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Industrial Design

Professor Patrick Gunning and the Centre for Medicinal Chemistry are revolutionizing how cancer drugs are created in academia.

Contents

FEATURES

12

INDUSTRIAL DESIGN

Professor Patrick Gunning and the Centre for Medicinal Chemistry are revolutionizing how cancer drugs are created in academia

By Marcia Kaye

19

RAWC LIFE

Inside UTM's popular fitness facility

Photography by Jeremy Sale

22

RAPID RESPONSE

Career in disaster relief gives alumnus faith in humanity

By Elaine Smith



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DEPARTMENTS

CAMPUS NEWS	3
UTMETRICS	7
SNAPSHOT	8
SPARK	26
CLASS NOTES	28
ALUMNI EVENTS	30
VAULT	32



VIEWFINDER

Off the beaten path Randy Landicho

The Photographer
Randy Landicho is the communications and social media assistant in UTM's Office of the Registrar. He graduated in 2012 from the Communication, Culture and Information Technology and Professional Writing and Communication programs.

As a photographer, fall is my favourite time of year at UTM. The campus looks beautiful year-round, but fall is when the foliage screams "Look at me!" Even just taking a stroll on the Five-Minute Walk becomes a treat once the fiery colours come out. I enjoy taking photos at UTM because even after eight years here, I still discover new places and find new angles to shoot. This photo is a great example of a spot I found only recently—in the woods beside the CCT Building. To me, it captures the essence of the natural setting of the UTM campus. It pays to walk off the beaten path.

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Build
dreams



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Campus News



Erindale from the air

How do you remember UTM? The aerial photo above was taken in 1988, and shows many of campus's original buildings, including the (now demolished) Crossroads Building, Wilson Pond (in front of the South (now William G. Davis) Building, was not yet so surrounded by greenery. Check out the upcoming issue of *M* for more archival photographs and UTM history!

50TH ANNIVERSARY

Golden Year UTM prepares for its 50th anniversary

1967. The year of Canada's coming-out party, Expo 67, the Summer of Love, and the last time the Toronto Maple Leafs won the Stanley Cup.

The musical *Hair* opened off-Broadway, Vietnam protests and race riots took centre stage in U.S. cities, Twiggy was a fashion sensation, and daring men wore turtlenecks under their dinner jackets. It was a time of change—shucking off the restraint of the '50s, and tripping into the psychedelic, flower power of a new generation.

It was also the year that Erindale College opened its doors to 155 students, 28 faculty and 40 staff. The campus consisted of one temporary structure—the North Building—and two tennis courts. On-campus students lived in houses already located on the land including Thomas Cottage and Hastie House, and Colman House was built to accommodate the student union office and a makeshift pub known as “Ugly’s”.

Fifty years later, so much has changed! UTM has evolved into U of T's second-largest division and a globally competitive campus in its own right, known for academic excellence and student success. But while some traditions have faded: Tent City, the green Jell-O™ frosh photo-op and the mud pits—others have remained: the St. George shuttle, the Meeting Place hang-out and feeding the resident deer.

To celebrate our 50th anniversary, UTM has planned a year of unique events and initiatives throughout 2017. There will be projects to engage your “inner” author and photographer, a film festival to celebrate international cultures, and art productions to open your eyes, ears and hearts. And much more!

For this anniversary year, we hope you will join us in our celebrations. Leading up to and throughout 2017, bookmark the 50th anniversary website at www.utm.utoronto.ca/50th to keep up-to-date on 50th events, projects, news and history. We have an exciting journey ahead.

PHOTO: UTM ARCHIVES

1

2

"GOTTA CATCH'EM ALL"

GAME ON!

When the Pokémon Go craze swept the world over the summer, U of T Mississauga was no exception. In fact, the campus' 225 acres became home to several PokéStops, eggs and gyms, and it was common to find groups of players searching the halls and pathways for wild Pokémon. Students, summer campers, staff and faculty scoured campus for Jigglypuffs, Rattatas and Weedles. Vicky McArthur, an assistant professor at the Institute of Communications, Culture, Information and Technology, attributed the game's popularity to the novelty of the "augmented reality" experience and the fact that Pokémon has already been a popular card game and TV show for 20 years. By autumn, the peak of the craze had already passed, but first-year students had already moved on to the next big thing: Guardians of UTM, a mobile mystery game that takes players all over UTM to gather clues, solve puzzles and—in the process—learn all about the campus that will be their home for the next four years.



