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Priming the brain to recover from stroke

By CATHERINE LOIACONO

For the 300,000 Canadians living with the aftermath of a stroke, partial paralysis and loss of independence is a daily reality.

Now a UBC brain stimulation technique that primes the brain to relearn and retain old movements is showing encouraging results for faster and more effective recovery. A wand, connected to a computer, is placed adjacent to persons head and a stimulus is applied.

“Currently, there are no drugs to help stroke patients regain mobility,” says Lara Boyd, UBC assistant professor of Physical Therapy in UBC’s Faculty of Medicine. “Thus far, physical therapy has proven to be an effective treatment for stroke patients to regain mobility. However, one of the biggest challenges is the time and amount of practice it takes for the brain to relearn an old movement.”

The two-part study tests a healthy brain first to ensure the technique is safe and that there are no adverse effects and then applies the same technique to a stroke-affected brain. The study is currently in the second phase.

Following a stroke, the affected part of the brain is no longer active because of the loss of blood flow, which causes brain



Assistant Prof. Lara Boyd’s research, on regaining movement following a stroke, is already showing promising results.

cell death. The area of the brain affected by the injury determines the patient’s inability to move, see, remember, speak, reason and read and/or write.

“One of the reasons that it is so difficult for the brain to recover from a stroke and

reorganize itself is that the side of the brain that is damaged becomes suppressed while the undamaged side becomes hyperactive,” says Boyd, who is a Canada Research Chair in Neurobiology of Motor Learning. “The left and right side

of the brain become unbalanced. It becomes more difficult for the affected side of the body to move because the damaged side of the brain is suppressed. Conversely, the unaffected side of the body moves much easier because the undamaged side of the brain

becomes hyperactive.”

This negative feedback loop helps explain why it becomes increasingly difficult for stroke patients to regain mobility.

“Fortunately, the brain is

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ONE YEAR GAMES COUNTDOWN

Watch for a special online UBC Reports Extra the week of Feb. 12 marking one year until the start of the 2010 Vancouver Olympic and Paralympic Winter Games.

Stories will profile our new arena venue and its link to the birthplace of Canada’s national hockey program, UBC’s focus on Games-related learning opportunities, and faculty with expertise on the Games and their impacts. www.ubc.ca/2010



Prof. Sue Grayston joins Bif Naked for a morning workout.

Band of sisters

Breast cancer patients test role of exercise

By SEAN SULLIVAN

When Sue Grayston began chemotherapy last year, a brisk morning workout with musician Bif Naked wasn’t exactly what she was anticipating.

Grayston, a professor in the Faculty of Forestry and Canada Research Chair in Soil Microbial Ecology, found a breast lump in April 2008. She was diagnosed with cancer in May, underwent surgery in June, and began treatment shortly after.

Through a tip from her oncologist, she ended up at CARE (Combined Aerobics and Resistance Exercise), a research trial in UBC’s School of Human Kinetics that studies


the role exercise plays in the lives of breast cancer patients undergoing chemotherapy.

Grayston says the trial has had an unintended side effect: establishing a close-knit, emotional bond among patients, including the aforementioned Canadian rocker, that continues long after involvement with the study ends.

Women participating in CARE take part in one of three exercise programs over the course of four to six months: aerobics, high-intensity aerobics, or aerobics combined with strength-training.

Like other participants in the trial, Grayston’s progress at

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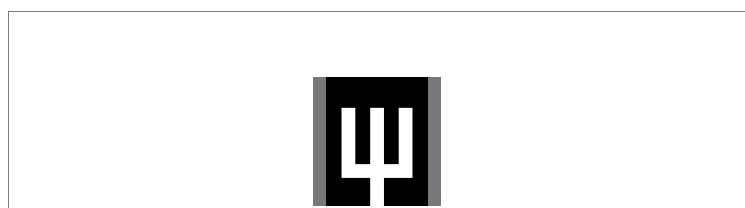
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IN THE NEWS

Highlights of UBC media coverage in January 2009. COMPILED BY SEAN SULLIVAN



PHOTO: CARLA TSANG

Andrea Polonijo surveyed Canada's top women's magazines for her study.

The downside of face lifts

A UBC study has found articles in leading women's magazines tend to portray cosmetic surgery as an empowering option for women, despite the lack of scientific consensus that it boosts emotional health.

"Alongside beauty, clothing and diet advice, women's magazines present cosmetic surgery as a normal practice for enhancing or maintaining beauty, becoming more attractive to men and improving emotional health," says author **Andrea Polonijo**, who conducted the research at UBC as an undergraduate honours thesis in the Dept. of Sociology.

Polonijo examined articles in Canada's five most popular English-language women's magazines: *Chatelaine*, *Cosmopolitan*, *O: The Oprah Magazine*, *Flare* and *Prevention*.

