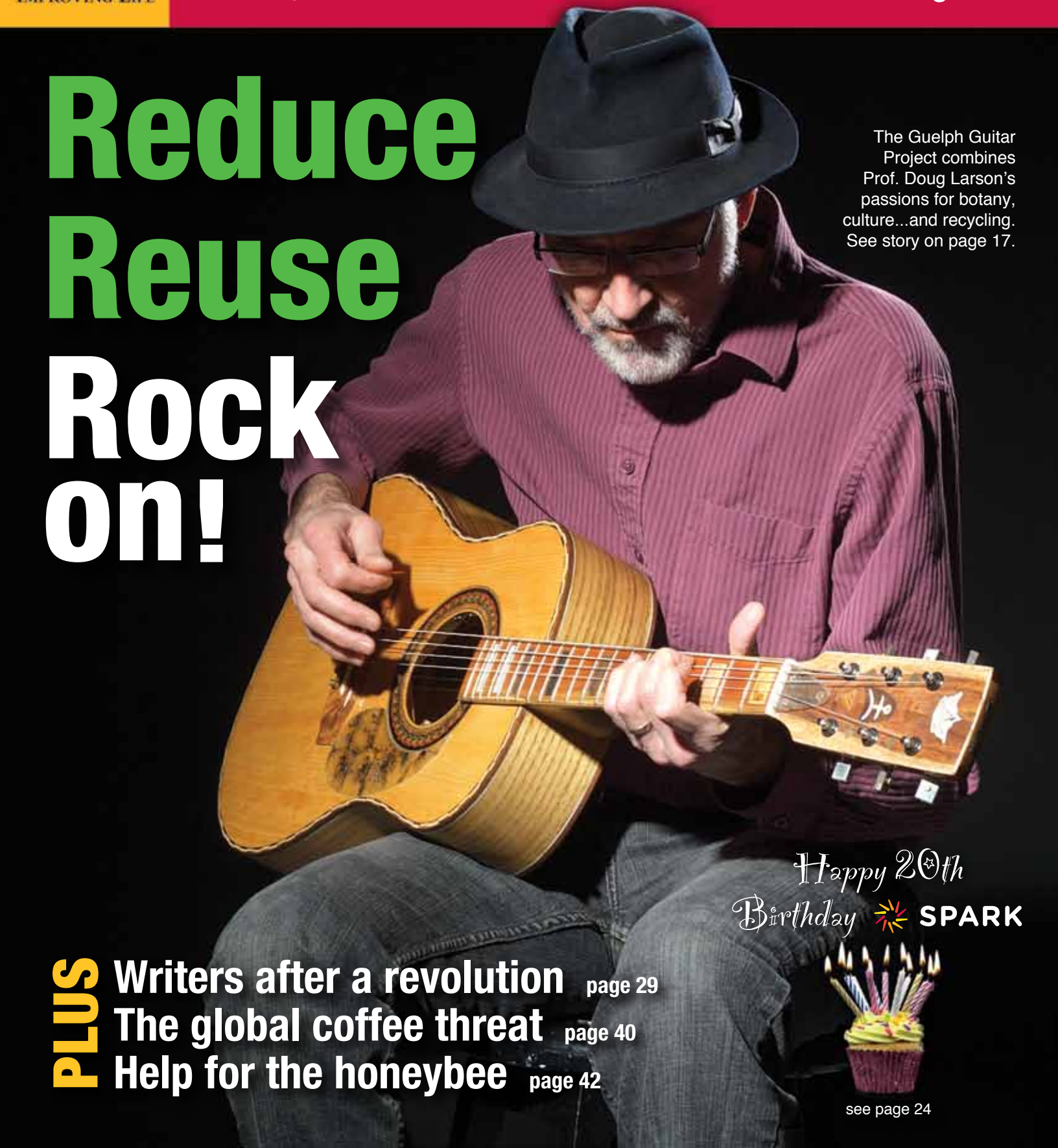
Inside this edition: *Transdisciplinary Research*

Volume XXV Number 1 Winter 2010

Research magazine

www.uoguelph.ca/research

Reduce Reuse Rock on!



The Guelph Guitar Project combines Prof. Doug Larson's passions for botany, culture...and recycling. See story on page 17.

Happy 20th Birthday SPARK

see page 24

PLUS

Seed research that is breaking new ground.

Pioneer Hi-Bred continues to invest aggressively in research to deliver innovative new products and technologies to Canadian growers.

Our rich pipeline includes innovations like a new herbicide tolerance trait for both corn and soybeans that will enable more flexible herbicide programs, new product concepts that will put corn refuge right in the bag and high oleic soybean varieties that will provide valuable nutritional and functional benefits.

And we've just introduced the industry's ***first*** and ***only*** canola hybrids with built-in clubroot and sclerotinia resistance.

And Pioneer won't stop there. Our goal is to deliver yield increases of 40 per cent in both corn and soybeans in the next decade.

Pioneer Hi-Bred. We're breaking new ground where it matters most: In the fields of Canadian farmers.

www.pioneer.com/canada

PIONEER®
A DUPONT BUSINESS

Science with Service Delivering Success™

Volume XXV Number 1 Winter 2010

Research magazine

www.uoguelph.ca/research

Winter 2010
Focus: Transdisciplinary Research

Vice-President (Research)
Kevin Hall

Associate Vice-President (Research Services)
Steven N. Liss

Editor and Director, Research Communications
Owen Roberts

Editorial Advisors
Steven N. Liss, Sandra Sabatini, Andrew Wayne, Donald Bruce

Associate Editor and Project Co-ordinator
Hayley Millard

Assistant Project Co-ordinator
Vanessa Perkins

Marketing, Advertising and Project Management
Lise Smedmor

Copy Editor
Barbara Chance

Design
JnD Marketing

Address correspondence to:
Owen Roberts, Director, Research Communications
Office of Research, Room 437, University Centre
University of Guelph, Guelph, ON N1G 2W1
519-824-4120 ext. 58278
inforc@uoguelph.ca

University of Guelph student research-writing activities are supported by:

Pioneer Hi-Bred Limited (founding sponsor)
Advanced Foods and Materials Network
Association of Faculties of Medicine of Canada
Canadian Farm Business Management Council
Canadian Poultry
Dairy Farmers of Ontario
Grain Farmers of Ontario
Guelph Mercury
Guelph Partnership for Innovation
Monsanto Canada (DEKALB Seeds)
Ontario Beef Farmer
Ontario Cattlemen's Association
Ontario Dairy Farmer
Ontario Hog Farmer
Ontario Ministry of Agriculture, Food and Rural Affairs
Ontario Poultry Farmer
SHARCNET
Soy 20/20
Syngenta Crop Protection Canada

Publication Mail Agreement number 40064673

Please return undeliverable Canadian addresses to:
Room 437, University Centre, University of Guelph
Guelph ON N1G 2W1 Canada

Printed at Sportswood Printing, February 2010, ISSN 0841-9493

Visit the University of Guelph research site
www.uoguelph.ca/research

Cover Photo: Martin Schwalbe

Working together to produce new ideas

Kevin Hall

The world today faces a broad array of challenges that are becoming increasingly more complex, such as accommodating a vastly expanding population and a changing climate. Both of these have extensive ties to agriculture and food security, and the University of Guelph continues to be a research leader in these areas.

New research collaborations and partnerships are becoming critical to bring researchers together from multiple disciplines to create new solutions for today's problems. Transdisciplinary research provides an opportunity for academics from many different disciplines to face widespread challenges together.

The NSERC-CANPOLIN story on page 42, for example, highlights the work of a Canadian pollination initiative that some of Guelph's top scientists are playing a key role in. Even a single bee is responsible for the reproductive biology of the crops that contribute to the global food supply. In Canada, the value of honeybees and other wild pollinators to the food system is about $1 billion annually. But the big picture of this research cannot fully be seen without contributing perspectives from biologists, ecologists, apiarists and economists working together.

In this edition of *Research* magazine, participants in our Students Promoting Awareness of Research Knowledge (SPARK) program have worked with U of G researchers from many fields to gain valuable insight on transdisciplinary partnerships. The articles, which are written and compiled by the student writers, strive to describe the many ways innovative solutions are being developed for Canada and, indeed, the world.

Rightly or wrongly, research has historically been seen as bound by specific disciplines and schools. But today at Guelph, new research models are allowing researchers with a variety of academic expertise to connect and integrate ideas in unprecedented ways.

I welcome you to enjoy this unique edition of *Research* magazine and to let me know your ideas about transdisciplinary partnerships.

Kevin Hall
Vice-President (Research)

SPARK turns 20... and so do its writers

The University of Guelph *Research* magazine is written and co-ordinated by participants in the Students Promoting Awareness of Research Knowledge (SPARK) program. SPARK, which turns 20 this academic year, was created around the same time most of our contributors were born. We're recognizing that fact in this issue and marvelling at how many SPARK participants' creative interests were clear right off the bat.

In the "Research in Retrospect" feature on page 50, **Alycia Moore**, a fourth-year agricultural economics student from Ridgetown, Ont., takes a look back at newly retired professor Doug Larson's research pursuits over the past 20 years of SPARK. His studies have now been featured on three Research magazine covers.

No one could get fourth-year international development student **Andra Zommers** to come inside when she was growing up in Hamilton, Ont. So it wasn't hard for us to convince her to immerse herself in one of the most ear-popping stories you'll ever encounter about lichens. See page 20.

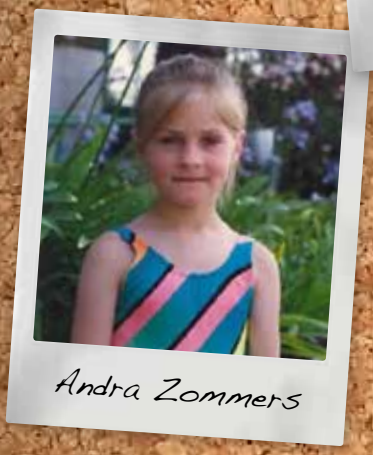
Andrea Hruska, now a fourth-year marketing management student, was clearly an active toddler around her house in Hamilton, Ont. At SPARK, she's had a particular interest in writing animal stories. Turn to page 47 for her article on racehorses that can provide stem cells for cartilage implants in other horses.

Sports journalism is in fifth-year English student **Katelyn Peer**'s future. Katelyn, who's from Waterdown, Ont., spearheaded the SPARK*AIR broadcast initiative last year. And judging by this photo, she was born for TV. On page 19, she writes about how one researcher has united astronomy and jazz.

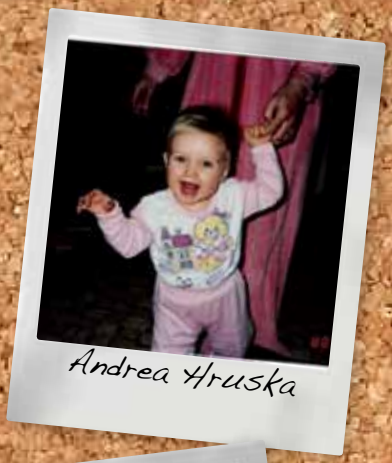
Horses were a childhood passion for **Katharine Tuerke** of Oshawa, Ont., and she still makes time for horseback riding when she's not spending time in the lab as a psychology and neuroscience doctoral candidate or writing for SPARK. Her story on page 39 describes a town-and-gown initiative that engages the public in science.

Natalie Osborne, a second-year biomedical sciences student who grew up just outside Guelph, didn't invite a magician to her first birthday party. But at SPARK, she's learned how to make stories appear out of nowhere. She demonstrates this ability on page 32, where she reveals the magic of science.

Alycia Moore



Andra Zommers



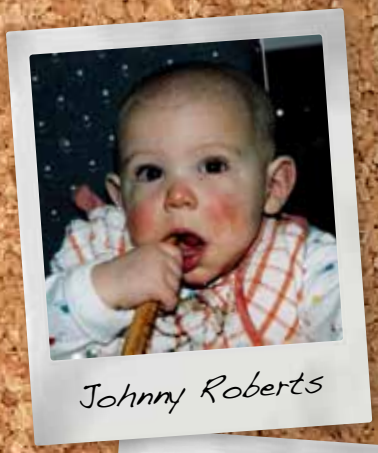
Andrea Hruska

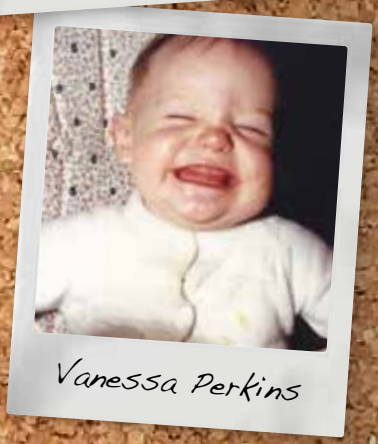
Katelyn Peer

Katharine Tuerke

Natalie Osborne

Rebecca Hannam





SPARK 20 YEARS

Cow pyjamas were all the rage for animal aficionado **Carol Moore** when she was growing up on her family's farm in Sussex, N.B. Now a fifth-year animal science student, she writes on page 31 about how farms could truly understand the benefits of their management practices by using GIS information technology.

Christmas morning and coffee — that's long been a tradition for SPARK co-ordinator **Hayley Millard**, who hails from Oakville, Ont. On page 40, she writes about some of the hardships coffee-producing countries have endured because of plant disease.

It's not clear whether **Joey Sabljic** was listening to Mozart or the Sex Pistols in this photo, because he has an affinity for both. More recently, this second-year English student from Guelph has gained new insight into how music allows people with disabilities to express themselves. See his story on adaptive-use musical instruments on page 22.

Breadsticks were **Johnny Roberts's** passion when he was growing up in Chatham, Ont. Today, the third-year theatre studies student has traded semolina for the stage and school performances. He eagerly embraced the chance to write about Guelph's Shakespeare project for the story on page 14.

There's no question that **Tara Walsh** of Milton, Ont., was an aggie from Day 1, judging by her choice of footwear. Now a fourth-year animal science student, she took on the challenging job of chronicling SPARK's 20-year history in research communications for the timeline on pages 24 to 27.

Vanessa Perkins, a third-year psychology co-op student from Newmarket, Ont., liked being read to as a child. But now, she's the one writing the stories. How do readers such as Vanessa search for literary information on the web? Turn to page 36 for her story on new technology that's improving online information retrieval.

Kids and pets go together, but do diseases follow? That's what biophysics PhD candidate **Robert Fieldhouse** of Guelph set out to discover when he was writing the story on page 46 about pet owners and animal health, a topic being pursued at Guelph's Centre for Public Health and Zoonoses.

Twenty years ago, **Rebecca Hannam's** main view on life was from her crib. Now, the second-year agricultural business student from Guelph writes about a new view on art — three-dimensional digital art that engages onlookers at festivals such as Toronto's Nuit Blanche. See her story on page 11.

Impact better when working together

I am writing in response to the article "A Greener Way to Go" in the "Agri-Food Yearbook" edition of *Research* magazine.

It was a perfect celebration of research partnerships and very fitting to showcase with the OMAFRA/University of Guelph partnership. Not only is the Ontario BioCar Initiative an innovative idea, but it's also full of collaboration: two of Ontario's top industries (automotive and agricultural), researchers from four Ontario universities and, of course, the OMAFRA/U of G partnership.

Like many groups in Ontario agriculture, the BioCar Initiative has realized its outstanding potential by encouraging partnerships and working together. It's amazing to see how one partnership can encourage many more and produce amazing results, such as the Ford Motor Company's decision to build its 2010 Ford Flex with wheat straw-reinforced plastic storage bins.

I think "A Greener Way to Go" was the ideal article to highlight research partnerships in an edition of *Research* magazine focused on OMAFRA and U of G.

Stefanie Nagelschmitz
Communications and Livestock Co-ordinator, Canada's Outdoor Farm Show
Guelph, Ontario

Water efforts deep and diverse

I read with interest the spring issue of *Research* magazine focusing on "Water's Bright Future." The format neatly packages current topical research at the University of Guelph — in this case, on water. I was impressed by the diversity of the work and by the optimism of a "bright future" for natural water, given that bottled water is a billion-dollar industry in North America.

Most studies appear to involve engineered biological or chemical remediation, which perforce cannot create long-term solutions. We operate on the idea that "the solution to pollution is dilution." This principle can work, provided the assimilative capacity of waters (page 31) is not continually exceeded. But it is, so we come full circle by managing the problem, with the disquieting observation that the disinfecting chemicals in potable waters may be doing us in (page 44).

I laud the belated idea of site-specific hydrogeological watershed models (page 29). Although this can be expensive research, it is a framework for all other efforts because surface waters are but an expression of the subsurface water regime. In this regard, Ontario Hydro, in connection with Atomic Energy of Canada Limited's Nuclear Fuel Waste Management Program (to which U of G has contributed) has data and hydrogeological models not only for the Precambrian Shield but also for southern Ontario.

Again, allow me to commend you and your contributors on a tidy publication.

Ingo Ermanovics, PhD Geology
Ottawa, Ontario

Research magazine admired in U.S.

Please pass along my hearty congratulations to the managers and editorial staff of *Research* magazine. Your first "Agri-Food Yearbook" edition is an excellent overview of the research and services provided in Ontario by its agencies and the University.

The editorial staff of Successful Farming and Agriculture.com have long admired *Research* magazine. This latest production again demonstrates the high-quality journalistic capabilities of your team. The design is clean and inviting, the photography is professional, and the writing is clear and entertaining.

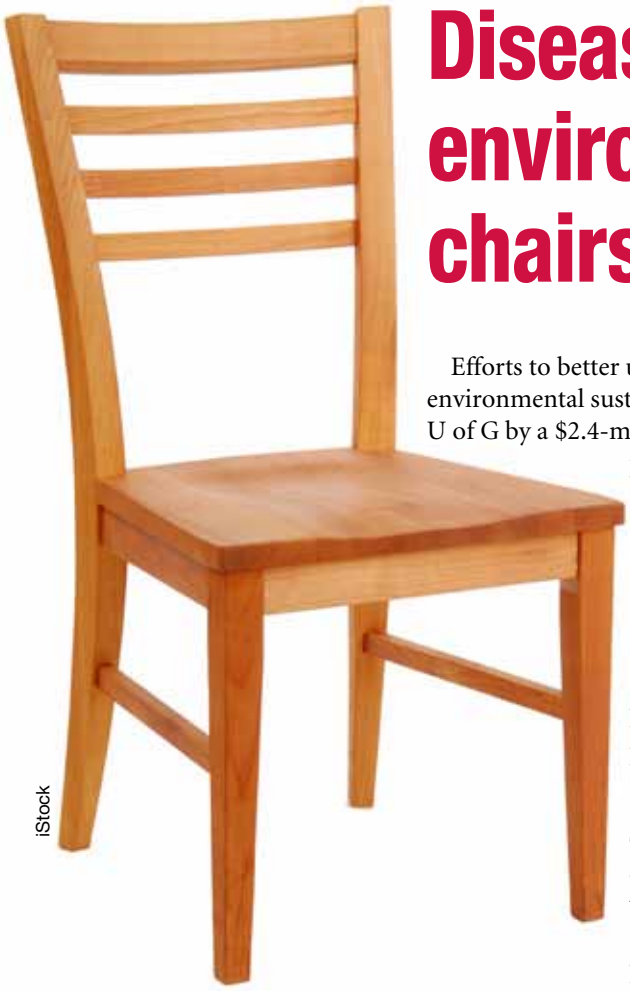
We are also impressed by the wide range of topics covered in the special edition. Indeed, this issue gives something back to the world. Anyone who reads it should learn a great deal more about the critical issues of our time in food and agriculture.