3

CIBC RUN FOR THE CURE

Toss the Boss— for a good cause

For \$5, students, staff and faculty had the chance to flip Interim Vice-President and Principal Ulrich Krull onto a judo mat—all to raise funds for the Canadian Breast Cancer Foundation Run for the Cure. Krull, who holds a black belt in judo, volunteered to teach others how to toss him, and then doubled each donation from his own pocket. The outcome? A few bruises for Professor Krull—and \$200 dollars raised to fight cancer.



4

MAKING WAY FOR CHANGE

Demolition of North Building stirs memories

When the demolition equipment clawed the concrete panels from the remaining section of the North Building in July, the reaction on social media was swift.

"My north building is being torn down...so many memories in the north cafe and reading room." "Curly fries in the cafeteria, falling asleep to Swift in the lounge. Rest in Peace, North Building!" "May the memory of the most convenient dropbox in UTM history never fade!" "Noooooo ☹ but yay for new spaces!" It took almost a week for the entire structure to be torn down, then its component parts were separated for careful recycling. The new North Building Phase 2 is scheduled for completion in the summer of 2018.



PHOTO: (TOP) CESAR MEJIA; (CENTRE AND BOTTOM) BLAKE ELIGH



5

IN TRANSIT

BRAMPTON EXPRESS BUS ROUTE PROVES POPULAR WITH STUDENTS

According to early ridership numbers, the new express transit route bringing Brampton students to the U of T Mississauga campus is on the right track.

The 199 Express bus pilot project launched in early September. Run by Brampton Transit, the new route provides non-stop service between Brampton's Gateway Terminal (at Main Street and Steeles Avenue) and the UTM campus. The route operates Monday to Friday, excluding holidays, with buses making six daily round trips between the two destinations. At full capacity, each bus can carry between 52 and 58 passengers. In less than a month, the service proved so popular that an additional bus has been added to the first and last daily departures, which run during peak commuting times.

"Reducing commuting time is a significant incentive to encourage transit use," says Mark Overton, dean of student affairs. "This route is saving student passengers almost a half-hour each way." Previously, the journey from Brampton to UTM took about an hour and required a transfer between two buses. The new route shortens the commute to between 30 and 40 minutes on a single bus. Student ridership on the route will be monitored from September to April, after which Brampton Transit and the university will decide whether or not to continue, end or modify the service.

PHOTO: (TOP LEFT) BRAMPTON TRANSIT; (RIGHT) ARJUN YADAV



6

THE BIG PICTURE

Consultations begin on new vision plan for UTM

What is U of T Mississauga, and where are we going as an institution and a community? Those are the big questions posed by a new Draft Vision Statement and consultation plan launched this fall by the Office of the Vice-Principal Academic and Dean.

The draft statement was created by Interim Vice-President and Principal Ulrich Krull, along with Professor Amrita Daniere, vice-principal academic and dean, and Professor Bryan Stewart, vice-principal, research, and it takes into account existing documents, including the 2015 external review of the campus and the 2012 Academic Plan. Once finalized, the Vision Statement will create a cohesive vision for the campus, setting the course for an updated strategic plan and helping to guide future decisions.

"In recent years, the UTM campus has seen a great deal of growth," Krull says. "We haven't had an opportunity to reflect on where we're going. It's time for the community to understand where it's going and our values as we move ahead."

The draft plan will be presented to stakeholder groups during the fall, including the Academic Affairs Committee, Campus Council and at town halls hosted by Krull. Daniere has also committed to personally reviewing all feedback submitted by email or anonymously through the dean's website. "We are looking forward to working with the entire UTM community to develop a Vision Statement that is inclusive, progressive and creative," Daniere says. "We're hoping for open discussion. People will have their voices heard."

A more refined version of the plan will be presented in December. The final version will be ready by May 2017, in time to help guide decisions for the next budget cycle. Read the Draft Vision Statement at www.utm.utoronto.ca/draft-vision-statement.