The study, published in *Women's Health Issues* journal, was covered by *Agence France Presse*, *Reuters*, *ABC News*, *MSNBC*, *China Post*, *Yahoo News*, *National Post*, *Montreal Gazette* and the *Edmonton Journal*, among others.

It's not fish poop

The digestive systems of fish play a vital role in mitigating climate change by maintaining the delicate pH balance of the oceans, says a UBC study published in the journal *Science*.

"This study is really the first glimpse of the huge impact fish have on our carbon cycle -- and why we need them in the ocean," said researcher **Villy Christensen** of the UBC Fisheries Centre.

Christensen estimate of total fish biomass in our oceans, at two billion tonnes, was also noted in the reports by the *Los Angeles Times*, *New Scientist*, *The Canadian Press*, *The Associated Press*, *Reuters* and *Bloomberg*.

The team discovered fish get rid of excess calcium by binding it to bicarbonate, and then excreting it as pellets of calcium carbonate, a chalk-like substance also known as "gut rocks." As the calcium carbonate from these pellets dissolves, it turns the seawater more alkaline, which has relevance for ocean acidification, and is impacted by the ocean's exchange of carbon dioxide (CO₂) with the atmosphere.

Climate change taking a toll on Western trees

A study co-authored by UBC biogeography Professor **Lori Daniels** has found the death rates of trees in Western forests have doubled over the past two to three decades, driven in large part by higher temperatures and water scarcity linked to climate change.

The findings, published in the journal *Science*, examined changes in 76 long-term forest plots in three broad regions across the West, and found similar shifts regardless of the areas' elevations, fire histories, dominant species and tree sizes.

Daniels, who studied 1,200 trees in old-growth forest plots on the North Shore, says climate change is the most likely cause in the dramatic death-rate increase.

The death rate is expected to continue to rise as temperatures go up, leading to sparser forests less able to act as carbon sinks, leading to even more warming.

The study was picked up by the *New York Times*, *Washington Post*, *Globe and Mail*, *Bloomberg*, *The Associated Press*, *Reuters*, *BBC News*, *Scientific American*, and the *Vancouver Sun*

Blogging through class

Alfred Hermida, professor at the UBC's Graduate School of Journalism, is a regular commentator on PBS's *MediaShift*. The website tracks how new media, from weblogs to podcasts to citizen journalism, are changing society and culture.

In January Hermida started requiring his UBC Journalism grad students to keep a blog. He sees the medium as a tool for reflection and critical thinking about events in the headlines: "The blog has emerged as a powerful platform for journalists to provide context, analysis and interpretation, often including behind-the-scenes information that does not fit into the structure of a traditional news story."

Hermida, a founding editor of the *BBC News* website, was also called upon this month by the *National Post* to give advice to the CBC on how it can adopt to the demands of an Internet-savvy audience.

"CBC can't just translate what it does for new media, it needs to evolve how it delivers the news," he said. "Newsrooms are notoriously reluctant to change. When change comes, the initial reaction is defensiveness. But *BBC* changed and so can *CBC*."

UBC REPORTS

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Executive Director **Scott Macrae** scott.macrae@ubc.ca
Editor **Randy Schmidt** randy.schmidt@ubc.ca
Designer **Ping Ki Chan** ping.chan@ubc.ca
Principal Photography **Martin Dee** martin.dee@ubc.ca
Web Designer **Michael Ko** michael.ko@ubc.ca
Contributors **Jody Jacob** jody.jacob@ubc.ca
Brian Lin brian.lin@ubc.ca
Catherine Loiacono catherine.loiacono@ubc.ca
Bud Mortenson bud.mortenson@ubc.ca
Sean Sullivan sean.sullivan@ubc.ca
Basil Waugh basil.waugh@ubc.ca

Advertising **Pearlie Davison** pearlie.davison@ubc.ca
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PHOTO: MARTIN DEE

Ian Townsend-Gault is weighing the effects of projects that have sought to strengthen environmental law in Laos and Vietnam.

Law prof takes aim at foreign-aid projects

By SEAN SULLIVAN

After 15 years of working on foreign-aid projects in Laos and Vietnam, Ian Townsend-Gault may soon discover what difference he's made.

The UBC Law professor is mounting a two-year project to examine what effect foreign-funded law and policy projects have had on the environmental health of Vietnamese and Laotian citizens.

"I know it sounds like I'm investigating myself, but an insider is going to be as dispassionate as possible," says Townsend-Gault, who is also director of the Law faculty's Southeast Asian legal studies

economic growth, protecting children from landmines, and building foreign-language skills among young people.

In picking an area to investigate, Townsend-Gault says projects focused on strengthening or creating environmental law and policy were the clear choice: "I chose environment because it affects everyone in the country."

The question for Townsend-Gault, who has served as a legal consultant to government ministries in both countries, is how well these projects have worked. He says despite the best intentions of donors, such large-scale aid can fall victim to shortcomings such as time frames that are too short, or

Protection took aim at problems it does not face (e.g., nuclear waste disposal) while omitting provisions that are standard in most countries' anti-pollution laws, such as the "polluter pays" principle.