Kudos to all.

John Walter
Executive Editor, Successful Farming and Agriculture Online
Des Moines, Iowa

Contents

WINTER 2010 Issue, Volume XXV, Number 1


iStock

Disease, environment chairs funded

Efforts to better understand infectious disease and environmental sustainability are being boosted at U of G by a $2.4-million commitment for two new prestigious Canada Research Chairs (CRCs) and the renewal of another. Profs. Christian Blodau, School of Environmental Sciences, and Scott Weese, a pathobiologist at the Ontario Veterinary College, have both been named new Tier 2 CRCs. A Tier 1 chair held by environmental sciences professor Chris Hall was renewed for seven years. Hall holds the Chair in Recombinant Antibody Technology, which is designed to develop innovative antibody-based products to protect the environment and improve human health and well-being.


iStock

Virtual poultry centre opening

A new virtual centre for leading Canadian scientists in poultry behaviour and welfare is opening at U of G, adding a unique twist to the University's extensive expertise in this field. Guelph was among seven institutions vying to house the new centre, a joint initiative of Agriculture and Agri-Food Canada (AAFC), the Poultry Industry Council and the Canadian Poultry Research Council. Animal welfare researchers from the Department of Animal and Poultry Science and the Campbell Centre for the Study of Animal Welfare will lead the new centre, along with AAFC research scientist Stephanie Torrey, a behavioural and animal welfare expert.

Royal Society selections named


Canadian Conservation Institute

Retired environmental sciences professor Peter Kevan and theatre studies professor Ric Knowles have been elected fellows of the Royal Society of Canada, the country's oldest and most prestigious scholarly organization. Candidates are selected by their peers for having a profound impact on sciences, arts or humanities in Canada. Kevan was honoured for his ecological, zoological and botanical contributions and for being a world leader in pollinator conservation (see story on page 44). Knowles, who is an expert on Shakespearean theatre and contemporary theories of theatre production and performance, was honoured as "the foremost scholar of Canadian theatre of his generation."

Equine stem cell studies advance

Horses are the premier animal model for studying the potential for stem cells to repair cartilage injuries. And it turns out equine joints are similar in some respects to human joints. Researcher Thomas Koch is a leader in equine stem cell research and will use a prestigious $1-million fellowship to advance his studies. The fellowship from the Danish Agency for Science, Technology and Innovation will support a transatlantic collaboration involving U of G and the largest human orthopedics laboratory in Denmark, along with researchers in veterinary and human medicine in Sweden, Canada and the United States. See story on page 48.

Dave Peleschak

New partnership leader appointed

Prof. Rich Moccia, centre, is joined by, from left, Amanda Mielke, Rachel Shaw, Mike Glinka and Neil Macbeth on a field research excursion.

Dave Bevan

The $59-million research agreement between the Ontario Ministry of Agriculture, Food and Rural Affairs and the University of Guelph is led by Prof. Rich Moccia, Department of Animal and Poultry Science. Moccia was recently named associate vice-president (research) agri-food and partnerships. He has 22 years' experience working within the agreement as a researcher and extension specialist. He helped develop the Alma Aquaculture Research Station and has served as director of the animal research program. Moccia says his role will help him advance research into critical areas of the agri-food sector, which contributes more than $33 billion to Ontario's economy annually.

Bio-conversion network launched

iStock

The new $5-million Natural Sciences and Engineering Research Council Bioconversion Network aims to develop energy-efficient, commercially viable and environmentally sustainable biomass conversion processes. The goal is to produce bioenergy and chemical products from renewable plant biomass, which is a readily available and abundant carbon-neutral source of energy. The network will accomplish this by overcoming the scientific and technical barriers that limit the efficient bioconversion of Canada's vast quantities of forest waste residues into fuels and chemicals. The network will bring together a core research team of 12 investigators from five universities under the co-direction of environmental sciences professor Hung Lee.

Collaboration helps us understand our world

These are exciting times. It's times like these that both test our resolve and move us on to greater things.

Most disciplines have tried-and-true research methods, well-defined research programs and discernible ways to judge the importance of the research undertaken. This model tends to locate the individual researcher within clearly delineated disciplinary boundaries and focuses the research on issues of importance to those who work in that particular area. Success is often measured in disciplinary terms: the publication of a monograph or article in a peer-reviewed journal, or the presentation of one's creative work before a discerning public. That is all well and good, and this model will continue to serve us far into the future, but is it enough?

Research in the College of Arts is also shaped by the dynamic and volatile context of our lives: the financial pressures that impinge on us, the expectations of accountability, the advent of new information technology tools, the development of "globalized" relationships and the very role of the university in society. These are all transforming the College of Arts just as surely as the college's researchers are transforming the nature of their work. These factors create a tension but also fashion a creative matrix for new types of research to arise.

In the College of Arts, faculty and students pursue research in two main areas — creative practice and humanities — with many overlaps and interconnections between them. Within these, many areas of research are rethinking themselves in terms of collaborative practice, interdisciplinary research, problem-oriented issues that cross disciplinary boundaries, and new mixes of fundamental and applied research.

"Transformative collaborations" function on many levels. They can be across conceptual areas, across institutional boundaries and among colleagues working in seemingly unrelated fields. They can involve a few people or many. They can bring professors and graduate and undergraduate students together in various ways. They can link town and gown in partnerships. And they can involve academic, business, government and community partners in unforeseen ways.

The transformative part of all this collaboration lies perhaps in the enhanced understanding of the hybrid nature of the problems we face now and in the future. Our most significant challenges require both technical/scientific and cultural/historical/political responses: climate change, the environment, the food supply, genetic manipulation, health care, intellectual property, gender and identity, water, participatory democracy, exploration of the biosphere and beyond, cultural continuity and change . . . the list could go on. None of these has a unitary solution arising out of a single discipline or analytical perspective.

As the University of Guelph approaches its 50th year, the College of Arts is intensively and actively engaged — not only in maintaining the valuable and important traditions of research in creative practice and the humanities, but also in moving towards new forms of transformative collaboration to resolve the complex challenges we will face in the 21st century. The research projects highlighted in this issue of *Research* magazine are but a few of the many currently underway that explore the possibilities of transformative collaborations.

Prof. Don Bruce, Dean of Arts

Photo By iStock |

Celebrating innovative art

Guelph studio helps artists incorporate digital technology into their work

BY REBECCA HANNAM

Digital communication technologies embraced by researchers in Guelph's School of Fine Art and Music (SOFAM) are bringing together performance and electronic media in a new way.

The Ice Station ISIS project is just one of FASTWÜRMS' research projects that amalgamate digital media and art. This project was developed at the Scottish Sculpture Workshop in Aberdeenshire, Scotland, and North Bay, Ont.

Profs. Kim Kozzi and Dai Skuse, known as the art duo FASTWÜRMS, showcased their new project at the 2009 Scotiabank Nuit Blanche, a nighttime art event in Toronto. Their exhibit, Skry-pod, transformed a building lobby and outside garden into a hub of artistic activity.

The project uniquely combined digital art and artistic performance. A glass-enclosed waterfall with tranquil music was the setting for costumed witches who did tarot readings as part of a performance.

Thousands of other artists and event visitors viewed the complex FASTWÜRMS exhibit, which also featured the initial release of a custom digital tarot application created for iTouch technology. The duo now plans to release the application and distribute it internationally.

Skry-pod is one of many projects created by FASTWÜRMS in U of G's Digital Media Studio, which helps artists incorporate digital technology into their work.

"The studio is really a research facility focused on media-rich applications," says Skuse. "In practical terms, we use many sophisticated cameras, video recording devices and outputs for producing digital art."

The technology available in the studio, which is used by FASTWÜRMS, SOFAM graduate students and visiting researchers, is propelling Guelph to a leadership position in the digital art world, he says. "Anything to do with digital media is possible here."

The Digital Media Studio was established in 2004 with a grant from the Canada Foundation for Innovation and support from the Ontario Innovation Fund. R

| Photo By FASTWÜRMS

Asterion:

A new theatre experience

Outdoor labyrinth helps researchers study individual responses through immersive theatre

BY HAYLEY MILLARD

Members of a theatre audience don't normally have much influence over how a performance unfolds, but a University of Guelph researcher is exploring what happens when they do.

Prof. Jerrard Smith of the School of English and Theatre Studies will be observing what spectators gain from being immersed in an expansive outdoor labyrinth that allows them to create their own storyline. He hopes it will connect them with their physical environment.

Smith has a 30-year history of collaborating with renowned Canadian composer R. Murray Schafer in creating real-time productions. In fact, the idea for creating a labyrinth, which they've named Asterion, was based on operatic text written by Schafer about ancient Crete.

Prof. Jerrard Smith, left, and a number of students and volunteers have built an outdoor labyrinth to study how audiences react to this form of immersive theatre.

Photo By Maria Michails-Posidis |

In Greek mythology, Asterion was another name for the Minotaur, a creature with the head of a bull and the body of a man, which lived at the centre of the Cretan Labyrinth.

"I thought: 'How can we make the environment come alive to create a narrative?'" says Smith. "This labyrinth tells a story not only in words but also through images, sounds, tastes, touch and textures."

In drama, it's rare for artifacts to become more prominent than the leading characters, but that's where the Asterion labyrinth differs. It uses physical and natural space — and the principles of environmental theatre — to tell a story. Smith studies how this produces theatrical tension that differs from what an audience experiences in traditional theatre.

The term environmental theatre was coined in the 1960s by theatre researchers studying audience reaction to immersive theatre, which engages the audience in the production. The term now often refers to the way theatre plays out in the natural environment.

Smith and the Asterion production team are using environmental theatre to promote environmental awareness and reconnect people with the natural world.

The labyrinth is designed to be experienced by one person at a time. That means each individual is not only the audience but the performer as well. Changes in the surrounding environment allow each person going through the labyrinth to create his or her own story. Smith is exploring how people are affected by the transitions between the labyrinth's thematic elements and how these transitions play a role in an individual's theatrical experience.

"We're trying to find out if spectators realize that they're actually performing a narrative in this case," he says.

Knowing how people respond to transitions and this type of theatre experience will help him understand applications for other theatre studies. Smith's results from this research could provide new insights into different ways to create theatre space as well as performance space in museums and galleries.

Construction of the labyrinth, which is located at an undisclosed site in Ontario, is expected to last another three years, he says. More than 100 people have contributed to the project, including sculptors, visual artists, landscape architects, engineers, craftspeople, technicians and students.

Funding has been provided by the Social Sciences and Humanities Research Council, the University of Guelph's College of Arts, Dufferin Aggregates, Toromont, Rocky Ridge Water and other companies and private individuals.

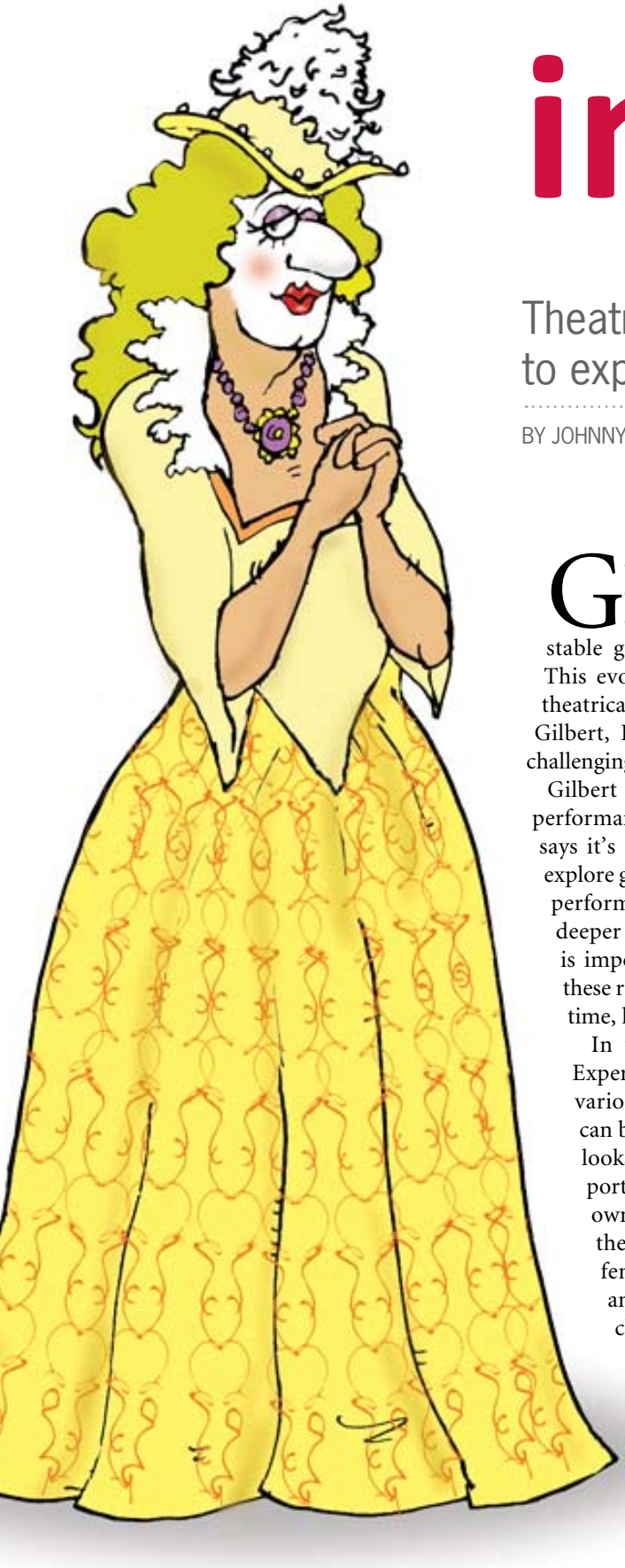
A look inside the labyrinth

The starting point of the Asterion labyrinth is through the mouth of a constructed giant wolf. From there, you travel through a series of dark tunnels and transitions until you reach the end.

The structure occupies three acres of land and encompasses a field, a forest and a pond. To keep the labyrinth environmentally friendly, Smith and a construction crew began by creating paths in a dense cedar forest. They allowed the nature of the terrain and the individual tree configuration to inform the shape of the paths. This developed into a process that, with practice, enabled the design crew to begin to choose routes with the story in mind and develop a true collaboration with the forest.

The labyrinth designers also took an organic approach to creating and building the structures. The crew made every effort to be environmentally responsible, and water engineers were consulted to determine how rainwater systems could be incorporated into the labyrinth. In addition, local materials such as straw and cedar branches were used for infrastructure.

Shakespeare... in drag



Theatrical performance offers new way to explore traditional gender roles

BY JOHNNY ROBERTS

Gender roles in society aren't as clear as they once were. As society evolves, people question the stable gender roles surrounding them. This evolution has also carried over to theatrical performance — and Prof. Sky Gilbert, English and Theatre Studies, is challenging all the boundaries.

Gilbert is adding the element of drag performance to Shakespearean plays. He says it's a new and experimental way to explore gender roles, not only in theatrical performance but in society as well. A deeper understanding of gender roles is important because cultural ideals of these roles have changed drastically over time, he says.

In what he calls the Shakespeare Experiment, Gilbert is observing the various ways a Shakespearean scene can be interpreted and performed. He looks at how male and female actors portray a gender different from their own. For example, he's considering the differences between male and female mannerisms that come to an actor's mind when portraying a character of the opposite sex.

"In the past, there was no drag element in Shakespearean performance," says Gilbert. "There was no attempt to accurately portray the role of a woman. So we ask the question: 'How might audiences have perceived the element of homosexuality or drag in performance?'"

To explore this question, his students work with professional actors, who re-create three different versions of the same scene. One is a historical and traditional version of the scene with a male cast. Next is the Stratford version, with women playing female roles and men playing male roles.

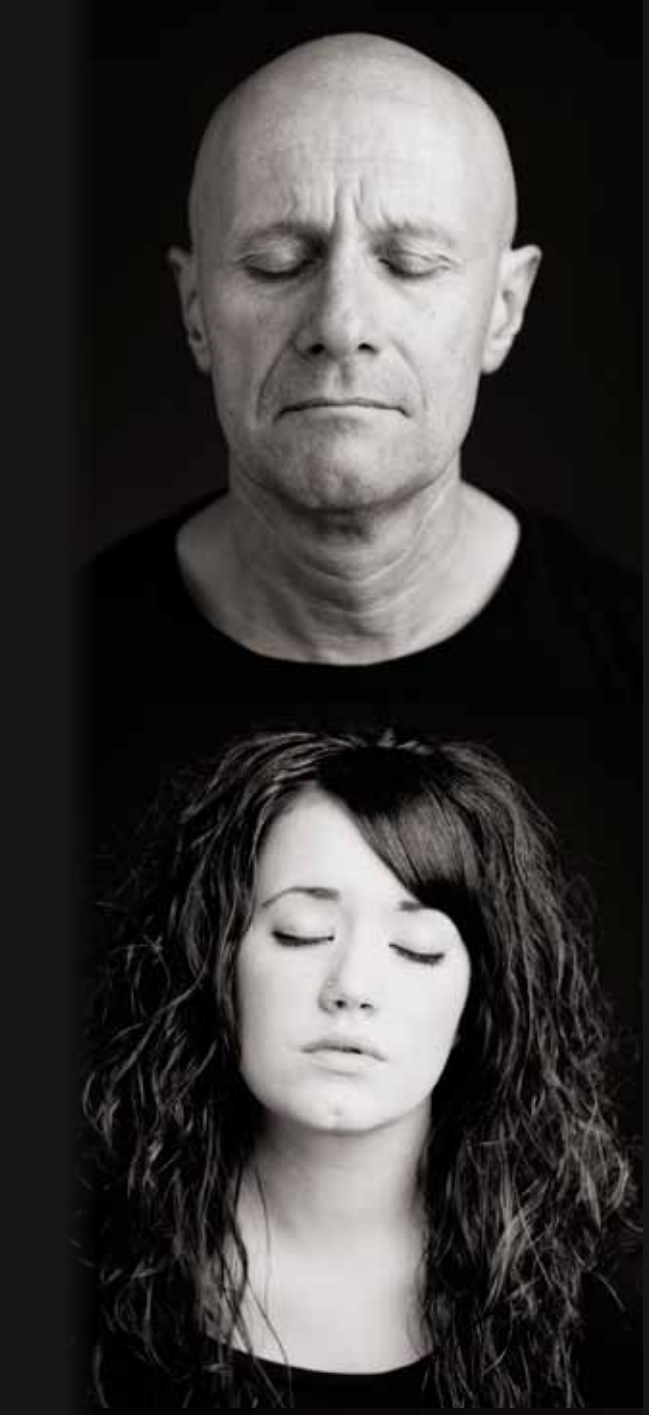
The final version is queer — Shakespeare in drag. In this version, Gilbert may use an openly gay actor to play the roles. The scenes are all performed at Toronto's Buddies in Bad Times Theatre.