Campus News

7

SOCIAL MEDIA

UTM in the moment

At UTM, there is something amazing happening around every corner. Here are a few of the moments that caught our eye:

Follow UTM on:

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- Facebook www.facebook.com/UTMississauga
- Instagram @uoftmississauga



New school year resolutions! #WelcomeToUTM #Oweek16



Dab! At Orientation. #UofT



Gorgeous Pandorus Sphinx Moth spotted on campus today. Part of the Sphingidae family, these moths have a wingspan of up to 11.5 cm! #nature #biology



Rainbow flags at the base of UTM's Peace Pole. #Orlando #PRIDE #loveislove



Autumn's Finest #deer #nature



Another stunning aerial shot by @arjsun. #UTMlife #Mississauga



School crossing! Gossies on their way to Wilson Pond. #nature #UTMtrafficjam

UTMetrics

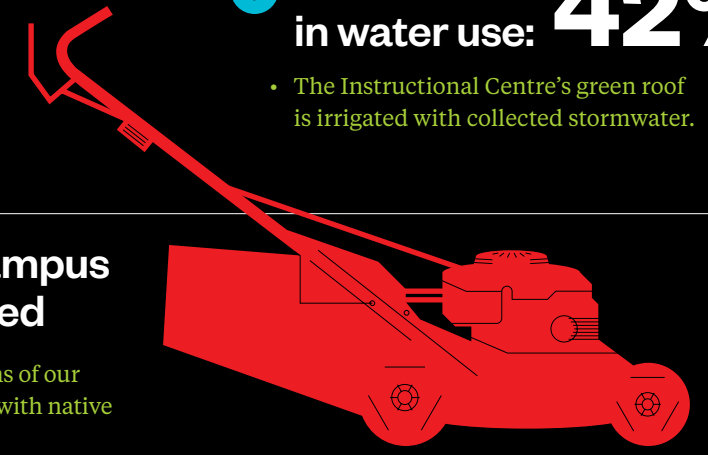
+ Reduction in water use: **42%**

The Instructional Centre's green roof is irrigated with collected stormwater.

20

+ # of sites on campus no longer mowed

Since 2004, up to 20 sections of our campus have been planted with native trees and wildflowers.



+ Approximate number of exam papers written in 2016:

81,200



+ Number of meals served at UTM during 2015/16:

1.5 MILLION



+ 1 Walkie-talkie

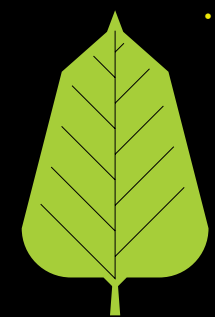
The new WorkAlone program, provides a hand-held radio connecting Campus Police to anyone on campus who is working alone, in an isolated area of campus or for any reason has safety concerns.



+ =



One full bucket

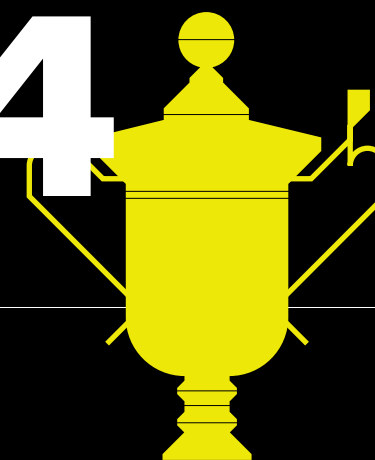


One free plant

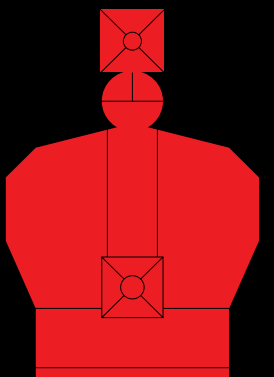
The Garbage2Garden program distributes buckets for food scraps to campus offices, which users then take to the campus greenhouse.

+ Number of architectural awards won by UTM buildings:

24



+ U of T's mace is gold-plated silver, bears the coat of arms of King George IV and was made in England. It was unveiled at the June 1951 convocation.



Snapshot



Andrew Wright

CLASS OF 1994

Exposed Alumnus Andrew Wright's photography draws global acclaim

U of T Mississauga is like an object in the distance in a piece of Andrew Wright's photographic art; although it isn't the focus of the work, it continues to make its presence felt.

Wright, an artist and chair of the visual arts program at the University of Ottawa, has exhibited with the likes of Michael

Snow and Edward Burtynsky, and his works hang in the Canadian High Commission in London, U.K. and aboard the Canadian warship HMCS *Toronto*.