Poverty in some regions has also led to discrepancies in Vietnam's enforcement of environmental law, perpetuating a divide between the health of people in poor and wealthy areas, he says.

During a 1996 visit to the environment office in Halong Bay, a UNESCO World Heritage Site in northern Vietnam, Townsend-Gault found the office staffed by Soviet-trained engineers with little understanding of the existing environmental law.

"They said, 'Ah, you're a lawyer, you can tell us what this means, we haven't the faintest clue!'" he says. "And we're talking about one of the most sensitive environmental areas in the country."

So, to what extent have things improved since then?

In Laos, Townsend-Gault points to the need for infrastructure and legislation that effectively protects the sensitive Mekong River, which is critical to the health of those downstream in Vietnam and Cambodia.

Townsend-Gault's Hampton project will look at a project funded by Sweden that set up Laos's environmental law, and for which he was a consultant.

The project could also contribute to the understanding of what practical steps are involved, for example, in using aid dollars to purchase latrines that won't contaminate drinking water, and how such programs can be set in stone without having to rely on further foreign investment.

Back home, Townsend-Gault

says he hopes his research will prompt Canadian officials to take a better look at their aid to Southeast Asia. Despite years of big-ticket projects, his counterparts in the area say Canada is slipping from their radar.

"We had a very important place in Southeast Asia, and I'm afraid that due to policy uncertainty in many fields we've either lost it or are in the process of losing it." ■

"I chose environment because it affects everyone in the country."

program.

The research takes aim at aid projects by donors such as the United Nations Development Program and the Canadian International Development Agency (CIDA), which have helped create basic environmental law and policy in both countries.

Supported by a 2008 Hampton Fund Research Grant funded by UBC's real estate endowment, Townsend-Gault will measure the outcomes of these projects, looking at how future law and policy initiatives can better support residents' environmental health.

CIDA, which manages Canada's \$4 billion in international development assistance, has planned more than \$230 million in projects for Vietnam.

Initiatives include combating HIV/AIDS, improving access to primary school, encouraging

failing to transfer the necessary expertise from international to domestic workers.

One initiative he will investigate is the Vietnam-Canada Environment Project, a \$12-million CIDA endeavor with a broad mandate to help build the capacity to manage industrial pollution.

Townsend-Gault aided in the program, which in part sought to equip laboratories in three provinces with the expertise and capacity to undertake environmental diagnostic testing, such as air and water quality.

"We're not looking to evaluate the legislation this project or that project developed, but what happened after that," he says.

In Vietnam, decades of shifting priorities and changing government have led to varying levels of enforcement and a hodge-podge of environmental regulations. The country's 1994 Law on Environmental

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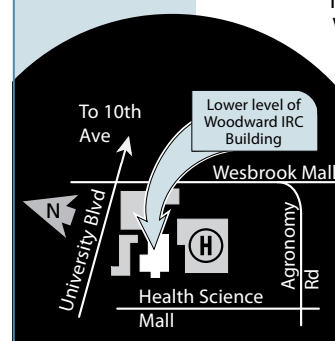
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BAND OF SISTERS

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the small gym near Vancouver General Hospital was carefully monitored and recorded by a team of volunteers and UBC graduate students, led by research technician Diana Jespersen.

However, Grayston quickly found the program offered more than just data for CARE's study.

"One thing they can't measure at the moment is the support we get from the other women," she says.

While the research will be published in oncology journals, and may lead to methods that could alter treatment for breast cancer, Grayston says it was the bond forged among the participants that helped her get through chemotherapy.

The trial has allowed her to connect with other women undergoing the same treatment, sharing tips on drugs and doctor's visits -- not to mention the best places in town to buy wigs (chemotherapy patients typically lose most of their hair).

"It's just made it actually bearable. I don't know how people could do this without support," she says.

Led by Dr. Don McKenzie, director of Sports Medicine at UBC and Dr. Karen Gelman of the B.C. Cancer Agency, the trial is a joint venture between UBC, the University of Alberta and the University of Ottawa.

McKenzie is known worldwide for launching the Abreast in a Boat dragon boat racing program, following his study that debunked a long-held belief that upper-body exercise in women treated for breast cancer encouraged lymphedema, an irreversible swelling in the arm and chest.

He says the current research trial could mark a turning point for women undergoing breast cancer treatment.

"After 25 years, we're starting

to appreciate that exercise is as useful in intervention and health care as a lot of the other things we can do."

However, he concedes it can be difficult for a woman undergoing chemotherapy to find the motivation to begin exercising.

"Chemotherapy takes the wind out of your sails," he says at the project's small gym. Side effects vary greatly, but patients can experience anemia, nausea, fatigue and depression. It's hardly the stuff that would prompt a visit to the treadmill.

If it weren't for CARE, Bif Naked, the study's first and most high-profile patient, says she would have had difficulty getting out of bed every day.