Gilbert interacts with his audience and seeks feedback through surveys that ask questions such as: "How can watching theatre make us think about gender?" and "What does a man bring to the role of a woman in performance and vice versa?"

"English Renaissance plays had young males playing female roles and older men playing the other male roles," he says. "Using a survey, we can see how society today reacts to elements of drag being integrated into Shakespearean performance and how men and women interpret gender roles in performance."

His work is supported by a research and creation grant from the Social Sciences and Humanities Research Council. R

Illustration By Brian Fray |



Mind open eyes closed

BY NATALIE OSBORNE

Photos By Susan Dobson

Adapting to constantly changing technologies has been a challenge for photographers, especially when it comes to communicating a sense of time. Glossy colour-enhanced digital prints don't yellow and disintegrate with age, so viewers have lost the ability to contextualize a photograph's age and gain a sense of its history. Now, a University of Guelph artist has combined both old and new technologies in a unique exhibition that initiates a dialogue with the past, references the present and foreshadows the future.

Prof. Susan Dobson, Fine Art and Music, explores the possibility of capturing the past and present in a single photograph with her solo exhibition "Rememory." She never expected the key to illuminating someone's past would be to photograph the person in the dark with his or her eyes shut, lost in thought.

She came up with the idea after taking a photo of her daughter that accidentally caught her blinking. That shot earned a prominent place in Dobson's studio.

"I was intrigued because it looked to me like she was deep in thought. It was almost the opposite of what you'd expect with a portrait because generally the eyes are seen as a passage in, and that was closed off. And yet I thought the picture spoke more of my daughter than any others that I had."

Dobson has been developing a way to teach her students to follow the transitions that occur in the world of photography, such as the switch from film to digital media. The result is a course that integrates both old and new technologies and concepts, and this dialogue between past and present led her to create "Rememory."

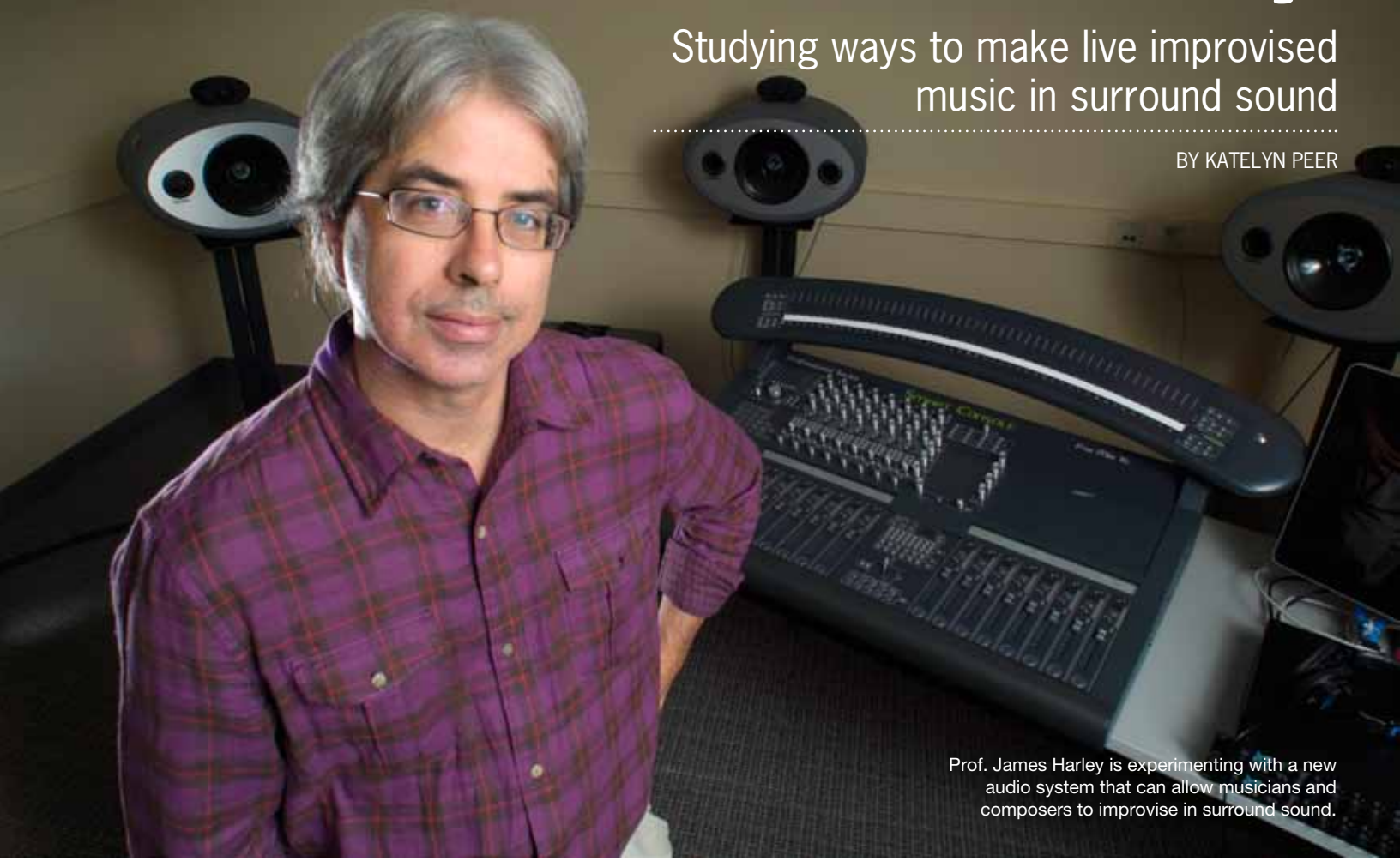
She wanted to see if it was possible for people to sit in her studio, close their eyes and truly reflect on past events, well aware that they're being photographed in an artificial setup. It was this time consciousness and juxtaposition between past and present that Dobson aimed to capture on film.

Funding for this project was provided by the Canada Council for the Arts and the Ontario Arts Council. R

A new musical reality

Studying ways to make live improvised music in surround sound

BY KATELYN PEER



Prof. James Harley is experimenting with a new audio system that can allow musicians and composers to improvise in surround sound.

Imagine a live improvised musical performance — in surround sound, with a computer manipulating and spinning instruments' sounds around eight different speakers in real time. That's being made possible through the University of Guelph's new Advanced Digital Audio Production and Performance Studio. It gives creative researchers an opportunity to experiment and learn new techniques for this type of production, which is called "performative music."

Prof. James Harley, Fine Art and Music, has been creating music for years as a composer, but now he's stepping into the improvisational, experimental and technological realm. He's studying new ways to incorporate the realism of surround sound into live recordings and performances.

"Out in the world, it's all surround sound," he says. "So that's what we want to create for listeners in the studio or performance."

His target is a musical performance that is visually and audibly something the audience couldn't otherwise experience. This will be achieved through his unique real-time manipulations and surround sound that can be improvised.

Here's how it works. Hundreds of audio tracks are created or recorded on a computer and are played back through eight speakers strategically placed around a recording studio or performance space. The musician has access to a special mixer to control the sounds coming out of the computer. Every sound can be varied and sent to different speakers at the same time, even if the instrumentalists are performing live. Through the mixer and computer, the instrumentalists can send their performance through surround sound, too.

Harley plans to incorporate environmental sounds such as birds chirping and wind blowing into his work. He also wants to collaborate with people in other academic disciplines, including computing science, engineering and acoustic ecology. That work could draw attention to issues such as noise pollution and highlight acoustically rich habitats that are disappearing, including indigenous forests and wetlands.

Others involved in this study are music professor Ellen Waterman, who collaborates on the flute for recordings and live performances, and audio engineer Randy Smith. Argentine composer Osvaldo Budòn will do a creative residency at the studio in May.

For his studies, Harley received a Leaders Opportunity Fund grant from the Canada Foundation for Innovation, a rare award for creative research. This support paid for renovations to create music studios in the University's Axelrod Building, as well as for recording and performing gear. R

Photo By Martin Schwalbe |

R Cover Story

When music meets science

Guelph Guitar Project tunes into local culture

BY JOHNNY ROBERTS

Documenting history can sometimes involve remanufacturing nature — or, in other words, putting the pieces back together again. But what if those pieces are what some would call garbage? A University of Guelph researcher has discovered that by collecting unwanted materials and combining them with valued objects, something beautiful, educational, meaningful and even musical can be created.

Integrative biology professor Doug Larson spent more than 1,000 hours collecting discarded materials in and around the Guelph area for what's become known as the Guelph Guitar Project. It's an initiative designed to spread knowledge of culture and to help us see ourselves reflected in just about anything.

Larson is visiting elementary and secondary schools in Guelph to share with them the stories behind the instrument's construction. "This guitar invites stories to be told that would otherwise be lost."

He says this is important not only for music but also for explaining culture, history and research — something that resonates even more given that a lot of the guitar's 3,500 pieces (many of which he calls "cultural artifacts") had been discarded.

Among the instrument's many pieces are:

- a nail from the University's first gymnasium (placed in the headstock of the guitar);
- part of an 1877 advertisement for Sleeman Breweries (headstock);
- the plastron (stomach plate) of a wood turtle once studied by professor emeritus Ron Brooks of the Department of Integrative Biology (pickguard);
- a leather desk blotter from the Ontario Agricultural College (guitar strap);
- a regimental belt buckle from the 11th Field Regiment, Royal Canadian Artillery (guitar strap); and
- leftover fabric from Biltmore hats (guitar strap).

The guitar body contains various wooden materials, including pieces of the Priory, the first building constructed in Guelph, and part of a tree that was planted on the University's Johnston Green in 1880 and was killed during a storm in 2007. A large section of American chestnut was donated to the project by integrative biology professor Brian Husband and his graduate student John Gerrath, who have done extensive studies on the tree.

The most recent addition to the guitar is a diamond donated by Greg Buzbuzian, co-owner of Knar Jewellery. The nearly flawless gem, which came from Canada's first diamond mine, the Ekati Mine, is now part of the guitar's headstock.

Larson says each piece tells its own tale about the evolution of culture, art history, biology and physics, all of which are related to U of G and the city of Guelph.

"I believe the arts and sciences to be the same thing. They shouldn't be divided into separate planes of knowledge. Rather, they should be perceived as two equal entities that can be connected to one another."

Among the many contributors to this project were the University of Guelph through Prof. Steven Liss, associate vice-president (research services); the City of Guelph; and John Sleeman of Sleeman Breweries Ltd. R

Prof. Doug Larson built the Guelph guitar out of discarded materials and created a unique cultural statement.

| Photo By Andra Zommers

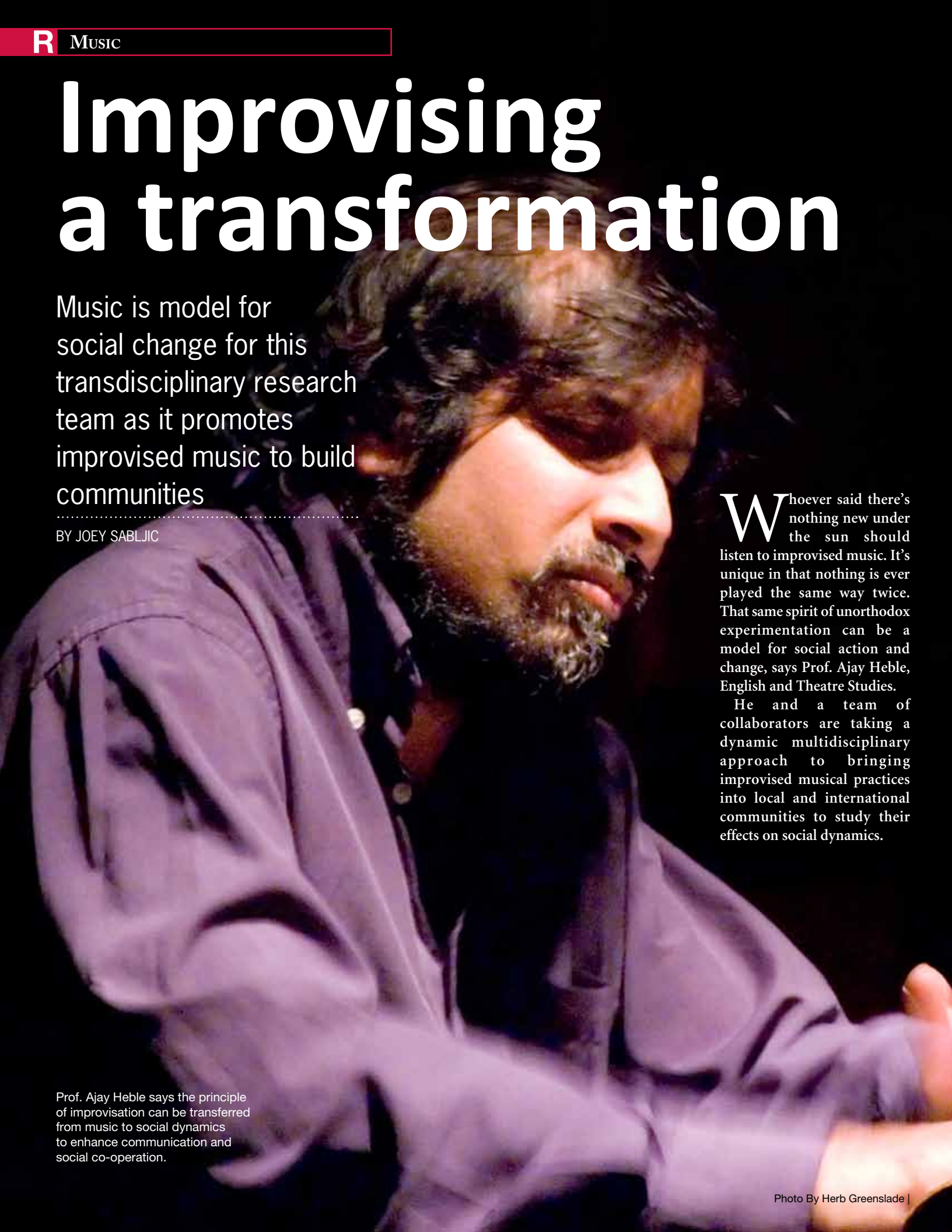
Improvising a transformation

Music is model for social change for this transdisciplinary research team as it promotes improvised music to build communities

BY JOEY SABLJIC

Whoever said there's nothing new under the sun should listen to improvised music. It's unique in that nothing is ever played the same way twice. That same spirit of unorthodox experimentation can be a model for social action and change, says Prof. Ajay Heble, English and Theatre Studies.

He and a team of collaborators are taking a dynamic multidisciplinary approach to bringing improvised musical practices into local and international communities to study their effects on social dynamics.



Prof. Ajay Heble says the principle of improvisation can be transferred from music to social dynamics to enhance communication and social co-operation.

Photo By Herb Greenslade |

Heble contends that improvisation serves as a model for political, ethical and cultural co-operation. He and his research team believe that using a creative improvised approach allows for cross-cultural communication and dialogue that transcend linguistic, ethnic and religious barriers.

"We want to find out what improvisation tells us about issues of trust, social co-operation, humility and cultural understanding," he says.

Heble heads the University of Guelph-based Improvisation, Community and Social Practice project. It brings together more than 35 diverse researchers from 20 institutions to promote improvised music in local communities, with an eye to changing community and social dynamics. He and his colleagues have received a total of $4.3 million, including a $2.5-million grant from the Social Sciences and Humanities Research Council (SSHRC).

Although improvisation is the most widely practised musical form, it's also the least understood because of its seemingly free-form nature, says Heble. As a result, it is often devalued and discouraged in academia and society. So he and his colleagues have responded with a print, broadcast and web media campaign that makes improvisation — and their research — widely available and accessible.

Over the next seven years, they will be hiring the equivalent of more than 200 students to work as editors for the project's online academic journal, to organize conferences and to design multimedia art exhibits.

The student researchers also organize local community outreach programs that bring improvising musicians into local high schools, child development centres and alternative education schools for disadvantaged and at-risk youth, such as KidsAbility and Give Yourself Credit. The musicians lead workshops, encouraging children and teens to learn how to play instruments while writing and performing their own compositions in an open, collaborative environment.

Heble hopes reaching out to youth groups will lead to greater community awareness. He wants these youths to be empowered and encouraged to express themselves artistically.

To get the most tangible sense of their outreach effects, the student researchers are conducting comprehensive open-ended interviews with the children participating in the improvised music workshops, as well as with their parents and teachers.

Once Heble and his colleagues have amassed several years' worth of interview information from their outreach projects, they will work with government organizations such as the Canadian Council for the Arts to help with data collection and analysis. They hope to use the information obtained from these interviews to develop a freely available tool kit of best practices for teaching musical improvisation in schools and communities.

Besides collaborating with street-level organizations, the project has begun to reach wider audiences by forming partnerships with music festivals in Guelph, Montreal, Vancouver and Paris. Each festival features a colloquium that brings together researchers and improvising musicians from around the world for live performances. It also provides opportunities to share research, broadcast findings to wider audiences and network with like-minded researchers.

"We're reaching thousands and thousands of people, which is something you wouldn't expect from academic research," says Heble. "This will help reinvigorate the public's understanding of art's social function."