Wright arrived at UTM in 1990 from Kingston, Ont. He earned a specialist BA in art and art history in 1994, shuttling back and forth between UTM and Sheridan College for classes in the joint program. "It was pretty idyllic," he says of UTM. "We used to wake up with deer on our lawn. It felt like we were just on the edge of farmers' fields."

Wright went on to earn his MFA at the University of Windsor, but returned to UTM and Sheridan briefly to teach in the program from which he had graduated. "I wasn't sure how one makes a living as an artist and how

to sustain a practice," Wright says. "I started picking up teaching jobs here and there and did sessional teaching for about a decade. "It was just happenstance that I ended up teaching [at UTM]. I may be the only graduate who has taught in the program, and it's a personal point of pride."

Wright was required to teach a photography course and it was then that he first began to consider the possibilities offered by photography as a medium. His early practice had focused on sculpture.

"I came to photography through the back door," Wright says. "I didn't do it with any seriousness until I left graduate school.

"When I came back to teach at Sheridan, I was given a photography class, and I had to



Snapshot

learn pretty quickly." Today, photographic art is his focus, although his work is "not about making pretty pictures. "The photography I do is about something other than the image presented," Wright says. "I comment on the circumstances around their creation or assumptions we make about esthetic value; I try to challenge assumptions."

One of his ongoing passions is the camera obscura, a technique that is the ancestor to today's camera. The term—which literally means dark chamber—involves a darkened room where light is admitted through a pinhole that casts the outside image on a dark wall in inverted fashion. Mirrors and lenses are often used to redirect the image.

Wright recently took his art to the Korean port of Ulsan, the world's largest shipping port. Using a shipping container as a camera obscura, he created images of a tree hanging upside down from a crane.

"The work is a bit of commentary on the commercial-industrial nature of the practice of photography," he says. "The tree is upside down, so it's right side up in the camera. It's a contemplation on the nature of photography in a very industrial context."

As a practising artist, Wright has dozens of exhibitions under his belt, including four solo shows in the past two years and publication of a large catalogue of his work. The exhibitions coincided with the first sabbatical of his career, a year that saw him

work on projects in locations as far flung as Venice and the Yukon.

Although he has taught at the University of Ottawa since 2008, Wright hasn't forgotten his UTM roots. He personally raises money each year for an alumni award given to a graduate of the art and art history program. "It's about recognizing the program and trying to contribute back to everything the program gave me: a sense of possibility, a sense of opportunity and a really good grounding in creative and critical thinking." — Elaine Smith

DISUSED TWIN BROWNIE HAWKEYE CAMERAS; SELF-PORTRAIT; SUSPENDED/BOUND TREE
ALL PHOTOS COURTESY ANDREW WRIGHT



Eugenia Duodu

PHD CHEMISTRY GRADUATE

A Passion for Science Alumna gives youth tools to succeed in STEM

Growing up in a Toronto Community Housing complex, Eugenia Duodu's initial introduction to science came from exposure to such television programs as *Bill Nye the Science Guy* and the *Magic School Bus*.

Today, with a PhD in chemistry from the University of Toronto in her pocket, Duodu is dedicated to fostering a passion for science in dozens of Toronto youngsters being raised in similar environments. As the executive director of Visions of Science Network for Learning, her daily mission is to ensure that youngsters in low-income communities discover the joys of science

and realize that a science career is a real possibility for them.

"I spent time during my undergraduate career working at Toronto Community Housing," Duodu says, "and I realized my own level of privilege in being supported in my journey through science. Not everyone has this opportunity."

While working with these youngsters and hearing them complain about how hard or unnecessary science was, Duodu began doing demonstrations to show them how science was all around them. "They really like the demos and I realized that we clearly needed to engage more people this way," she says. "I'm passionate about science and teaching others about it."

Nonetheless, Duodu wasn't certain that a classroom teaching career was right for her, because "I liked teaching outside the box." In 2011, a year after completing a BSc with a double major in chemistry and biology at U of T Mississauga, she began volunteering

for Visions of Science and discovered that it was a good fit. She currently serves as the executive director of the organization, which offers in-school enrichment, summer learning camps and STEM (science, technology, engineering and mathematics) clubs. Under Duodu's leadership, Visions of Science is expanding its reach.