The Canadian rocker, known offstage as Beth Torbert, announced her breast cancer in a January 2008 interview with the CBC's George Stroumboulopoulos.

"When I was diagnosed with breast cancer it came as a big surprise to me," she says. "And had this not been in place for me, I wouldn't have done anything. I would have probably just stayed in bed the whole time."

Seventeen women have finished the program at UBC, and another 25 are currently involved. In all, 300 women will take part at the three universities.

For graduates of the UBC trial, their three-day-a-week exercise regimen has evolved into a weekly morning walking group, though Torbert jokes that she and her friends see it more as a gang.

"It's really fascinating, psychologically and emotionally, how integral this group of people became to each other in very unusual circumstances," she says. "It's not that we cried together; we laughed together".

"It's probably somewhat unheard of for anyone to have a grand old time during breast cancer treatment, especially during chemotherapy, but I assure you, we have a riot." ■

Factoring biodiversity into farming



Kai Chan's research is boosting biodiversity and farm productivity in Costa Rica.

By **BASIL WAUGH**

How do you improve farming operations while protecting biodiversity?

"The people who structure farm payment schemes and subsidy policies are in dire need of tools to help them make those complex decisions," says Kai Chan, a professor in UBC's Institute for Resources, Environment and Sustainability.

Enter Chan and colleague Prof. Gretchen Daily of Stanford University who have published the world's first planning framework that calculates the production and conservation benefits of investments in farmland.

Chan recently used the framework to create a business case for Costa Rican farmers to invest in a series of windbreaks

that are protecting bird habitats and improving agricultural productivity.

"Biodiversity is a tremendous store of natural capital and we've got moral duties to protect it," says Chan, a Canada Research Chair in Biodiversity in Ecosystems Services.

"To do this, we must find a balance between agricultural production and conservation."

"Most people simply don't realize that small, targeted changes to farms can have a positive impact on biodiversity, without affecting their bottom line," Chan adds.

Chan and Daily's framework has antecedents. In the 1980s, planning algorithms revolutionized wildlife reserve and park design, helping decision-makers to better tailor large regions to biodiversity

needs. But these do not apply to smaller scale decisions such as on individual farms, Chan says.

"When you consider the huge amount of land devoted to farming around the world, you get an idea of the need for a biodiversity planning algorithm that addresses the needs of the agriculture industry," says Chan.

The framework identifies how the components of a landscape, such as field and vegetation types, contribute to individual species. It then analyzes the species' survival chances based on its need for habitat types and the distribution of habitats across the landscape. Then it predicts how changes in habitat will affect individual species and the total richness of species.

To test the framework, Chan traveled to Costa Rica where -- like many areas in Latin America -- biodiversity has been ravaged by logging and agriculture industries. The results of his work with farmers were recently published in the journal *Proceedings of the National Academic of Sciences*.

Chan and colleagues used the framework to identify windbreaks as way to improve productivity of cattle and crops, and to help protect 17 species of birds, including many that migrate from the U.S. and Canada.

"Cattle, bananas and coffee were under stress from high winds and underperforming, so there was a clear economic argument for investing in wind barriers," says Chan. "We investigated how different wind barriers would impact biodiversity."

Using the framework, they determined that by planting a mix of native trees, shrubs and other plants they could not only shelter the farm from wind for less than the cost of a wood fence, but also provide an important habitat for these birds. ■

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A crystal ball for Pacific salmon: unprecedented genomics study underway

By BRIAN LIN

A team of UBC researchers is dialing up the heat to study Pacific salmon from the inside out – 30,000 genes at a time.