In addition to receiving a Major Collaborative Research Initiatives grant from SSHRC, the Improvisation, Community and Social Practice project is funded by a number of partner institutions, including McGill University, the University of British Columbia, Université de Montréal and the University of Guelph. Several other partner organizations are also providing support. R

| Photo By Jonathan Michaels

Jazzed-up physics

BY KATELYN PEER

Prof. Diane de Kerckhove

Some 400 years ago, Galileo first turned his telescope towards the stars. When that happened, it ushered in the era of modern astronomy because it allowed theories to be tested against detailed observations of the sky. One University of Guelph professor has taken a unique interdisciplinary approach to highlighting this milestone — she's combining physics and song.

And that's natural for Prof. Diane de Kerckhove of the Department of Physics. She once had to choose between a Rhodes Scholarship at the University of Oxford and a recording contract. She chose the former but has continued to sing jazz professionally, performing under the name Diane Nalini.

To celebrate the International Year of Astronomy (IYA) 2009, she merged her two passions with the release of her fourth album, *Kiss Me Like That*, which celebrates the stars in music. The album's title is based on the mnemonic device "Oh, Be a Fine Girl, Kiss Me Like That," which she teaches her astronomy students to remember the order of stars by heat classification (OBAFGKMLT).

The album's release concert in Guelph was one of a number of IYA events held on campus.

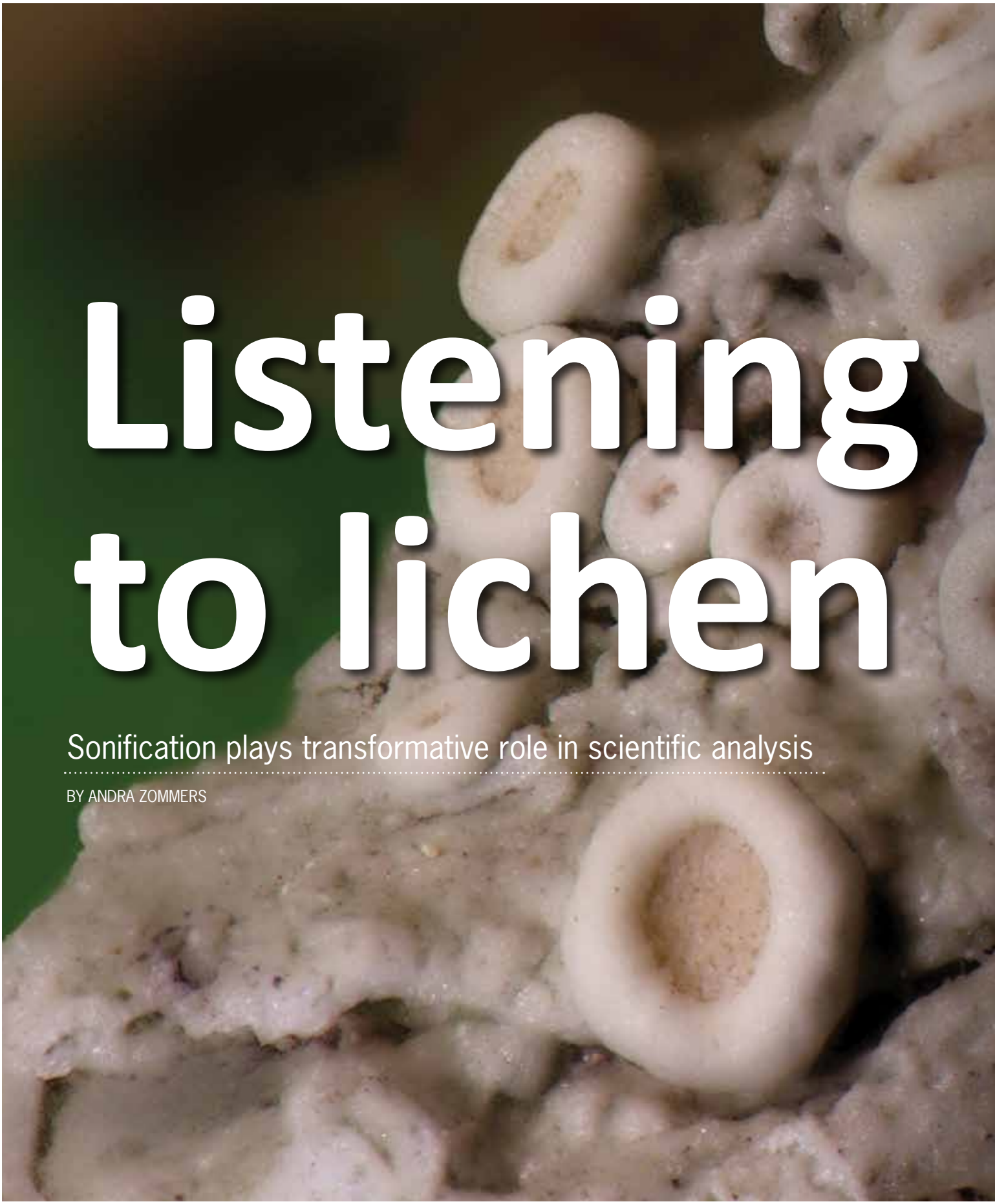
"The more interdisciplinary the celebration, the better," says de Kerckhove. "We want people of all ages and interests to discover the night sky as Galileo did."

Her lyrics for the song *Love in Outer Space* on the album are partly inspired by the search for extraterrestrial intelligence. *Mundos Escondidos* describes the Magellanic clouds, galaxies that can be seen only in the Southern Hemisphere. *Winter Eclipse* is about sipping hot toddies in the snow while waiting for a lunar eclipse.

Although some of her lyrics use astronomical terms as metaphors, they also feature everyday situations and emotions that listeners can relate to. For example, *Cuando Sale La Luna* is about the moon chasing the sun, but they are never meant to be together as lovers.

De Kerckhove says she doesn't want to alienate people with thick scientific jargon. "The beauty of the stars is for everyone to enjoy, not just scientists."

For more information about the songs and their origins, as well as audio clips, visit www.kissmelikethat.com.



Listening to lichen

Sonification plays transformative role in scientific analysis

BY ANDRA ZOMMERS

From a clock tower tolling the hour to a heart-rate monitor signalling a healthy pulse, sonification is a practice that uses sound to convey information to listeners. Now, it's being used by a husband-and-wife research duo to listen in on lichen.

University of Guelph PhD student Kevan Berg of the Department of Integrative Biology and composer Jodi Vander Woude, a master's graduate of the University of Western Ontario, are challenging the boundaries between art and science, exploring sound as an alternative avenue for scientific analysis. They've created four short compositions that together make up the *Arboreal Suite for Lichen*. The piece expresses various scientific measurements and data inputs as unique synthesized instrumental sounds such as wood blocks, a xylophone and agogo bells.

Vander Woude used Berg's collected data on lichen communities growing on pine and spruce branches in Ontario's boreal forests to assign each species an instrument and a melodic profile.

"Sonification lets us experience data in a different way," says Berg. "It doesn't easily fit into the hypothesis-testing framework of the scientific method. In terms of science, it's still a new way of understanding data."

Lichen result from a symbiotic association between fungi and algae. The fungal component provides the lichen with structure; the algae supply the energy for the partnership.

The profiles were based on an interpretation of the "personality" of each lichen species. *Parmelia sulcata*, for example, was determined to be lion-hearted, reflecting its metallic- and shield-like features, as well as its general prominence in lichen communities. Using sound parameters such as volume and timbre, the researchers convey a sense of the spatial distribution, frequency and abundance of each species.

For the computerized performance, a projected digital image of a tree branch is followed linearly from left to right. The accompanying musical score, which sounds like a tinkling jungle-themed music box, conveys the characteristics of the lichen communities growing on each branch, using Max/MSP graphical programming and real-time audio software.

Sonification opens up another realm of understanding data or concepts that are not necessarily visual, says Vander Woude. In some practical situations, it can be extremely helpful to allow listeners to be conscious of data inputs and still have their eyes and hands free to do other things, as in the case of the heart-rate monitor, she says.

Vander Woude notes that music and science have a long history together.

"Throughout time, music has had a foot in both the science and art disciplines. But music itself has a scientific basis in physics because music is made up of sound waves. Music can also be approached scientifically."

Next, she and Berg hope to use sonification in conjunction with different plant communities, with data collected using alternative statistical approaches, and further explore various applications of sonification to scientific study.

"It's a meeting between music and science that we'll definitely keep thinking about," says Vander Woude.

She conducted this research as part of her master's studies in the Department of Music Theory and Composition at Western. She used data from Berg's master's thesis, which he completed in Guelph's former Department of Environmental Biology. R

Lichen species such as the *Ochrolechia pseudopallescens* pictured here can be characterized through sound.

| Photo By Kevan Berg

Going solo

Software allows children with little mobility to create improvised music all by themselves

BY JOEY SABLJIC

With the help of musical software, children with physical and mental disabilities can produce their own digital music compositions.

Physical or mental disabilities shouldn't prevent creative people from expressing themselves. Recognizing that, a University of Guelph music professor is collaborating with researchers from across Canada and the United States on an innovative project that combines music, computer science and sociology to develop software that enables children with disabilities to create their own improvised musical compositions.

Prof. Ellen Waterman, School of Fine Art and Music, has been working with Pauline Oliveros, an internationally recognized musician and composer who is Distinguished Research Professor of Music at Rensselaer Polytechnic Institute in Troy, N.Y., and Leaf Miller, an occupational therapist and musician at Abilities First in Poughkeepsie, N.Y. Oliveros and Miller have been developing Adaptive-Use Musical Instruments for the Physically Challenged (AUMIPC). It's free computer software that uses webcam technology to allow children with little mobility to play virtual instruments by translating their movements into music.

Waterman is also working with Gillian Siddall, dean of social sciences and humanities at Lakehead University, and Sherrie Tucker of the University of Kansas to develop a research project to support, document and further develop the groundbreaking AUMIPC project.

"Making music is a way for these children to be creative," says Waterman. "And for the first time in their lives, children who can't speak and who can barely move are making their own choices, enabled by this technology."

The software uses a webcam to create a focal point on a child's face. On the computer screen is a horizontal and vertical grid. When the child tilts his or her head laterally and vertically, different drum sounds or notes on a keyboard are triggered.

Waterman, Siddall and Tucker are conducting in-depth interviews with several dozen children and therapists using the software and documenting their individual responses to it. The researchers are taking into account each child's physical and mental abilities to determine what improvements or additional features would make the software more useful to a wider audience.

Because the software is freely available, the researchers are depending on users to provide feedback and suggestions. More important, they hope the software will eventually help create an ever-expanding network of therapists, teachers and handicapped musicians who will use, manipulate and share the software to suit their individual needs.

Funding for the adaptive-use project is provided by the Social Sciences and Humanities Research Council through the Improvisation, Community and Social Practice research project based at U of G.

More information and a downloadable version of AUMIPC are available at www.deeplistening.org. R

Photo By Byeong Sam Jeon |

Equity and anarchy

Shakespearean theatre reveals integral element of legal environment

BY JOHNNY ROBERTS

Prof. Mark Fortier is looking at Shakespearean literature to study how the concept of equity has evolved over time.

Equality among citizens is vital for maintaining a functional society, but what does societal equity mean? Prof. Mark Fortier, English and Theatre Studies, says examining Shakespearean plays can help us understand how the term equity was conceived and the versatile meanings it has had through the ages.

Fortier says equity has evolved to keep up with our culture. He's a law school graduate, and with his parallel interest in theatre and literary studies, he longed to connect the two disciplines. In fact, it was that passion that led him to join Shakespeare and concepts of law, particularly equity.

Studying Shakespeare has enabled researchers to see how equity has developed as an integral part of today's legal environment. Legally speaking, equity is a kind of justice that recognizes the need for exceptions to any rule. It allows for standard rules to be waived in cases where they might do more harm than good. Equity is about the spirit of the law rather than the letter of it, says Fortier.

Some people call this anarchy. But equity suggests that human beings rely on their sense of fairness and discretion to make decisions.

"This research is an attempt to understand the concept of equity in greater detail," he says. "By observing Shakespeare's plays, we discover what he perceived to be uniquely valuable to humans and how the literature and the legal system interact."

Fortier researched and analyzed numerous Shakespearean plays, leading him to see the Bard's interest in equity inside and outside the law. In *The Merchant of Venice*, for example, Shakespeare exploits notions of the law to reveal how ruthless and unjustly strict and unbending law could be. His interest in the law allowed his readers and supporters to weigh strict enforcement of the law against acts of mercy.

In fact, the term equity has a long history of being applied to various areas of society, including law, financial decision-making, religion, politics and even theatre. As expressed in the golden rule: "Do unto others as you would have them do unto you," equity brings care and understanding into social prominence. In a way, says Fortier, equity maintains civil behaviour.

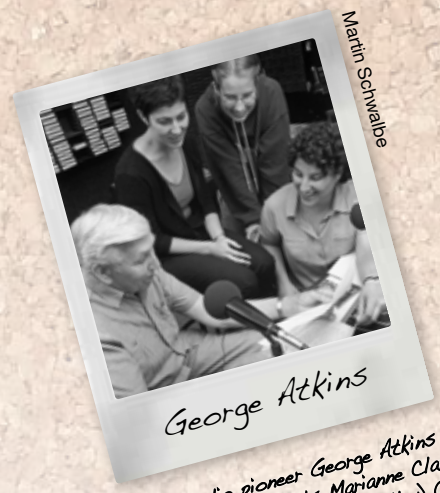
He has published a scholarly book titled *The Culture of Equity*, which describes the historical development of equity. He says it provides society with the opportunity to understand equity's value in matters of contemporary law, as well as in basic functions of everyday life.

This research is funded by the Social Sciences and Humanities Research Council.

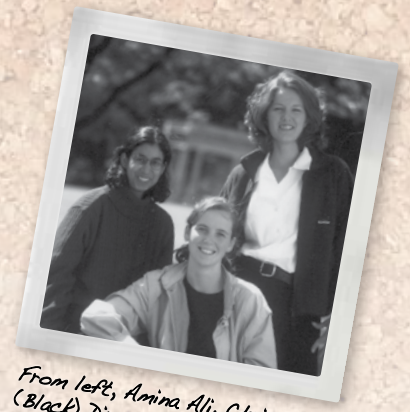
| Photo By Martin Schwalbe

20 Years of SPARK

These snapshots and SPARK timeline were compiled by Tara Walsh and Katelyn Peer



Farm radio pioneer George Atkins gave SPARK participants Marianne Clark, Jenny Dobbin and Carol (Pilley) Carson, some broadcast lessons at CFRU.



From left, Amina Ali, Christine (Black) Dixon and Jenny Tye received writing awards from the Canadian Farm Writers' Federation in 1998.

"Where do I begin?" says Anne Douglas when asked how SPARK helped her career get off the ground. She was with SPARK from 1992 to 1997 while studying English. Her proudest accomplishment at university was seeing one of her SPARK articles published in the Globe and Mail. It also received an award from the Canadian Farm Writers' Federation in the best daily newspaper award category. "SPARK taught me how to write in a way that was practical and newsworthy, but it also taught me about project management and co-ordination," says Douglas. She now uses all these skills as a communications specialist with the Guelph Food Technology Centre.

SPARK reminded Claire Moxon that writing is indeed enjoyable, even when one is immersed in science exams and mathematical equations. She completed a master's degree in molecular biology and genetics while working at SPARK from 1998 to 1999 and is now a senior patent agent for Pioneer Hi-Bred in Iowa. Moxon is completing a law degree to become a patent attorney. "Although my work now is more technical, it certainly draws on the skills I honed during my time at SPARK," she says.

1989

- SPARK (Students Producing Articles on Research Knowledge) launched with *Ontarion* student newspaper contributors Andrew Wagner-Chazalon and Greg Smith.

THE ONTARION

90

- Pioneer Hi-Bred Limited becomes founding sponsor with support from its Community Development Fund

PIONEER. A DuPont Company

92

- First *Research* magazine produced with student-written articles
- SPARK receives first recognition: SPARK writer Sherry MacKay wins gold award for best news release from Canadian Farm Writers' Federation

cfwf

94

- SPARK wins gold the first time "Best New Idea – Creativity on a Shoestring" category is offered in Canadian Council for the Advancement of Education awards

Le Conseil canadien pour l'avancement de l'éducation · CAE · The Canadian Council for the Advancement of Education

95

- Photography added to SPARK portfolio
- Program name changed to Students Promoting Awareness of Research Knowledge
- First "SPARKPlug" appears in the *Guelph Mercury*

Guelph Mercury

Lisa (Caines) McLean says her SPARK experience was key to her getting into the working world quickly after graduating from Guelph. She gained valuable communication skills working at SPARK from 2000 to 2002 while studying English and drama. She went on to start the Farmers Feed Cities campaign and is now director of communications and regulatory affairs with the Alliance of Ontario Food Processors. "People know that if you've worked at SPARK, you understand what a quality finished product looks like because you've learned through the editing process," she says.

Christina Clark

Christina Clark, a SPARK writer and project co-ordinator from 1997 to 2000, realized she likes learning and writing about research more than conducting it herself. She finished her undergraduate degree in biochemistry and her master's in human biology and nutritional sciences during her time at SPARK; now she's active as a medical writer, working in the health sciences and pharmaceutical industry. "SPARK really helped me shape my career," she says.

Kristy Nudds

Kristy Nudds, a SPARK writer from 2000 to 2003, is now editor of the national trade magazine Canadian Poultry and has an arrangement to publish SPARK poultry articles. She completed an undergraduate degree in animal biology and a master's in animal nutrition and metabolism at Guelph, but SPARK helped guide her career path. "It made me realize there are so many opportunities for using an agriculture degree in a career," she says. "I really found my niche at SPARK."

From left, SPARK writer Kate Roberts and SPARK co-ordinator Mitch Ritter interview physics professor John Dutcher in 2005.