"Our programs have been focused on students from Grades 3 to 8, but we are about to launch a youth program to bridge the gap between Grade 8 and post-secondary education," she says. "There are certain supports a student needs to ensure an equal chance to be successful, and we connect our youth with those supports."

Duodu knows all about the value of supportive people in pursuing an interest and building a career, and doesn't want to leave it to chance for others. "I had special science teachers while I was in the biotechnology program in Martin Grove Collegiate," Duodu says. "I also took part in U of T's Summer Mentorship Program, something I heard about serendipitously through a student teacher at my school.

"I can't even imagine what my life would have been like without that program. Just being on a university campus for the summer, having a library card and learning how to do things like a proper reference search – it was transformative. I met kids from all over the city and we were able to get together to encourage each other. I'm still friends with a majority of those people."

Duodu is delighted to know that she and her colleagues are assisting many others in following a similar path. "Being able to inspire kids on a daily basis about something I'm passionate about is really cool," Duodu says. "Seeing the kids' growth, not only in their knowledge of science, but in learning to collaborate, is wonderful. I also love seeing the growth of the volunteers who train the students; their commitment always blows me away.

"I meet people who are just as passionate about science as I am and they often say, 'I wish I'd had something like this when I was younger.'" — **Elaine Smith**

PHOTO: MELISSA HEIDE

UofT
organized TED event

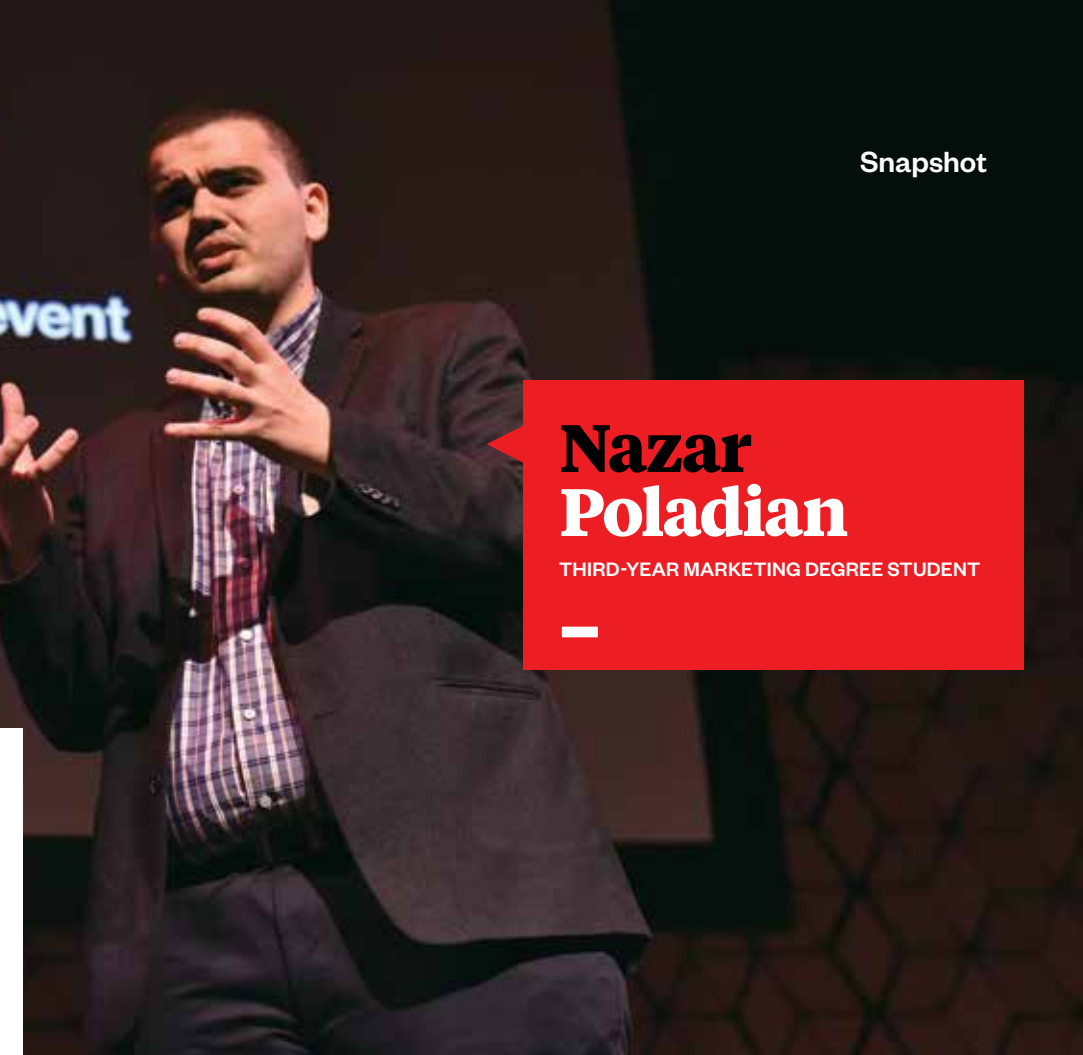
Path to Success New initiative helps Syrian students study and gain accreditation in Canada