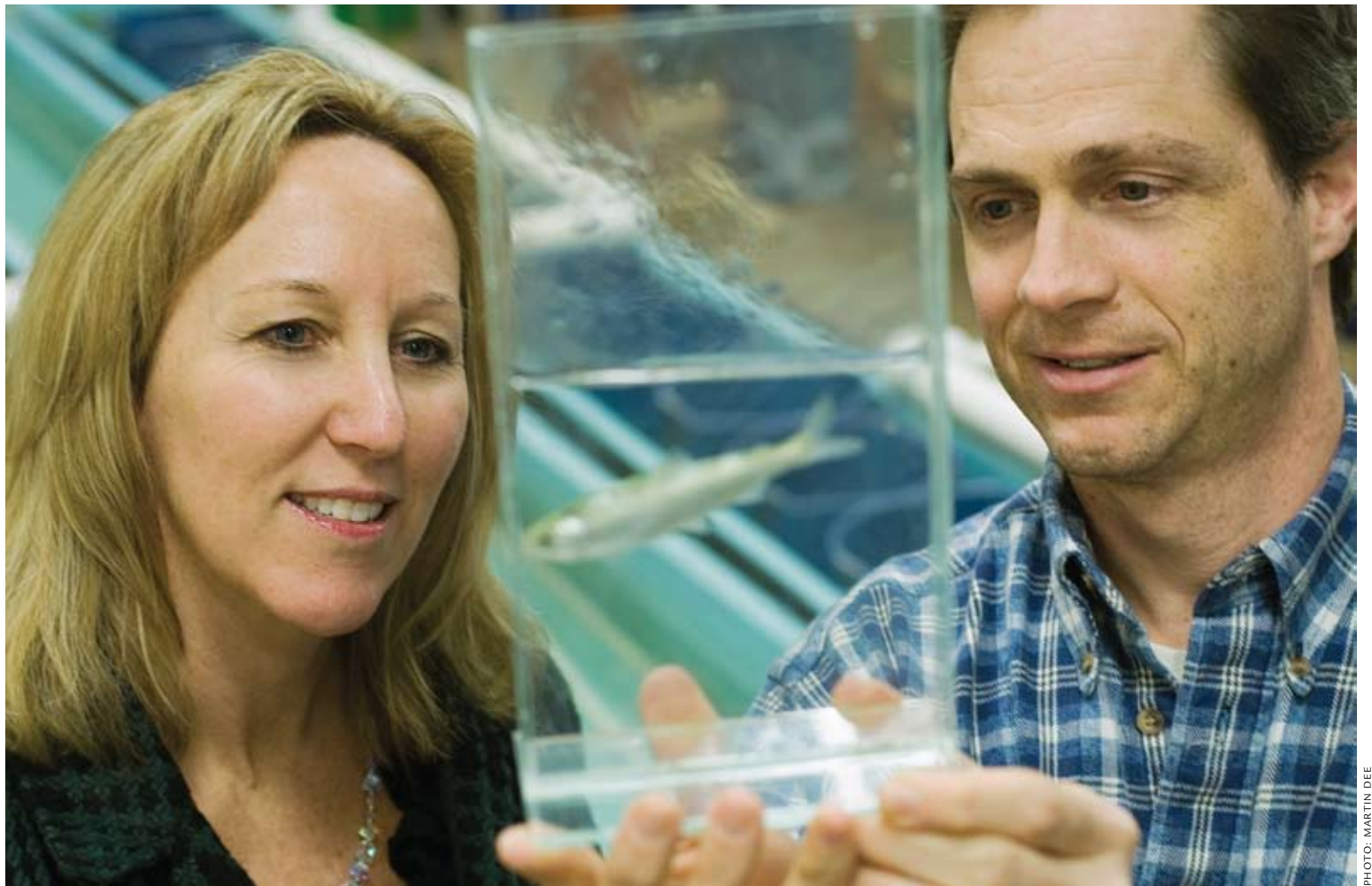
In the most ambitious and largest-scale ecological genomics study ever launched on a wild species, Kristi Miller and Scott Hinch are sorting through countless interactions among temperature, physiology, behaviour and diseases to identify genetic markers that could accurately predict the fate of future salmon stocks.

“Not all salmon are built the same or behave the same way as they navigate a myriad of environments during migration,” says Miller, an adjunct professor in the Dept. of Forest Sciences and head of Molecular Genetics at Fisheries and Oceans Canada (DFO).

“British Columbia, like the rest of the world, has experienced unprecedented changes in our natural environment due to climate change. As a result, traditional fisheries management tools, largely based on historic observations of salmon stocks, are falling short.

“The traditional ways of managing salmon stocks based on their return run time don’t take into account genetic differences among stocks returning to the same river at the same time. We end up exploiting some stocks too heavily and under utilizing others,” says Miller, who currently runs a sockeye genetic stock identification program at DFO.

What’s unique – and powerful – about the UBC team’s approach, says Hinch, a professor in the Faculty of Forestry and the Institute for Resources, Environment and Sustainability, is its attempt to link genetic expressions with a variety of internal physiological responses and external



Kristi Miller and Scott Hinch are taking a holistic approach to predict the future of wild Pacific salmon stocks.

conditions in a highly migratory fish species.

To accomplish this, the Genomics Tools for Fisheries Management – or FishManOmics – Project will enlist a genomics technology called cDNA microarrays to profile the expression of tens of thousands of genes at a time. The technology was originally developed to identify cancer types in humans and has been highly utilized for personalized medicine.

“We will look, for example, at which genes are being turned on or off – and what the physiological function of these genes are – to determine whether a fish is being attacked by a pathogen, how they are responding to unusually high

water temperatures, or whether they are prepared for shifts in salinity,” says Hinch.

“We will also assess changes in the physiological condition of fish sampled throughout their life history, and examine the links between condition, behaviour and eventual fate of spawning adults by tracking them using telemetry tags and in controlled lab experiments.”

Some of the lab experiments involve turning up the water temperature to simulate climate change to learn how salmon stocks’ physiology responds to severe conditions.