97

- SPARK receives silver award for publications and newsletters from Agricultural Communicators in Education
- First SPARK article appears in *Milk Producer* magazine

98

- University of Guelph receives gold award from Canadian Council for the Advancement of Education for "Best Private-Sector Partnership" for the OMAFRA enhanced partnership with SPARK)
- *Country Guide* magazine publishes SPARK news briefs

99

- Natural Sciences and Engineering Research Council provides start-up funding for a national SPARK prototype program at 10 other Canadian universities, using Guelph expertise and the Guelph SPARK model

2001

- Video partnership with *Town and Country Ontario* TV show earns SPARK writer Dale Duncan a bronze award for television news reporting from the Canadian Farm Writers' Federation

02

- SPARK's *PigPens* newsletter about pork research at Guelph wins silver award for best newsletter from the Canadian Council for the Advancement of Education
- First article in *Ontario Beef* magazine

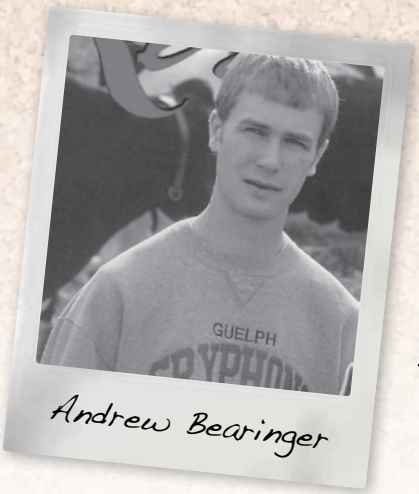
Martin Schwalbe

Members of the fall 2001 SPARK team pose for a group shot. At back, from left, are Murray Tong, Shannon Hicks and Heidi Clark. In front are Lucas Habib, Blythe McKay, Marianne Clark, Erinn White and Lisa (Caines) McLean.

Martin Schwalbe

Associate vice-president (research services) Steven Liss takes time during SPARK's 20th-anniversary celebration to congratulate Canadian Farm Writers' Federation award recipients Natalie Osborne and Arthur Churchyard.

SPARK writer Shannon Hicks meets with Jim Wright, video specialist from the Ontario Ministry of Agriculture, Food and Rural Affairs.



Andrew Bearinger

Andrew Bearinger was a SPARK writer from 2000 to 2001 while earning a degree in agricultural science. He went on to teach high school science and biology before becoming a high school guidance counsellor in Waterloo, Ont. "SPARK was such a positive work environment," he says. "It gave me the opportunity to develop my communication skills, both oral and written, which are important for being a teacher as well as a counsellor."

03

- SPARK receives international recognition and gold award for "Best Media Relations Program" from Agricultural Communicators in Education

05

- SPARK receives Agri-Food Innovation Award in communications category from the Province of Ontario
- AFMNet releases its first issue of *Advance*, written and co-ordinated by SPARK

07

- SPARK begins contributing research radio news to CKNX
- SPARK articles published in *Ontario Wheat Producer* and *Greenhouse Canada*

08

- SPARK receives gold award from Canadian Farm Writers' Federation for technical publications from Association for Communication Excellence in Agriculture, Natural Resources, and Life and Human Sciences
- SPARK receives silver award for webcast "Building Bridges for Agriculture" by SPARK writer Arthur Churchyard

09

- SPARK receives gold award for technical publications from the Association for Communication Excellence in Agriculture, Natural Resources, and Life and Human Sciences
- SPARK receives Silver Award for Webcast -- Building Bridges for Agriculture -- by SPARK writer Arthur Churchyard, from Canadian Farm Writers Federation

Martin Schwalbe

Former federal agriculture and agri-food minister Hon. Lyle Vanclief at an event at his department's Ontario region office in Guelph, with SPARK writers Christine (Black) Dixon, left and Polly Stanley.

Before producing research videos, SPARKAir took its first broadcast steps into the radio realm. Former SPARK student Arthur Churchyard, who began the SPARKAir initiative, was invited to the CKNX radio station to see how SPARK's radio broadcasts would make their way out into radio land.

Owen Roberts

Arthur Churchyard

Clare Illingworth studied animal biology with a minor in nutrition and food science while she was a SPARK writer from 2002 to 2004. "SPARK really shaped my career," she says. "I was studying science, which I enjoyed, but learning to apply science to the real world was important. I use this scientific literacy in my work now." After SPARK, Illingworth went on to work for Ontario Pork. She's now an internal communications specialist with Syngenta Crop Protection Canada.

TODAY

- News stories developed through alliance with Association of Faculties of Medicine of Canada and Canada Foundation for Innovation
- SPARK articles appear in *Ontario Corn Producer*

- SPARK's Natalie Osborne receives bronze award for "best radio news reporting SPARK/CKNX radio) from Canadian Farm Writers' Federation
- SPARK supplies news articles to Canadian Farm Business Management Council
- SPARKAir begins; first video appears on farms.com

- SPARKAir students, from left, Andra Zommers, Katelyn Peer and Natalie Osborne with researchers Eric Lyons, John Zandstra and Mary Ruth McDonald.

AM 920 cknx INFORMATION COUNTRY

SPARKair

English, French or both?

Looking at bilingualism promotion and reception in English-speaking Canada

BY CAROL MOORE

English-French relations and language policy have been at the forefront of many political debates in Canada over the last 40 years. U of G history professor Matthew Hayday is analyzing the promotion and reception of bilingualism in English-speaking Canada from the 1960s to the 2000s.

Combing through media coverage by major Canadian newspapers and magazines, promotional material from government agencies, parliamentary debates, interviews with activists and archival material from organizations interested in language questions, Hayday hopes to uncover the different ways Canadian groups have promoted or opposed the idea of bilingualism.

His research has a transdisciplinary component in that he also wants to determine how bilingualism is affecting the job market, how it affects Canada as a whole, how it is affecting lobby groups such as Canadian Parents for French (CPF) and what they are doing to defend their initiatives.

Hayday is focusing his research on the past five decades because many important political and social movements revolving around language took place within that time frame. Since the 1960s, Canadians have seen the creation of the Royal Commission on Bilingualism and Biculturalism, the formation of the Alliance for the Preservation of English in Canada, two separatist referendums in Quebec and many high-profile constitutional negotiations that brought language issues and policy to the forefront of Canadian politics.

"I'm looking at how Canadians have responded to the idea of bilingualism as a result of these events," says Hayday.

For the past year, he's been visiting archives across Canada, conducting interviews, doing preliminary research and collecting documents. He's trying to understand the strategies used by groups to promote or oppose bilingualism, as well as the ideological factors and simple economics attached to bilingualism.

Hayday plans to look closely at language policy and all the disciplines that have an impact on policies. Although his research uses historical methodology, he will also draw on theoretical approaches from other disciplines such as political science to understand the development of public policy.

Sociolinguistic theories will help him explain why Canadians decided to learn a second language or, conversely, to perceive the promotion of bilingualism as threatening to their identity. He hopes this breadth of information will help him establish the reasoning behind why the majority of English-speaking Canadians would want to learn how to speak a minority language such as French. He's also interested in the costs associated with that decision.

"This is not an issue that can be boiled down to one specific area," says Hayday. "It's not just an issue of economics or simply hatred for the other language community."

When his research is complete, he plans to publish a book with UBC Press, tentatively titled *Coaxing the French Tongue Down Our Throats*, and a number of journal articles.

Funding for this research is provided by the Social Sciences and Humanities Research Council.

Photo By iStock |

Writers after the revolution

BY KATELYN PEER

The terms "popular writer" and "government minister" rarely appear in the same résumé, at least in the English-speaking world. But in Latin America and Southern Africa, it's been commonplace for decades. In fact, it's preferred that such intellectuals be part of the government.

Prof. Stephen Henighan, right, pictured here in 2005 with Prof. Petelo Fidel at Agostinho Neto University in Luanda, Angola, wonders how a government revolution transforms writing.

Prof. Stephen Henighan, head of Hispanic studies in the School of Languages and Literatures, is looking closely at this double career choice by comparing the writing of four officials before and after their stint in revolutionary government. He wants to know how the upheaval affected the way they use language in poetry and novels to construct a national identity.

Henighan travelled to Angola, Nicaragua and Mozambique to meet the four writers in their homelands. Poet Ernesto Cardenal was Nicaragua's minister of culture from 1979 to 1988. Sergio Ramirez is Central America's best-known novelist and was vice-president of Nicaragua from 1984 to 1990. Pepetela, Angola's most famous novelist, served as deputy minister of education from 1976 to 1982. And Mia Couto, whose books have been published in 22 countries, was named Mozambique's director of information at age 20 and served from 1975 to 1982.

Travelling to these countries, Henighan noticed an overwhelming change in the writers' pre-revolution texts compared with their post-revolution texts. They went from confident male identities to having anxieties about gender roles. The idea of nation and the construction of masculinity had become one; the weakened state of the nation meant that their composition of male identity had been weakened, too. The writers/government officials were also dealing with the stress of being part of small nations in a modern world that is constantly moving towards global exchange.

Henighan's research was funded by the Social Sciences and Humanities Research Council. R

Exploring collaborative culture

TransCanada Institute encourages critical discourses of Canadian literature

BY CAROL MOORE

Canada has a highly multicultural population, which has led to the creation of many Canadian novels with influences from a number of diverse cultures. But this has generated many questions about what constitutes Canadian literature. The TransCanada Institute at the University of Guelph is trying to provide answers.

The institute was founded by English professor Smaro Kamboureli, who holds the Canada Research Chair in Critical Studies in Canadian Literature. She designed it to foster, support and initiate research on various aspects of Canadian literature. It was also established as a "positive and productive pedagogical and mentoring space for graduate and undergraduate students," she says.

The TransCanada Institute group

The initial intention of the institute was to create a collaborative culture of scholars and students. Conferences, which have been the main initiative of the institute, bring together people working in Canadian literature studies, political science, sociology and cultural anthropology, practising writers and journalists, and people from education and native studies.

"The main focus of these conferences has been to discuss how what we do as academics can be translated into something that's considered 'useful' in society," says Kamboureli.

Future plans for the TransCanada Institute include events with guests from abroad. Kamboureli is also organizing a think-tank that will include scholars from other universities. She expects this will bring together people working on the cutting edge of critical discourses to discuss and establish the institute's future research plan.

Funding for the institute was provided by the Canada Foundation for Innovation. R

Photo By TransCanada Institute |

Economics and the environment

Information technology can bring them both together

BY CAROL MOORE

With a close eye being kept on food production, farmers are looking for more environmentally friendly ways to manage their operations and remain profitable. To that end, a University of Guelph researcher says information technology can be applied to assess the economic impact and cost-effectiveness associated with adopting environmentally friendly practices or beneficial management practices (BMPs) such as conservation tillage, nutrient management and riparian buffers.

GIS technology is helping Prof. Wanhong Yang assess how beneficial management practices can have a positive impact on farms.

Prof. Wanhong Yang of the Department of Geography is using Geographic Information Systems (GIS) technology — a computer modelling system — to combine economics and environmental analysis. The goal is to better understand farming's environmental impact, as well as the cost-effectiveness of implementing agricultural conservation programs for water-quality improvement.

"Agricultural runoff and water quality have become a concern over the last decade," says Yang. "We can use GIS to examine the cost-effectiveness of conservation programs designed to limit agricultural pollutants and improve water quality."

Ottawa has started investing public funds to help farmers offset costs in implementing BMPs that could reduce the impact of agricultural runoff. Through organizations that develop and implement water-quality improvement programs directly or with farmers, Yang can use GIS technology to see where it would be best to invest public funds to maximize the environmental benefit and minimize cost to producers.

Here's how it works. GIS technology organizes custom geographical information into different layers. Some of the raw data may include soil, land use, terrain pattern, water network, precipitation and temperature, compiled by government agencies such as Environment Canada and Natural Resources Canada or by commercial vendors who create their own data or repackage existing information.

With GIS technology, all data layers can be overlaid to provide geographically related data. Economic models can then be developed to quantify BMP costs in terms of forgone cropping returns or implementation costs. Hydrologic models can be applied to estimate corresponding environmental benefits in terms of water-quality improvement.

Yang says the advantage of GIS technology is that the BMP cost and benefit data can be mapped to pinpoint locations for implementing one BMP or a suite of them to achieve cost-effectiveness in an agricultural region.

"We want to optimize the benefit for farmers and the environment but also keep costs at a minimum, providing a scientific tool for public and government use for designing agricultural conservation programs," he says.

Other research collaborators include Peter Boxall of the University of Alberta; Alain Rousseau of Centre eau, terre et environnement de l'Institut national de la recherche scientifique; Brook Harker and Terrie Scott of Agriculture and Agri-Food Canada's Watershed Evaluation of Best Management Practices project; Shane Gabor of Ducks Unlimited Canada; and U of G research scientist Yangbo Liu.

Funding for this project is provided by the Social Sciences and Humanities Research Council; Agriculture and Agri-Food Canada; the Ontario Ministry of Agriculture, Food and Rural Affairs; Ducks Unlimited Canada; and the Canada Foundation for Innovation.

| Photo By Mitch Ritter

The magic of

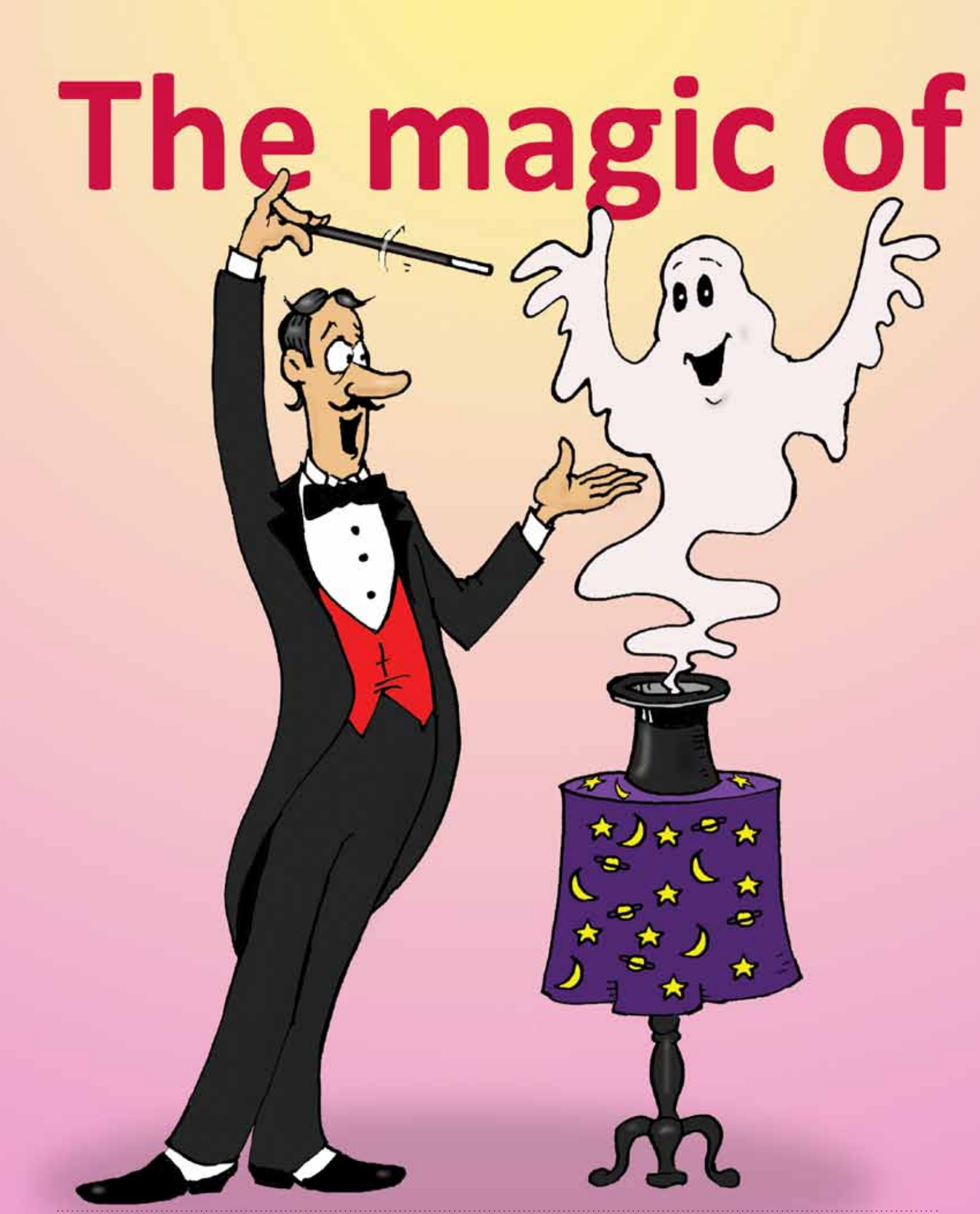


Illustration By Brian Fray |

science

BY NATALIE OSBORNE

Standing confidently on the stage of a magic house in 19th-century France, a magician announces that he's discovered a chemical that induces levitation. Before long, members of the audience are gasping in their seats as his assistant rises into the air. Taking note of how that era's scientific advances blended with a fascination for the supernatural, University of Guelph history of science professor Sofie Lachapelle is examining how self-proclaimed "professors of amusing physics" presented science and magic interchangeably to sold-out theatres.

Lachapelle is studying science's unique role in the golden age of magic to understand how society interpreted the wondrous discoveries of the time. During dozens of visits to the Bibliothèque Nationale de France, she read books, magicians' autobiographies, trade journals and newspaper articles to study stage magic from 1840 to 1910.

She says magicians borrowed ideas, language and credibility from the rapidly advancing scientific community. Chemistry and physics experiments, mathematical tricks and displays of electricity were all essential elements of a magic show.

Some performers would even exhibit animated models of geology and astronomy in theatres, considering themselves popularizers of modern science.

Lachapelle says the period was equally famous for an obsession with the occult, which also provided material for magicians' acts. She discovered the lines between fact and fiction were effectively and expertly blurred in the era's magic shows.

"One minute you have a magician conversing with a ghost on stage, and the next minute he's combining chemical substances to change the colour of a flower with vapours," she says. "So it's a strange mix, which really illustrates the tensions of the 19th century."

But most magicians used science to excite rather than educate their audiences, capitalizing on the sense of wonder inspired by new discoveries. For some members of the public, inventions such as the steam engine and the telegraph would have seemed just as incredible as the levitations and clairvoyance occurring in seances.

Lachapelle says magicians encouraged this ambiguity between the real and the imaginary. Although many magicians such as Harry Houdini began their careers as mediums, most sought to discredit and expose their mystical counterparts as frauds. Magicians attributed the shared illusions of ghosts and spirit communication to scientific principles rather than otherworldly powers. In this way, they tried to identify themselves as men of science.