Nazar Poladian was in his third year of a marketing degree program when his family fled Syria on one of the last flights out of Aleppo in 2012. He spent three years in Lebanon where he tried to finish his degree before the family landed in Canada, ultimately settling in Scarborough.

Upon arriving in Canada, Poladian worked in digital marketing and banking, but he hit dead ends in trying to complete his education. "I have 48 courses finished, but no degree completed," he says. "The Canadian government was flexible to give us permanent residence, but finding an official education status was more difficult. No one seemed to have a solution. I thought I would have to start again."

But after delivering a TEDx U of T talk on the refugee experience in 2016, Poladian connected with Adam Fraser, the manager of UTM's Pathways programs. UTM's Pathways programs were established to help students taking

PHOTO: MAHMOUD SAROUJI



Nazar Poladian

THIRD-YEAR MARKETING DEGREE STUDENT

a non-traditional route to higher education. "Not everyone comes to university the same way," says Fraser. "Pathways helps students who are transitioning to UTM, such as seniors, mature students and those coming to us from college programs."

Fraser was able to assess Poladian's transfer credits before he applied to U of T. "Adam pushed a lot, he explained a lot," Poladian says. "He guided me, especially for the scholarship and to assess my transfer credits. UTM started that process even before I applied officially—other universities didn't offer that."

In September, Poladian entered UTM part-time as a transfer student in the Digital Enterprise Management program. He was also granted one of six \$10,000 scholarships from U of T's Scholars-at-Risk program. The financial help is a big relief, Poladian says, as he is working full-time to help support his family financially.

Fraser saw a unique opportunity to help Syrian students displaced by conflict in their homeland. Fraser's research shows that there are nearly 1,300 Syrian students living

within 60 km of the UTM campus. "We can take that same Pathways model and transition Syrian students," he says. "There will be three kinds of students—those who are ready to go to school now, those who were in university and need to transfer, and those who have a degree but need to transfer their qualification to Canadian equivalents."

Some of the unique challenges presented by prospective refugee students include those arriving without documentation or with degrees that are different from those granted in Canada. "If an applicant has official documents, they would apply directly as any other student would," Fraser says. "But if they are missing that documentation, we can help them access the system to determine their level of education and where they would fit at U of T."

"There is a need amongst this population," says Fraser. "As Syrian students start thinking about school and getting a higher education, they will find us. UTM can support these students knowing that they need that extra help." — **Blake Eligh**

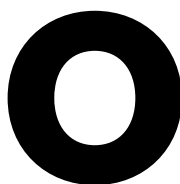
INDUSTRIAL

DESIGN

Professor Patrick Gunning and the Centre for Medicinal Chemistry are revolutionizing how cancer drugs are created in academia

By **MARCIA KAYE**
Photography by **RILEY STEWART**





On the day that Nicholas Gorys of Brampton, Ont., was diagnosed with acute myeloid leukemia as an 18-month-old, doctors didn't expect the weakened toddler to live through the night. When he did, they started a series of aggressive treatments, despite giving him only the barest chance of survival. Today Nicholas, now 13, is considered cured. But what a toll the treatments took on him and his family.

The little boy had to have a blood transfusion every second day for five months. He endured five rounds of intense chemotherapy, and suffered multiple infections. He underwent a bone marrow transplant. He was in isolation for eight months. He received so many courage beads—each one representing a treatment—that his family had to start a second string. His mother, Teresa, with a husband and five other kids at home, virtually lived at Toronto's Hospital for Sick Children.