All this information will then be used to build a new generation of tools that will allow scientists to predict the likelihood of each river stock in

B.C. to survive two of the most critical junctures in their lifetime: as juveniles entering the ocean and as spawning adults returning to fresh waters. The new models will also give fisheries managers a better grasp of how salmon might behave when challenged by varying water flows, pollutants and diseases or whether they are physically fit to withstand these adversities – and spawn.

“A stock-specific approach based on genetics allows us to be much more precise in our fisheries management and maximize catch on healthy, abundant stocks while minimizing impact on weak ones.”

The three-year project, supported by Genome BC, the

Pacific Salmon Commission, DFO and the Natural Sciences and Engineering Research Council of Canada, is the salmon equivalent of a holistic health approach, says Hinch. The multi-disciplinary team, including UBC professors Anthony Farrell, Paul Wood, Paul Pavlidis and DFO’s Janelle Curtis, also covers expertise in physiology, social science, bioinformatics, and modeling.

“A better understanding of the mechanisms underlying salmon behaviour gives us insight into what they’ll do or how well they could survive under different circumstances,” says Hinch. “This is as close to having a crystal ball of the salmon’s fate as we could get.” **R**

Pump prices high? Don’t bother shopping around

By BASIL WAUGH and DEREK MOSCATO

When gas prices skyrocket, who doesn’t look around for bargains?

According to a new UBC study, that is precisely the wrong time to shop around. Consumers are better off comparison shopping when prices are dropping, the study finds.

And with pump prices falling in recent times, that means the time for looking around is now.

UBC Sauder School of Business assistant professors Ambarish Chandra and Mariano Tappata recently studied daily gas prices at 25,000 U.S. gas

stations for an 18-month period. They found significant pricing differences when gas prices were low or moderate, but these differences diminished or disappeared when prices were high.

“People are really shopping around for gas at the wrong time,” says Chandra. “There are bargains out there, but at the price valleys, not the peaks. The differences between prices shrink when the price is high.”

Chandra says the study was motivated by anecdotal observations of significant fluctuations in the price of retail gasoline sold at gas stations, even though gasoline is a relatively



standardized and homogenous product.

They found myriad reasons for fluctuations in gas prices. The price of oil is a key factor, but there are other variables that can impact pricing, including location, brand power, number of neighboring stations and amenities such as car washes, convenience stores and number

of pumps.

“When oil prices spike, as they did last summer, gas station owners find their profit margins squeezed and they have a smaller range of prices that they can profitably set,” Tappata says. “Shopping around during these periods really doesn’t pay off.”

Gas stations have more flexibility around pricing

strategies when oil prices are moderate, Tappata says. “That is when you will find particular stations charging relatively higher prices, hoping to catch consumers who are not comparison shopping.”

On the flipside, low oil prices also enable stations to lower prices and still be profitable. “That is when many stations will try to target price-sensitive consumers, attempting to drive sales by slashing their prices,” Chandra says.

“If you are willing to shop around, that’s when you’ll find the bargains.”

Chandra, who says the U.S. and Canadian retail gasoline markets are very similar, expects the results to apply in Canada. “But the lack of data availability from the Canadian market prevents us from doing the same study right now for Canada.” **R**

PHOTO: MROTTI/ISTOCK PHOTO

Sleep Apnea: children may benefit from UBC device



PHOTO: MARTIN DEE

Prof. Alan Lowe's invention, an oral appliance called Klearway™, is being tested to treat sleep apnea in children.

By CATHERINE LOIACONO

Children suffering from obstructive sleep apnea (OSA) may soon be sleeping better thanks to a new use of a device being studied in UBC's Division of Orthodontics, Faculty of Dentistry.

The study, led by Prof. Alan Lowe, is the first to test and document the effectiveness of an oral appliance called Klearway™ in children with OSA. The device is already being used in 30,000 adults world wide.

Habitual snoring in children can be an indicator of OSA, which is characterized by cessations of breathing and problems with sleep, including restless sleep. OSA occurs when a child repeatedly gasps and stops breathing during sleep because the upper airway is obstructed.

During sleep, the tongue can be sucked back against the back of the throat, obstructing the airway. The Klearway™ oral appliance is made of clear acrylic resin and is similar to two connected orthodontic retainers. It prevents the lower jaw from dropping down and back and keeps the teeth together during sleep.

"The preliminary results from this clinical trial are promising and better than expected," says Lowe, who invented the UBC technology. "What is most surprising is how quickly the

appliance works in children. In just a matter of months, we have found that children who wear the appliance show dramatic improvements in sleep and significantly improve how their upper and lower teeth fit together."

Although snoring in children is a common condition that may affect up to 27 per cent of kids aged two to 12, OSA affects from one to 10 per cent of children who snore. Many of these children also exhibit enlarged tonsils.

The effects of OSA in children can include attention-deficit disorder, behavioural problems, poor academic performance, failure to thrive, bedwetting, cardiopulmonary disease and, in some cases, obesity and type II diabetes.