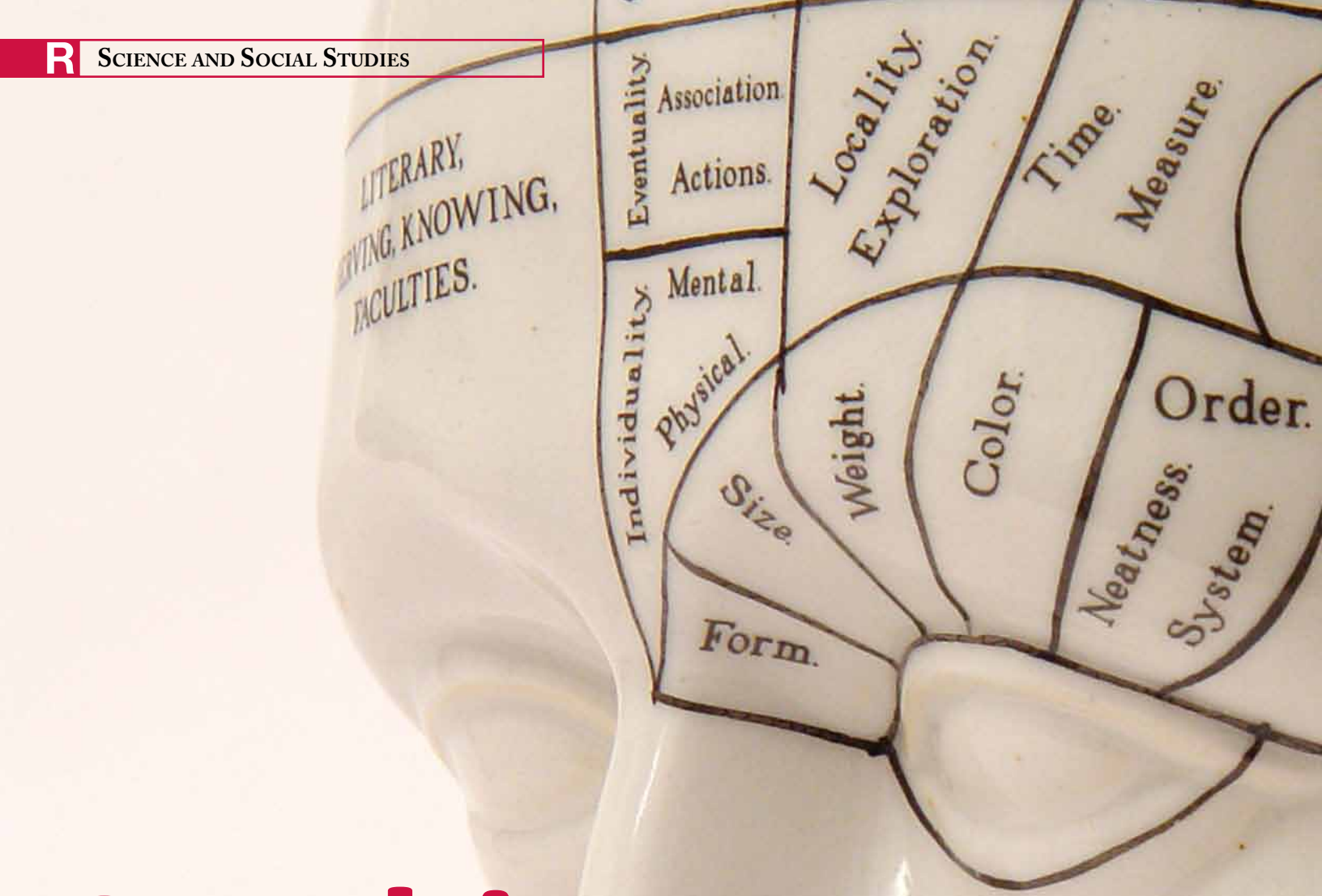
But Lachapelle discovered that in some cases, scientists benefited from the magicians. Many magicians came from families of inventors and instrument makers, and some, such as Jean-Eugène Robert-Houdin, designed and built award-winning inventions for both the stage and the laboratory. Robert-Houdin was particularly famous for his ocular instruments and his application of electricity to clocks.

The growing field of psychology was also interested in magicians' intuitive knowledge of human perception. In 1893, noted psychologist Alfred Binet invited five famous magicians into his lab in hopes of learning how and why their illusions fooled the mind. Lachapelle says Binet observed how magicians use stage presence, misdirection and dexterity to make audiences see what is not there and fail to notice what is in plain sight. He filmed various tricks, then dissected them frame by frame. Only by removing the key elements of speed and narrative were he and his colleagues able to see the illusion. They were often surprised at its simplicity and effectiveness, and once they learned the trick, they could spot it even at normal speed.

"The fact that these magicians were willing to give up their secrets to Binet shows just how much they wished to be included in the scientific community," says Lachapelle. "This era was famous for its interest in both science and magic, which historians tend to separate. But the magicians are a perfect example of how the two were actually interconnected."

She is currently writing a book about her findings.

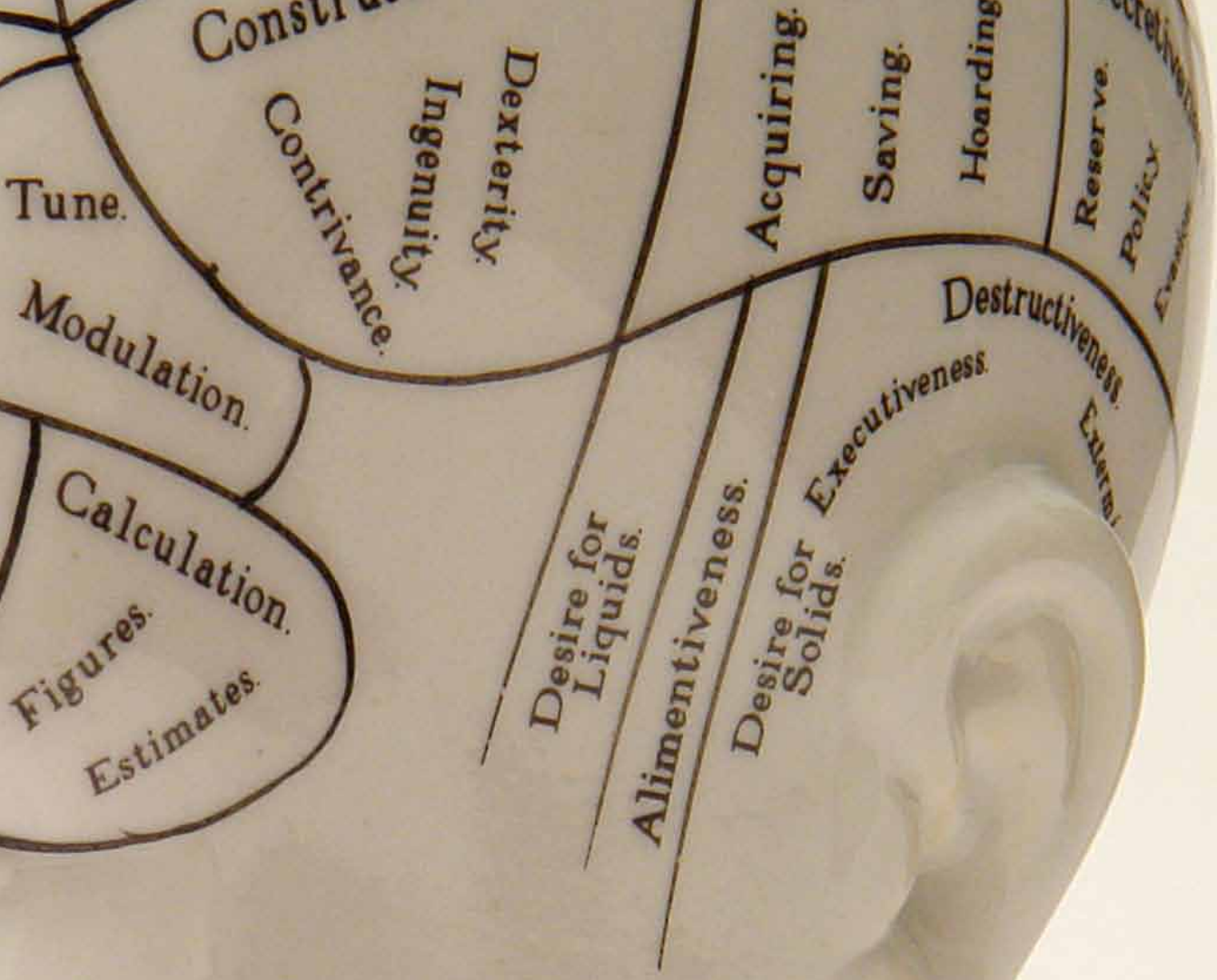
Funding for this study was provided by the Social Sciences and Humanities Research Council.



Looking at things another way

Scientific thinking is expanded through philosophical theories of reductionism and emergentism

BY JOHNNY ROBERTS



From the viewpoint of philosophers, most scientists tend to use reductionist thinking methods, which focus on fundamental scientific processes when approaching problems. But University of Guelph philosophy professor Andrew Wayne is exploring the philosophical theory of emergentism (a counter theory to reductionism). He wants to see if incorporating this theory may actually expand and strengthen scientific thinking and allow scientists to branch out of traditional thinking methods.

Wayne is investigating how the theories of reductionism and emergentism are applied to scientific disciplines, and how scientists could gain new concepts and ways of thinking by learning about ideas of emergence. He describes emergentism as the view that opposes everything being explained by fundamental physics.

"It's partly a philosophical claim, but emergentism simply states that if one is to understand, for example, an organism, one should stick to biology to find answers," he says. "Understanding a chemical formula would have an emergentist sticking to chemistry. Reductionists agree that biology and chemistry offer the best answers now, but they think that someday all will be explained even better by basic physics. Emergentists think this is a pipe dream."

Wayne defines reductionism as the view that objects, properties, phenomena and behaviours at the macroscopic level — the level that can be seen by the naked eye — can all be explained in terms of fundamental physics. The reductionist hypothesis may still be controversial among philosophers, he says, but a vast majority of active scientists accept it without question.

And that shouldn't be the case, he says. As a philosopher, he wonders whether everything can be reduced to an overpowering fundamental theory. An emergentist would propose that, to understand or explain something, one should simply stick to one's respective area of science.

Wayne says these two theories generate much debate among scientists and philosophers because they have different approaches to critical thinking. Looking at how scientists perceive these theories will allow further understanding of their functions in the sciences and philosophy, he says.

Current work at the intersection of physics and philosophy gives good reason to re-evaluate views about emergence in physics, says Wayne. One such area involves physical systems, wherein base-level (or fundamental) theories appear to break down.

"A great thing about being a philosopher of science is interacting with scientists," he says. "We are most definitely learning from one another. I learn more about how scientists view reductionism and emergentism, and scientists gain new concepts to work with and new perspectives to apply to their thinking methods."

As long as most scientists are reductionists, there will be a great effort to find explanations from basic physics, he says, but this may not be the most effective strategy in some cases.

One of Wayne's goals is to invoke a new perspective in scientific thinking, negating scientists' constant use of reductionist methods.

"Historically, physics has been an incredibly successful reductionist program. Although we shouldn't give up on that, we definitely should pay more attention to situations where it really looks like reductionism breaks down. My project is to develop an emergentist perspective to make sense of these kinds of cases." R

| Image By iStock

Digital humanities are revolutionizing research methods

BY VANESSA PERKINS

Searching the Internet for a single topic can yield millions of hits, many of which may not be useful. Newer technologies have improved the speed of information retrieval, but they haven't substantially improved the ways of looking at information.

People studying literature, art and philosophy — collectively called humanists — are facing this problem as they try to adapt to today's digitized methodology of information input and retrieval. The traditional method of reading books and taking notes cannot grapple with the exponentially exploding amount of digital material. Adequate tools do not yet exist to sift through it all.

But this could all change with new search tools being developed by researchers from various specialties through what's being called digital humanities. This field emerges from the efforts of humanists working with current technology to evolve new ways of engaging in research.

"I have a strong sense that although these tools are in their infancy, they will soon become useful far beyond the specific applications we originally envisioned for them, making it easier for everyone to deal with the deluge of information we're all faced with," says Prof. Susan Brown, School of English and Theatre Studies.

Brown heads the Orlando Project (named after the transgendered writer-protagonist in Virginia Woolf's book *Orlando: A Biography*), a collaborative venture looking into how to use digital scholarship material on women's writing throughout history for new kinds of inquiry. Its flagship publication is a textbase called *Orlando: Women's Writing in the British Isles From the Beginning to the Present*.

In Orlando, information is organized alphabetically, and users can pull up names much like picking a book from a shelf. But it's also organized by tags that can narrow searches by contexts such as political activities, relationships with publishers and reviews of texts to find materials or authors that aren't known in advance.

Brown and other researchers are gaining further insight into people's information-seeking behaviour by observing users of Orlando. They've found that allowing users to start with a broad topic and then narrow down the results is effective.

Text visualization — something novel to literary scholars — is also emerging as a new way to understand the information available on certain topics. Visualization tools are increasingly available to scholars and the public. One is the Mandala Browser, which uses colour-coded dots to represent the results for each piece of search criteria. These images pictorially demonstrate themes, patterns and relations between portions of digital text. The corresponding evidence behind the visualization can then be read by pulling up the pertinent text that the dots represent.

Brown has received funding from the Canada Foundation for Innovation (CFI) to produce a new online platform called the Canadian Writing Research Collaboratory, which will allow scholars to share materials, work together online and experiment with these sorts of new tools for humanities research.

She and her colleagues hope a Digital Discovery Centre will be established in the U of G Library in the near future. It would offer unique tools and technical support for researchers migrating into digital methods to make their work much more efficient.

"The humanities include everything from archeology to philosophy," says Brown, "and people around the world in these traditional humanities fields are pushing their own assumptions and research agendas to collaborate with designers, computer scientists and multimedia professionals. It's revolutionizing how massive quantities of digital material can be investigated."

Orlando Project collaborators include University of Guelph professor Blair Nonnecke; Patricia Clements, Stan Rueker and Isobel Grundy of the University of Alberta; Michael Bauer of the University of Western Ontario; Milena Radzikowska of Mount Royal College; Stéfan Sinclair of McMaster University; and dozens of graduate students.

Funding has been provided by U of G, the University of Alberta, the CFI and the Social Sciences and Humanities Research Council.

Prof. Susan Brown says searching for a specific subject in the humanities will no longer be a problem with new digital tools.

Studying yesterday to find answers for today

Guelph researchers use SHARCNET to analyze Canada's historical censuses

BY JOEY SABLJIC

Since Canada's beginnings, the federal government has conducted a national census every 10 years, collecting information about each household to organize parliamentary ridings by population. Now, University of Guelph researchers are using pre-1900 Canadian censuses to assemble a population database that would enable modern researchers to study societal trends of the past. Their hope is to find answers to some of today's problems.

Continued on page 38

| Photo By Martin Schwalbe

SHARCNET is helping researchers compile information on 19th-century populations such as these Doukhobor immigrants photographed in 1899, to provide insight into ongoing social, economic and health trends.

Continued from page 37

Economics and history professor Kris Inwood is working with a shared network of high-performance supercomputers that connect institutions across Ontario. Called SHARCNET, it has previously been used to model climate change, design new pharmaceuticals and energy-efficient vehicles, and track the spread of infections and diseases. Inwood leads a team that has built a digitized sample of 1871 and 1891 census data. The team is analyzing the new data with SHARCNET to gain better insight into shifting social, economic and health trends.

For example, tracing poverty's roots in Canada back to specific patterns of population mobility or examining how religious affiliation affected employment opportunities would give researchers an opportunity to study and compare past societies with current ones by tracking these trends through each decade.

Researchers could also study census data together with First World War medical exams to see what demographic groups were most affected by disease, where certain illnesses became less common over time or how childhood nutrition influenced adult height and health.

"We're able to compare today's population with one from more than 100 years ago because the census data give us a snapshot of that point in time," says Inwood. "Then we can follow these large populations through time and analyze what happens."

More than 80 per cent of Canadians from these census records are what he calls "invisible people." They didn't appear in local newspapers, didn't keep a diary and weren't studied in history textbooks. Yet he's confident that the key to understanding changing societal, economic and medical trends also lies in accounting for some of these overlooked people.

Besides basic data such as age, sex and location, the census records contain much more personal information. Each person's name is included, as well as details about occupation, place of birth, marital status, religion and literacy.

Even physical and mental handicaps such as blindness, deafness and developmental disorders were documented. Inwood sees great potential for many new research projects based on this detailed information.

Currently, he and his research team are also putting together a digitized library based on the 1871 Scottish census. Their plan is to eventually acquire more census data from Statistics Canada and the registrar general of Scotland for each decade up to the present and to create a full historical population database.

"We're going to be able to give you information about people you knew nothing about," he says. "To fully understand a society, you need to understand everybody."

Inwood and his research colleagues have formed partnerships with the universities of Alberta, Montreal and Victoria. At Guelph, he's working with Prof. Graeme Morton of the Department of History; Prof. John Cranfield of the Department of Food, Agricultural and Resource Economics; and post-doctoral researchers Andrew Ross (economics and history) and Luiza Antonie (computing science and economics).

The 1891 Canadian Census Project is supported by the Canada Foundation for Innovation and the Ontario Ministry of Research and Innovation.

The project also receives funding from the Social Sciences and Humanities Research Council, U of G's College of Arts and College of Management and Economics, and private-sector companies such as MES Hybrid Document Systems. R

Photo Courtesy of Library and Archives Canada |

Great minds drink alike

Science is always on the menu at Café Scientifique

BY KATHARINE TUERKE

Science is the new buzz in specialized cafés and bars around the world — and the University of Guelph is at the forefront of the global trend with its Café Scientifique.

Organized by the School of Environmental Sciences (SES) outreach committee, the monthly discussion series provides an opportunity for anyone to explore current hot topics in science, technology and the environment outside a traditional academic setting.

Integrative biology professor Joe Ackerman, who founded Café Scientifique when he was associate dean of the Faculty of Environmental Sciences, calls the series a transdisciplinary way of raising awareness and engaging the public.

"Café Scientifique is an important outreach opportunity that highlights broad current issues such as the environment, which is defined broadly, and incorporates natural, physical and social sciences as well as human perspectives," says Ackerman.

Held at Diana Downtown in Guelph, the sessions all begin with a speaker giving a 20- to 30-minute presentation on the issue up for discussion. Previous topics have included coffee production, global warming, environment and the evolution of human behaviour, sustainability and water, organic agriculture, pets and health, and businesses that are going "green."

After the presentation, members of the audience are invited to ask questions, incorporate their expertise and engage in debate.

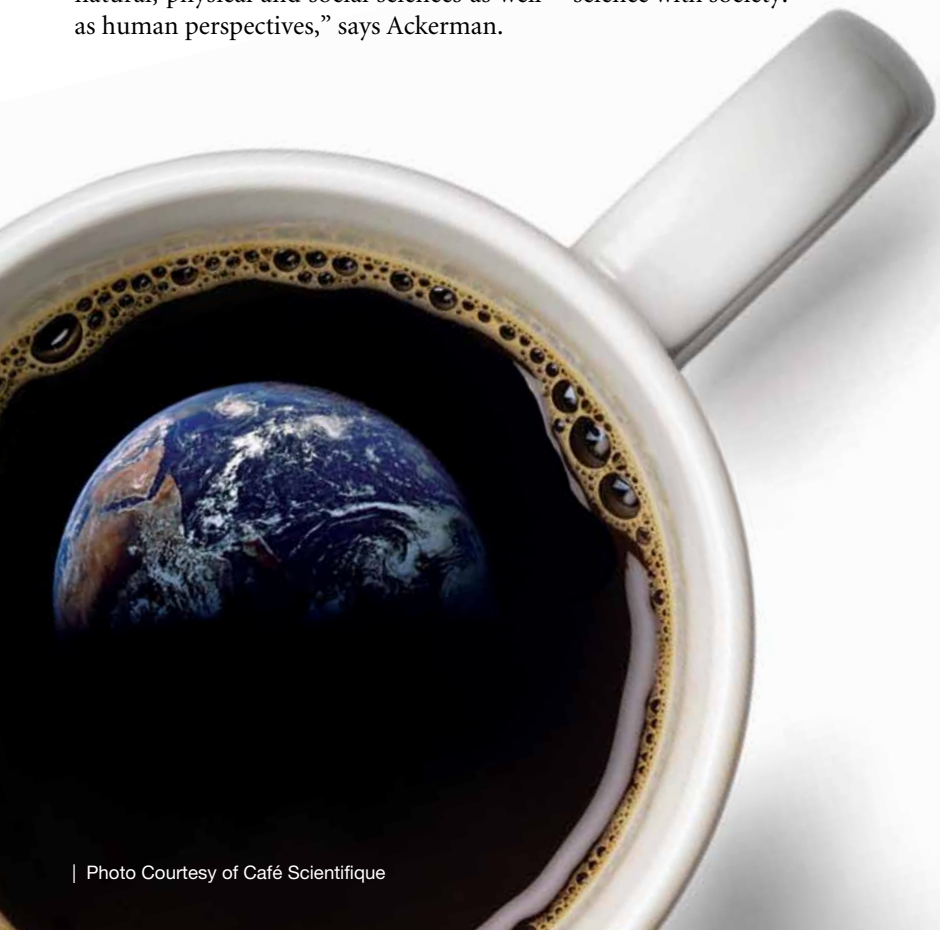
Café Scientifique explores multiple issues and crosses disciplines, drawing faculty speakers from all seven of the University's colleges.

"Humans are part of the environment, and environmental issues aren't limited to one discipline," says Prof. Madhur Anand, chair of the SES outreach committee. "To better understand them, we must bridge science with society."

Anand is co-editor of *Regreen: New Canadian Ecological Poetry*, a new collection of contemporary Canadian poetry addressing the environment and environmental concerns. The book was officially launched at an October event held in collaboration with Café Scientifique.

The theme of this year's Café Scientifique is the human dimensions of the environment. Sessions will address some controversial issues, including human health and vaccination, alternative energy sources and the politics of ecology. For a complete list of upcoming topics, visit www.uoguelph.ca/ses/content/outreach.

The success of this series has led to the launch of two other University of Guelph café events — Café Astronomique and Café Philosophique — which are held at the Bookshelf in downtown Guelph. R



| Photo Courtesy of Café Scientifique

From January to April 2010, Café Scientifique runs on the second Tuesday of the month at 7 p.m. at Diana Downtown in Guelph. On Jan. 12, U of G mathematics professor Chris Bauch presented "Is Vaccination a Game?: H1N1 and the Good of the Whole." On Feb. 9, geography professor Noella Gray discussed "Ecotourism: More Harm Than Good?". Ridgetown professor Rob Nicol will present "Food, Fuel and Chemicals: There's Plenty to Go Around" on March 9. Admission is free, and no reservations are required.

Trouble's brewing

Historian, pathologists study crop epidemic that has plagued coffee farmers everywhere since the mid-1800s

BY HAYLEY MILLARD

Coffee was one of the first tropical crops to become a global commodity and has been one of the most highly traded across the world. But in the 19th century, a crop epidemic began to flourish that drastically changed the coffee industry.

The disease, known as coffee leaf rust, can cause losses of up to 25 per cent of a harvest in bad years. Globally, it costs producers as much as US$2 billion annually. The disease's impact can be mitigated by applying fungicides to high-yielding varieties to increase production and offset any losses from the rust. But the disease can never be completely eliminated.

Guelph history professor Stuart McCook has studied the ecological and economic impact of this disease and is now compiling his findings in a book he expects to be released next year. The core narrative will trace the coffee leaf rust epidemic from its origins in Ceylon (present-day Sri Lanka).

McCook is amassing historical information on the disease, collaborating with a group of biologists, ecologists and pathologists. Together, they are documenting the environmental changes and characteristics of coffee plots and production methods before the rust's first outbreak.

Each chapter of the book will cover rust's growth in a particular coffee-producing region. It will also discuss the economic, political and scientific forces associated with the epidemic over time. McCook believes the book will benefit and interest a broad range of people, including historians, pathologists, agricultural scientists and coffee consumers around the world.

The disease

Coffee leaf rust, which is caused by the *Hemileia vastatrix* fungus, gets into the leaf's tissue and can cause premature leaf fall, which ultimately lowers production. Coffee beans from diseased plants are sometimes inferior in size.

The impact of rust varies from place to place. In Sri Lanka, for example, the high humidity created by monsoon rains provides optimal breeding grounds for the microscopic spores that cause rust disease. These spores are then easily transported by the wind, on the fur of animals and even unknowingly by people.

Prof. Stuart McCook is looking at the history of a coffee leaf rust epidemic to measure how global coffee production has been affected.

Photo By Andra Zommers |

This coffee tree (*Coffea arabica*) is heavily infested with leaf rust, yet researchers found it was surrounded by other varieties that are more resistant to the disease.

Historically, the disease increased with the global expansion of coffee plantations in the 19th century. It spread from Ceylon to distant British colonies such as Africa and Fiji when farmers travelled there to set up coffee colonies.

"When more plants and people started travelling on steamships and railroads, there was an increase in the movement of undesirable things such as spores carrying diseases," says McCook.

He has travelled to coffee-producing regions such as Latin America and the Caribbean to study how vulnerable landscapes, export culture and the boom in regional agriculture accelerate the movement of pathogens and pests. He has talked to producers to learn about the effects of the disease first-hand. His upcoming book will explain what some of these regions are doing to manage the rust epidemic today.

McCook has collaborated with associates from CABI in the United Kingdom, the Centre for International Co-operation in Agronomic Research for Development in France, the American Phytopathological Society, the Coffee Rust Research Centre in Portugal, the Colombian Centre for Coffee Research, the Costa Rican Coffee Institute, the Inter-American Institute of Agricultural Sciences in Guatemala and Guatemala's National Association of Coffee Growers.

Funding for this research is provided by the Social Sciences and Humanities Research Council.

Soybean farmers ready for rust, too

BY HAYLEY MILLARD

Coffee farmers aren't the only ones plagued by crop-ruining rust. Invasive rust pathogens are a problem for North American soybean farmers, too, ever since rust hit a Louisiana soybean crop in 1994. The disease is more prevalent in the southern United States, but Ontario farmers still have reason to be concerned because rust-carrying spores can spread easily if they're wind-borne and if a host is present.

"As the rust continues to survive in the southern United States, there's an increased chance that the spores could migrate to the mid-United States," says researcher Albert Tenuta, who works for the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) at the University of Guelph's Ridgetown Campus. "At that point, the spores could have a bridge to make their way into Ontario or travel from the southern United States on storm fronts directly."

The rust came north to Ontario in 2007. OMAFRA, U of G and Agriculture and Agri-Food Canada (AAFC) researchers were prepared, and plans were in place to meet it head on.

For example, a spore-tracking network was developed that taps into expertise in the United States through the North Central Soybean Research Coalition and includes a series of rainfall and air traps throughout Ontario, Quebec, Manitoba and Alberta. Air samples are taken 24 hours a day to test for soybean rust traces, and water samples are taken during rainfall.

This helps researchers forecast potential spore showers or identify growing conditions for soybean rust.

Ontario's cold-weather climate naturally helps ward off rust overwintering, but soybean breeders aren't ruling out future problems. Tenuta has worked with U of G soybean breeders Profs. Istvan Rajcan and Gary Ablett, along with other breeders from AAFC, to develop rust-resistant varieties suitable for the Ontario market.

Funding for this research has been provided in part by OMAFRA, AAFC through the CanAdvance Program administered by the Agricultural Adaptation Council's Pest Management Centre, the Ontario Research and Development Program, the Ontario Soybean Growers and the Ontario Soybean Rust Coalition.

| Photo By Stuart McCook

Bee heal

Canadian researchers shore up pollinators' $1-billion contribution to maintain natural ecosystems

BY ANDRA ZOMMERS

Canada's pollinators are in danger. In hives across North America, honeybee population losses have risen over the last three winters to rates as high as 37 per cent — more than double the rate beekeepers are used to. This marks a disastrous turning point for honeybees in a 10-year struggle for survival against parasitic tracheal mites, microscopic creatures that live in bees' tracheas. But it's not only honeybees that are in jeopardy; wild pollinators such as bees, flies and moths are also in decline. What's going on?

Researchers at the University of Guelph are trying to find out. They're collaborating with 44 other researchers at 26 universities in the Canadian Pollination Initiative (CANPOLIN), a five-year strategic network funded by the Natural Sciences and Engineering Research Council (NSERC). They're seeking to learn more about pollinator decline and to determine where bees and other pollinators fit in the bigger picture.

Recently retired environmental sciences professor Peter Kevan serves as scientific director and principle investigator for NSERC-CANPOLIN. The network brings together researchers to investigate pollinators and the plants they rely on, to study the ecosystems they support and to explore the effects of climate and land-use change.

Their goal is to assess pollinator activity in Canada's forestry and agriculture industries, both in economic terms and within a broader environmental context. They hope to help shape government policy to ensure the appropriate valuation and long-term protection of honeybees and other pollinators.

"There are a number of different ecosystem services that are very important to the functioning of ecosystems as we understand them," says Kevan. "Pollination is central in terms of its value and importance."

Indeed, the role of insect pollination in Canadian agriculture is valued at some $1 billion annually, with honeybees accounting for about 75 per cent of that. The remainder is attributed to flies, butterflies, moths, other wild insects and hummingbirds. The total value would be even greater if pollination's impact on forestry was included.

thy

When it comes to honeybees, the main factor associated with mortality is the spread of Varroa mites, says U of G environmental sciences professor Ernesto Guzman. Other factors include pesticides, diseases such as nosema (affecting the bee's digestive system) and land-use and climate change, which can adversely affect a hive's food supply.

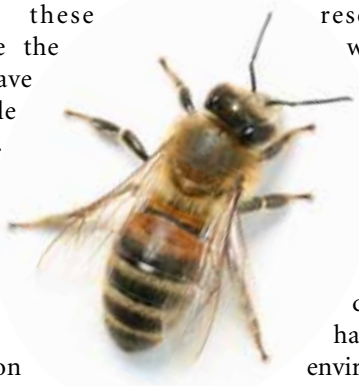
Until issues with honeybee health and population decline are resolved, beekeepers are keeping pace with their losses by importing bees from countries such as Australia. Some have also resorted to splitting their remaining colonies and introducing new queens to the deficient halves to create new hives.

But it's economically unsustainable to continue with this trend, says Guzman.

"It's very costly to split colonies. They don't usually produce honey the next summer because you weaken the population."

He is investigating alternative strategies to combat rising bee mortality rates. He's found that certain organic compounds can control mite infestation by as much as 97 per cent. These compounds include thymol (from the herb thyme), oregano oil and clove oil and are relatively non-toxic to bees.

Guzman and his NSERC-CANPOLIN collaborators hope these compounds can replace the pesticides thought to have played a significant role in pollinator decline. Sometimes applied to eliminate mites, pesticides can accumulate to toxic levels over time in the beeswax that makes up the hive.



There is also speculation about climate change and its impact on bees. For example, one consequence of colder winters is that hive populations deplete their food reserves before the spring bloom arrives, and the bees die of starvation.

But like humans, bees that are stronger have a better chance of survival. Paul Kelly, an apiarist at U of G's Honeybee Research Centre, says beekeepers can help strengthen their hives by using improved management practices.

"We're finding out that nutrition plays a really key role in reducing stress in colonies and that stress leads to higher disease levels," says Kelly.

By monitoring and treating their bees against diseases and feeding them properly, beekeepers can help manage depleting bee populations, he says. But Kelly is clear about the future: "It's not possible for bees to survive without our intervention."

To that end, researchers in NSERC-CANPOLIN will collect pollinator and plant data over the next five years from ecosystems across Canada. One local site of particular interest is the city of Guelph's Pollinator Park. Created on a 100-acre decommissioned landfill site, the park is designed to encourage and conserve wild bee populations.

To the untrained eye, the site resembles an overgrown wildflower field. But this green space is a world model for the promotion and protection of pollinators and their habitat. The park will be used to raise public awareness of the importance of pollinators and will provide critical data on developing pollinator habitats from once-degraded environments.

Along with other ecological data collected by NSERC-CANPOLIN, the information will feed into a comprehensive online pollination database with links to illustrations and graphics. This baseline data will in turn be used to answer critical questions about pollinator health and sustainability.

"We want this sort of information to eventually be part of people's general appreciation of where their food comes from," says Kevan. "We also want them to have an appreciation of the ecological interactions that are sustaining the natural environments we have in Canada."

Other partners in NSERC-CANPOLIN are Agriculture and Agri-Food Canada; Bayer CropScience Inc.; the Ontario Ministry of Agriculture, Food and Rural Affairs; the Saskatchewan Alfalfa Seed Producers Association; the David Suzuki Foundation; Royal Botanical Gardens; Seeds of Diversity; Nelson Aggregate Co.; the Ontario Fruit and Vegetable Growers' Association; and Meridian Credit Union. R

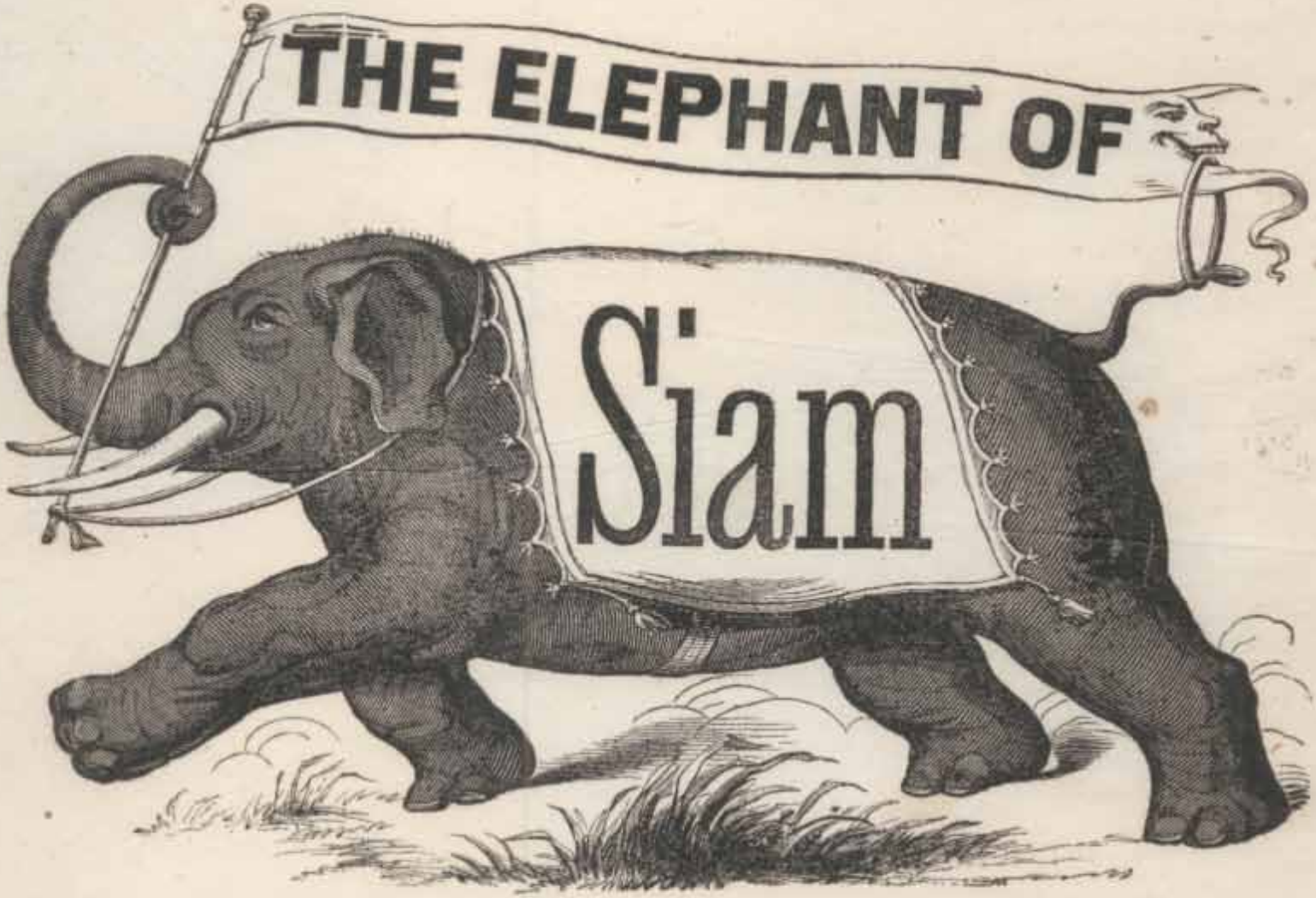
| Images By iStock and Fotolia

EVERYBODY

SHOULD SEE THE MOST

Gorgeous and Imposing Spectacle

EVER PRODUCED IN AMERICA.



Presented with New and Magnificent Scenery, Dresses and Appointments, and introducing

THE ACTING ELEPHANT, LALLA ROOKH!

And 300 Performers, at Dan Rice's Great Show,

Every Night and on Saturday Afternoons

IN CONNECTION WITH

ANIMATED ACTS IN THE RING

U. S. Steam-Power Book and Job Printing Office, Ledger Buildings, Philada

It's not easy being grey

Book documents Asian elephants' struggles as circus stars

BY JOEY SABLJIC

In the golden age of the circus, elephants dazzled audiences with their nimble moves, intelligence and brute strength, but when the curtain fell, it was a different story. Abuse, mishandling and poor living conditions were common. The plight of elephants in the first century of the American circus business is the focus of a soon-to-be-published book by U of G history professor Susan Nance. Tentatively titled *Seeing the Elephant*, the book looks at Asian elephants and their impact on 19th-century American circuses.