The study shows promise for Klearway™ to treat OSA particularly in those children with prominent upper front teeth and short lower jaws – a condition called malocclusion. The distance between the upper and lower front teeth was reduced and the vertical incisor overlap decreased.

According to the study, when compared to baseline recordings, the Klearway™ appliance demonstrated improved minimum blood oxygen levels. The results also show that the episodes of not breathing were reduced from eight per hour pretreatment to

2.4 posttreatment.

"One of our patients' grandmothers reported that she suspected a problem because her grandson was often very tired and reported that he fell asleep on the bus on the way home from school," says Lowe. "After using the device for a few months, the patient and grandmother have seen a tremendous improvement in sleep, energy, concentration and overall mood."

The Klearway™ appliance effectively increases the size of the airway during sleep by creating more room at the back of the throat at the base of the tongue. The appliance fits over the top and bottom teeth and gradually moves the lower jaw forward giving the patient more room to breathe.

"In prepubescent children with this condition, Klearway™ may also correct the malocclusion," says Lowe. "It has the potential to treat OSA because it opens the airway and decreases the mismatch between the upper and lower teeth."

Lowe cautions that not all children who snore suffer from OSA, nor do all OSA patients snore. Assessment by the family physician and referral to a pediatric sleep specialist are required before a definitive diagnosis of OSA can be made and therapy decisions determined. **R**

New patinas bridge science and art

By JODY JACOB

Imagine a purple Statue of Liberty, dressed in a canary-yellow robe, holding a bright red flame.

The artistic concept is in the scientific works, thanks to research by Ashley Devantier, a fourth-year UBC Okanagan student using chemistry to create more colour options for artists working with patinas.

A patina is a coloured coating on the surface of bronze or similar metals, often produced naturally by oxidation over a long period – such as the blue-green colour on the Statue of Liberty's copper surfaces. Artificial patinas are used by artists to add an antique look or feel to their artwork, but these artificial patinas have their drawbacks: they're confined to a very limited colour palette (usually blue-green) and often use highly toxic or hazardous compounds.

By mixing and manipulating common – and far less toxic – metallic elements and identifying the molecular basis for new colours, Devantier has produced nearly a full rainbow of colours not previously available in the patina palette. In addition, she has studied and analyzed the underlying molecular changes that take place when applying these new patinas.

"I took some common metallic elements – like chromium, iron, cobalt and copper – which are known to give compounds with very intense, vibrant colours, and started to explore the chemical processes that occur when they

are applied to bronze surfaces," says Devantier. "All of a sudden these amazing colours started to show up."

Although the practical applications are yet to be determined, Devantier's research could potentially give artists new, less-toxic formulas to create patinas of varying colours -- .

Devantier, who received an Undergraduate Research Award (URA) from the Irving K. Barber School of Arts and Sciences to conduct her research last summer, says interest in her work has been overwhelming and the experience itself has been life-changing.

"The response I've had from the internal UBC arts community is fantastic," she says. "Personally, when I look at where I was only a few months ago and where this project has taken me over time, well, it's mind-boggling. The URA grant has completely changed my personal path and the way I thought about science and research."

Devantier had planned to finish her Bachelor of Science degree in chemistry by December. She was looking forward to finishing university and was eager to start working – in whatever field she was able to land a job. But after receiving the URA and completing the research part of her project last summer, Devantier decided to continue with her project through an honours thesis.

"This project has been in Ashley's hands since day one," says Stephen McNeil, assistant professor of chemistry and

primary supervisor of Devantier's patina research project. "It is really something off the beaten path. I was surprised to find out that nobody seemed to have done the preliminary work to see what transition metals could be put on a surface to create colour, so it was very exploratory at the start. It's a visually enticing project that really bridges science and art."

Currently, as part of her honours thesis, Devantier is studying molecular changes over time occurring on the surface of the bronze patinas, and recording them. The next step will be to

approach the arts community to determine the practical applications of the research.

Although the project has been rewarding for Devantier, it has presented interesting challenges.

"There was the great saga of the disappearing red," she says. "I produced this beautiful bright red and for the life of me I couldn't figure out how to do it again. I used the exact same mixture, and it would repeatedly turn blue. I was convinced the colour gods hated me."

A few weeks of perseverance and careful study revealed the cause: solutions of an iron salt

would react with the copper atoms in the bronze surface, yielding a red iron compound. If the iron solution had time to react with oxygen in the surrounding atmosphere, the iron complex would oxidize, and form a blue colour instead. Applying the iron under a flow of nitrogen gas would prevent the oxidation, leaving the original red. Chemical identification of the blue and red materials provided the clues needed to reproduce each colour.

"Figuring that out was the most rewarding thing I've ever done," says Devantier. **R**



PHOTO: TIM SWANKY

Entirely new colours for metal patinas are being developed by UBC Okanagan chemistry researchers Prof. Stephen McNeil and fourth-year undergraduate Ashley Devantier.


STIMULATING
continued from page 1

an amazingly dynamic organ that can reorganize itself," says Boyd, whose current study looks at the benefits of applying an electromagnetic stimulus to the stroke affected section of the brain. "What we want to do is to stimulate and enhance brain cell reorganization around the damaged part of the brain."

In doing so, Boyd believes that the brain can reorganize itself and find an alternate pathway to performing a previous movement.

The first part of the study tested individuals who had never suffered a stroke. The participants received an electromagnetic stimulus and were then asked to practice a specific movement. Participants who received the stimulus demonstrated increased and improved learning for 15 - 20 minutes following the stimulus.

"Preliminary results of our research on non-stroke patients show that if you pre-excite the brain by applying an electromagnetic stimulus, motor learning and retention of skill is improved and retained," says Boyd. "We are currently applying this technique to the stroke affected brain and the available data is positive. We are quite optimistic that this approach will work and we expect results in the coming months."

According to the Heart and Stroke Foundation, each year, there are between 40,000 to 50,000 strokes in Canada and close to 16,000 Canadians die. 

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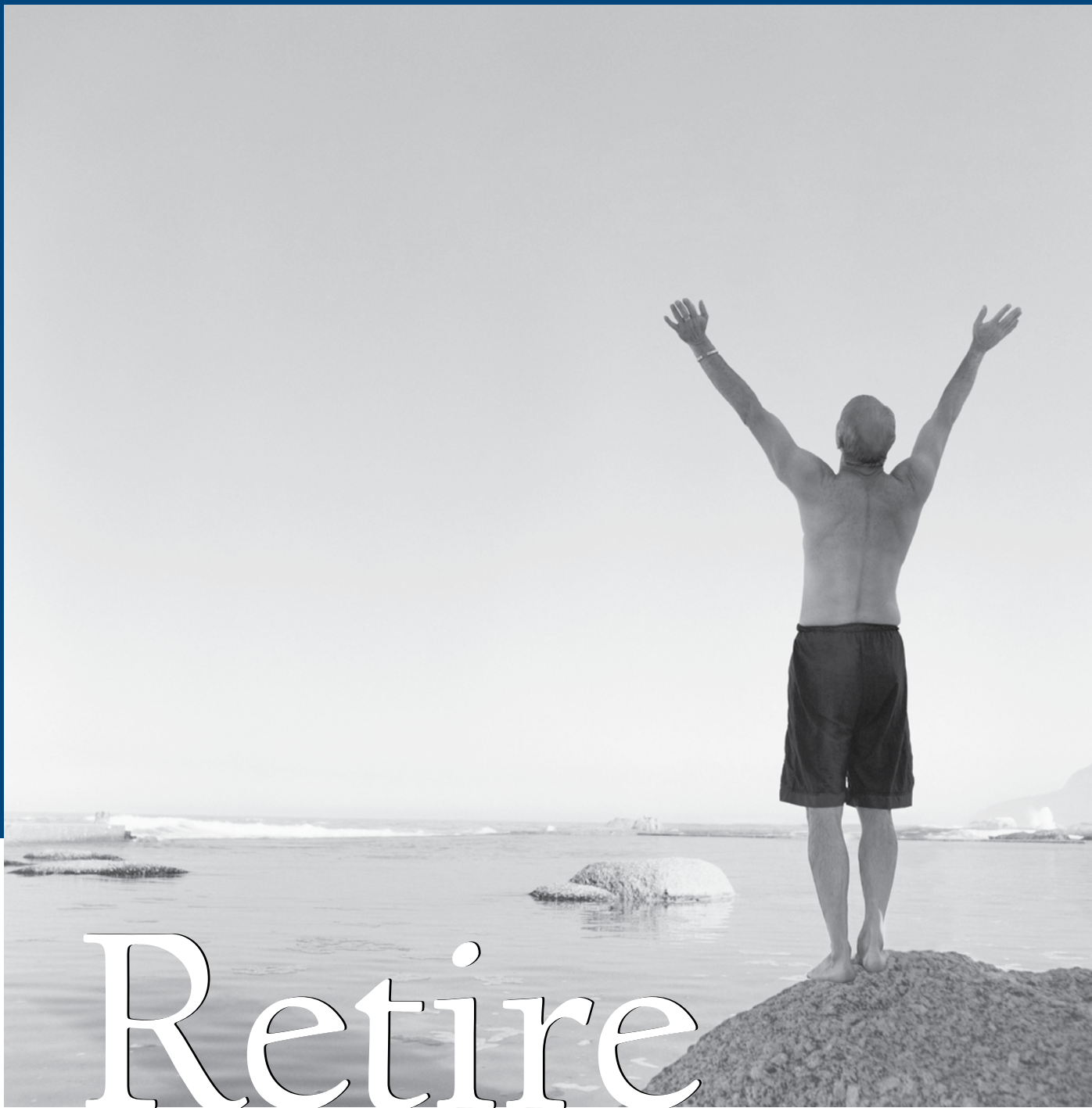
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