"People don't usually write about animals as historical actors because historians are trained to document human agency, whereas more generally, people like to take credit for what animals have done," says Nance. "My work documents elephants' lives to explain the importance of their contributions. Current scientific literature gives us knowledge about contemporary elephants that can help provide insights into the lives of historical animals and verify accounts of their behaviours."

She searched extensively through press releases, newspaper articles, photographs, circus advertising and correspondence between circus employees and owners. She often found accounts of elephants rocking back and forth in their ankle shackles.

"In 1830 or 1875, people thought this was normal elephant behaviour, but we now know that it's a sign of frustration and stress."

To get the widest possible perspective, Nance studied elephant use ranging from small single-elephant shows of the 1790s to the enormous rail shows of the 1890s, such as Barnum & Bailey and the Ringling Brothers.

"The success of the early single-elephant shows inspired subsequent impresarios to invest in the species, laying the foundation for the Gilded Age shows featuring a dozen elephants or more," she says. "Those huge ventures came about because the first elephant in America ate bread from people's coat pockets with her trunk, and audiences loved it."

Nance builds her historical narrative around the lives of individual elephants. The story begins in 1795 with the birth of the first elephant to be imported to the United States from India and ends in 1907 with the death of the first elephant born in captivity in America.

Their growing popularity and association with the circus made Asian elephants a commodity to circus owners, who bought and sold them as needed to support their shows, she says. But escalating elephant upkeep and transportation costs became an obstacle. Circus owners felt obligated to continually deliver elephant spectacles to audiences while often operating on the verge of bankruptcy.

Nance found that the elephants suffered most from these financial constraints. It eventually became cheaper for circuses to shoot, strangle or sell adult elephants to poorer circuses and import infants, rather than provide proper care for the aging elephants they owned.

She also explores the sometimes perilous relationship between the elephants and their human keepers. Many adult elephants became dangerous and deranged from physical abuse and confinement. Although circuses tried diligently to present elephants as clowns and family-friendly entertainers, they posed a real danger, she says.

Gradually, the popularity of the circus began to wane with the growth of movies, radio and television. As a result, circuses started to reduce their elephant numbers when their upkeep costs proved too much to handle.

"Without claiming to write from the elephants' point of view, I wanted to find out what happens when we look at historical elephants' welfare and life cycles," says Nance. "As it turns out, their stories predicted the 20th-century decline of the American circus."

Her research is supported by U of G's College of Arts and the Friends of the Princeton Library. R

This banner (left) was displayed in Philadelphia around 1860 to attract audiences to circus elephant performances.

| Banner Courtesy of The American Antiquarian Society

One world, one approach to health

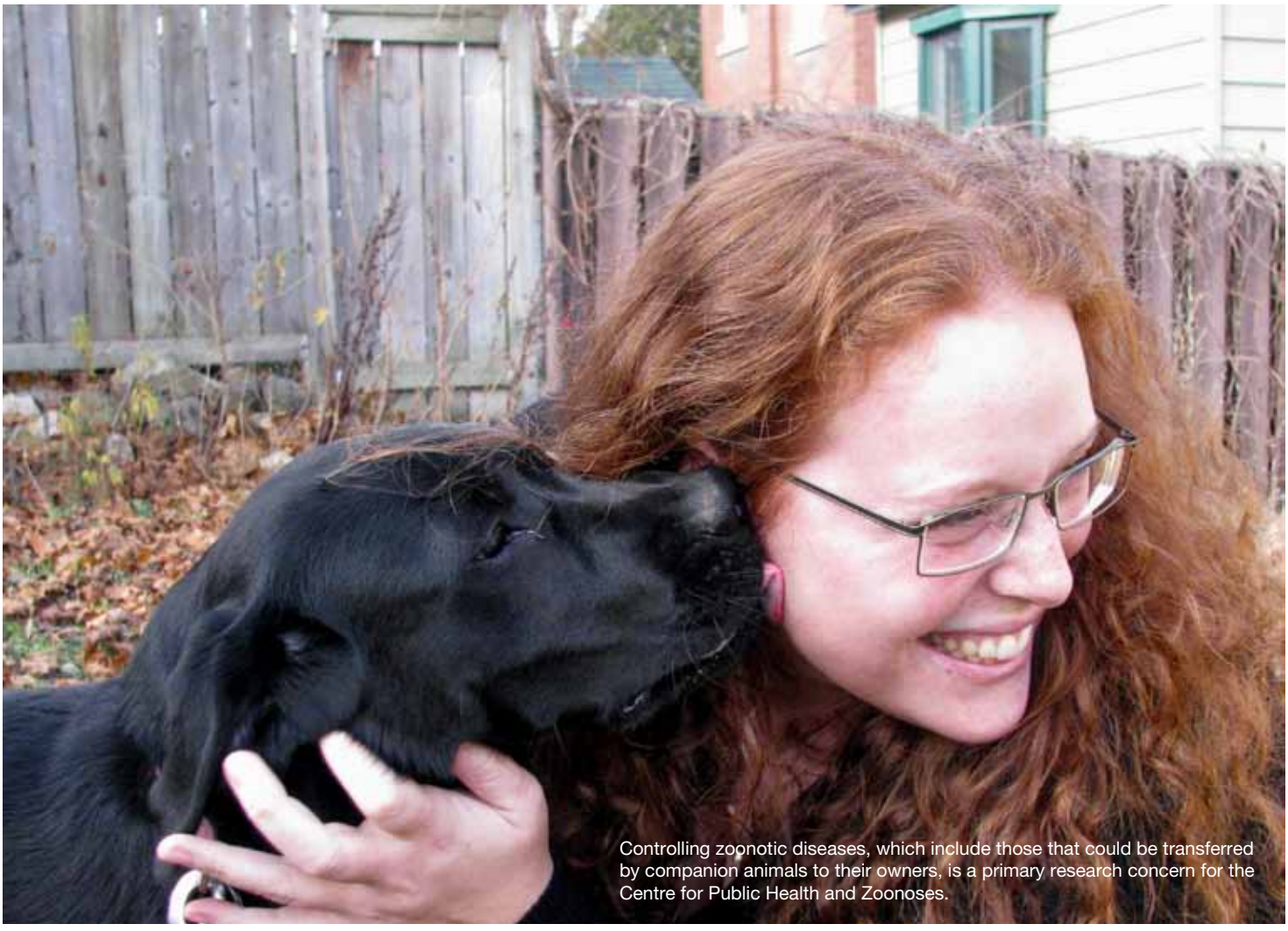
BY ROBERT FIELDHOUSE

Public health scares — whether from *E. coli*, *Salmonella*, SARS, avian influenza or H1N1 — seem to appear with increasing regularity. As the list grows, so does the idea that human health, animal health and environmental health are inextricably linked. It's a concept called one health, and it's driving the University of Guelph's Centre for Public Health and Zoonoses (CPHAZ).

Prof. Jan Sargeant, the centre's director, says this approach addresses heightened concern about zoonotic diseases (those that can be transferred between animals and humans). About 60 per cent of human pathogens originate in animals. That's why scientists from diverse backgrounds embrace CPHAZ's collaborative atmosphere as they examine human interactions with livestock and companion animals to achieve the one-health goal.

"The spirit of the centre is this whole concept of one health," says Sargeant. "You can't separate animal health, human health and the environment."

CPHAZ has six themes — zoonoses, antimicrobial resistance, environmental health, food safety, water safety and public health policy. The goal is to forge connections between researchers focusing on animal health and those involved in public health, and to provide new avenues to share ideas and scientific equipment. Education and outreach programs include public health graduate programs as well as a website, a blog and best-practices guidelines.



Controlling zoonotic diseases, which include those that could be transferred by companion animals to their owners, is a primary research concern for the Centre for Public Health and Zoonoses.

Photo By Andra Zommers |

CPHAZ is committed to public outreach, says Sargeant. Prof. Scott Weese and post-doc Maureen Anderson of the Department of Pathobiology worked with Hamilton Public Health and Community Services to set up the Worms & Germs Blog (www.wormsandgermsblog.com) to fill a gap in knowledge about zoonotic disease risks associated with pets. It provides fact sheets for doctors, veterinarians, pet owners and children.

Weese also studied dogs that visit hospitals and suggests that stricter guidelines and sanitation rules may prevent pets from spreading disease as they visit hospital patients to provide companionship.

The environment also plays a huge public health role. Climate change, globalization, pollution and ecosystem health all contribute to the one-health equation. Extreme weather, for example, increases the spread of water-borne disease. And improperly managed agricultural production systems could affect the environment and have health consequences.

There's no single key to one health, says Sargeant, but the focus is on preventive measures rather than a treatment or curative approach. Even simple strategies go a long way, such as handling food properly and keeping an eye on children at a petting zoo.

Ongoing benefits are expected as CPHAZ engages more than 50 scientists from 14 departments who contribute to its activities.

"Creating the centre didn't make the University of Guelph a leader in animal-related aspects of public health — it already was," says Sargeant. "This helps to focus it."

The Guelph-based centre has received funding and collaboration from the Ontario Ministry of Agriculture, Food and Rural Affairs; Agriculture and Agri-Food Canada; the Canadian Research Institute for Food Safety; the Ontario Ministry of Health and Long-Term Care; the Ontario Agency for Health Protection and Promotion; the Public Health Agency of Canada through the Laboratory for Foodborne Zoonoses; the Centre for Foodborne, Environmental and Zoonotic Infectious Diseases; and the Canada Foundation for Innovation.

Stem cells to the rescue

Here's a potential biological fix for cartilage injuries and degeneration in horses and possibly humans

BY ANDREA HRUSKA

Cartilage injuries and degeneration are serious concerns in the equine industry. Cartilage can't regenerate by itself, and treatment options for these injuries are currently limited. But U of G researchers are making some progress. They're working with international veterinarians, biological engineers and surgeons from human medicine to create cartilage implants grown from horses' umbilical stem cells. These could help horses if they sustain a cartilage injury.

Guelph graduate Thomas Koch of Aarhus University in Denmark is working with his former PhD supervisor, Dean Betts, now an adjunct professor in U of G's Department of Biomedical Sciences and a faculty member at the University of Western Ontario. During Koch's PhD studies, the two researchers were the first to isolate cells from equine umbilical cord blood that were capable of becoming adipose, bone and cartilage tissue in the laboratory. They've now moved on to tissue engineering, developing scaffolds created from nanofibres that make up the bone component of a cartilage implant. The cartilage component of the implant, grown from a horse's umbilical cord stem cells harvested at birth, is attached to the scaffold.

This research could also lend some hope to human patients, says Koch, who received a $1-million post-doctoral fellowship last summer from the Danish Agency for Science, Technology and Innovation.

Continued on page 48

Horses may continue to thrive after a cartilage injury, thanks to stem cell implants.

Continued from page 47

He hopes the techniques used to create biological cartilage implants for horses could eventually help other researchers determine how they could be applied to human joints as well. Currently, human cartilage injuries are typically treated using a titanium implant, which can start to wear down after a number of years and may need to be replaced.

"It's incredible that a patient can walk out of the hospital a few days after surgery and have no more joint pain," says Koch. "But the problem is that titanium implants aren't lifelong solutions."

Although the researchers say it may be ambitious to suggest that biological cartilage implants could be a permanent treatment, evidence exists that stem cells could rebuild and regenerate lost cartilage.

The researchers will continue to carry out treatment trials, focusing on focal cartilage defects, which are small areas of lost cartilage that could result in osteoarthritis if left untreated. They hope to soon treat progressively larger areas until they're able to create a full joint.

It's expected that horses will begin to receive biological cartilage implants at the Ontario Veterinary College by 2011.

"Members of the equine industry have had a strong reception to this research," says Betts. "They're very excited and supportive, and they really see the potential for stem cells."

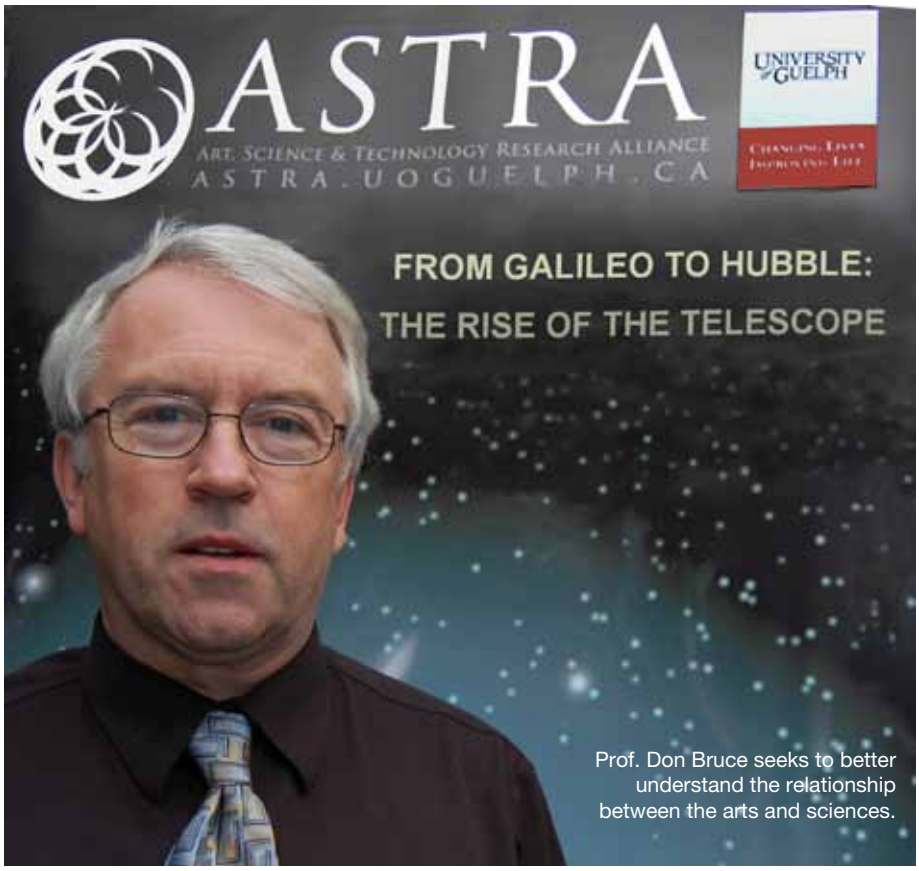
He and Koch are collaborating with OVC professors Mark Hurtig, Judith Koenig and Dorothee Bienzle; Rita Kandel of Mount Sinai Hospital in Toronto; Kjeld Soballe and Michael Ulrich-Vinther of the Orthopedic Research Laboratory at Aarhus University; Katarina Le Blanc of Karolinska University Hospital in Stockholm; David Hess of the University of Western Ontario; and Lisa Fortier of Cornell University.

Photo By iStock |

Two halves of the big picture

When arts and sciences talk, understanding advances

BY ANDRA ZOMMERS



Prof. Don Bruce seeks to better understand the relationship between the arts and sciences.

Specialization and the division of labour have fundamentally transformed manufacturing and production over the last two centuries. That has promoted a depth of knowledge that has spurred entire technological and scientific industries. But according to one University of Guelph researcher, educational systems may actually suffer from overly specialized structures, resulting in the degradation of community and its ability to tackle complex social issues.

Prof. Don Bruce, dean of the College of Arts, is engaged in an area of study referred to by the French as epistémocritique — the critical exploration of modes of understanding and their interactions.

He has spent years analyzing texts from the 19th century to better understand the separation of the arts from the sciences (the long-term trend in education), as well as their convergences. He believes that by acknowledging arts and sciences as being engaged in a dialogue, people can be better prepared for 21st-century challenges.

"More than ever before, technology is in our everyday life, so it's important that people understand the impacts of scientific knowledge in the cultural world," says Bruce. "That interconnectedness is key to understanding, or else we'll find a lot of problems arise from ignorance and misunderstanding."

This misunderstood relationship is exemplified by the notion of what's called degeneracy. It's a theory of moral and social corruption commonly associated with essayist Max Nordau (1849-1923) that came to be an underlying discourse of the 19th century. It was once believed that physical degeneracy was linked to a sense of moral degeneracy in society. In this manner, class conflicts and pervasive political and social conditions were understood using scientific and medical justifications. Society has since rejected degeneracy theory, but it illustrates how scientific thinking — whether right or wrong — can influence society and vice versa.

To better explore the interface between arts and sciences at the university level, Bruce founded U of G's Arts, Science and Technology Research Alliance (ASTRA). Over the last three years, ASTRA has provided a forum for the Guelph community to explore the ramifications of science on social, political and cultural processes, as well as to better understand the social and cultural context in which science is developed.

Last year, ASTRA hosted presentations in honour of the International Year of Astronomy as well as the 100th anniversary of the publication of Charles Darwin's *Origin of the Species*. R

| Photo By Andra Zommers

Reaching readers for 20 years

BY ALYCIA MOORE

Knowledge translation and transfer is a modern term for what started out as extension — that is, extending information from a knowledge base such as a university to users such as the public. The new approach is more intricate, but the end activity is the same: helping people gain access to knowledge that can improve their lives.

In the University of Guelph's research communications unit, SPARK writers are the knowledge translators, and publications such as *Research* — along with websites, videos and podcasts — are vehicles for transferring researcher-generated knowledge.

Researcher support is integral to SPARK's knowledge translation and transfer role. Some researchers, such as newly retired botany professor Doug Larson, see SPARK and the media as gateways to the public.

"The public wants to know what we, as researchers, are doing," says Larson. "It's our obligation to tell them and to explain how it can benefit them — and perhaps even the world — as a whole."

The media aren't the only vehicle for reaching the public. Larson, for example, speaks regularly at schools, nature clubs and professional gatherings. But when it comes to delivering practical, meaningful messages to the public, the media works well.

This edition of *Research* marks the fifth time Larson has been featured in the magazine. His research on preserving fragile ecosystems has twice been the cover story — in 1993 and 2003. His work has also led to articles in more than 300 other Canadian magazines.

The botanist's latest research transcends natural sciences to touch on music and culture through what he calls the Guelph Guitar Project, profiled on the cover and page 17. R

one door. endless connections.

GPI CONNECT
guelph partnership for innovation

GPI is your door to regional, provincial, federal and global resources.
GPI connects you to business, public sector, investment, research,
economic development and commercialization resources.

Move your discoveries to market faster.

www.guelphinnovation.com