Finally, the cancer was gone but the therapies did their own damage. "The treatments were very invasive to his body," says Teresa, "and we still don't know what all the aftereffects will be." Nicholas has permanent hearing loss in both ears and some vision loss. His adult teeth will never grow in, necessitating dental surgeries. He gets recurrent lengthy respiratory infections and misses a lot of school. In mid-October, he had surgery to have his tonsils and adenoids out. "Hopefully soon there'll be better treatments for future patients that aren't so invasive," his mother says.

Enter Patrick Gunning. A professor in UTM's Department of Chemical & Physical Sciences, Gunning is aiming for exactly that: gentler drugs based on precisely designed molecules that would "switch off" cancer

cells and result in far fewer toxic effects on the patient. Gunning is the Canada Research Chair in Medicinal Chemistry, a field that bridges biology and medicine. He has met Nicholas and calls the boy's experience motivational. "It really spurs me and my research team to make molecules that are less aggressive and can help people like Nicholas," he says.

Gunning's research has progressed dramatically from five years ago, when he had four people working in a small lab. Today, he has more than 30 people in a lab that has grown to 3,600 square feet. And now, the research is so promising that his lab has become the catalyst for a major venture at UTM: the creation of a brand-new interdisciplinary centre for the research and development of better treatment options for the most devastating and under-explored human diseases.

The new Centre for Medicinal Chemistry launched in September, thanks to nearly \$6 million from the Canadian Foundation for Innovation and the Ontario Research Fund and \$7 million from the Mississauga-based Orlando Corporation.

"Orlando Corporation has had a long history of supporting healthcare in the Greater Toronto area and specifically Mississauga," says Phil King, Orlando's president. "We are delighted to contribute to the establishment of the Centre for Medicinal Chemistry. The impressive record of the Gunning lab in early research trials promises great things for the future of cancer research. We are pleased to support a centre that will have such a significant impact on the health of so many people around the world."

Just as Gunning's laboratory has grown, there are plans to scale the Centre for Medicinal Chemistry into an internationally leading research consortium with four other world-class principal investigators, representing the fields of medicinal chemistry, computational chemistry, cancer biology and stem cell biology, along with dozens of researchers and hundreds of undergraduate

and graduate students. The widespread enthusiasm it's generating is very much warranted, says Diana Kraskouskaya, Gunning's senior research associate. "We're going to have a centre right here in Mississauga that has a high potential of producing novel medicine and novel therapeutics for cancer," she says. "We're all pretty excited about it."

The centre represents the first significant contribution UTM has made toward cancer research, says Professor Ulrich Krull, the interim vice-president and principal of UTM. Not only is the research itself promising for cancer patients and their families, says Krull—himself a chemist—but the centre has major implications for the university and the community. "And it comes at the perfect time," he explains. "The City of Mississauga is promoting its role in building a life sciences sector in the business community. This centre could well play heavily in where the city can go. It will be a magnet for business, supporting the economic development agenda of the city." There's already huge interest: Gunning's initial tweet in September about the centre's launch garnered an immediate 38,000 views from around the world.

What makes the Gunning lab's approach to killing cancer cells so different from traditional methods? Everything. Historically, researchers have followed one of two paths. Either they screen natural compounds, such as those derived from rainforests,

hot springs or oceans, to see which ones, if any, might interact with a target such as a cancer cell. Or they screen vast numbers of chemical compounds, hoping to get lucky. Developing a new drug this way is a slow process that can take 15 years or more and cost more than a billion dollars.

Gunning's approach is to isolate a spot where cancer can be interrupted and deliberately design a compound from scratch to target it. Identifying lead compounds—those that hold promise to be turned into cancer-fighting drugs—takes significantly less time this way. In just the past five years, Gunning's lab has identified four lead compounds and moved them to advanced preclinical trials. "This is the farthest we've ever been with a molecule," says Gunning. Teams in the United States, Europe, Japan and China are also pursuing a molecular approach against the same targets, but Gunning says, "We think we've got the best molecule." His lab's studies show that the molecule didn't just put cancer in remission but cured it, with no negative side effects other than some weight loss. "The hope is if it passes advanced preclinical trials in larger animals, then we're just a year away from human trials."

Here's how the science works. Cells behave the way they do because of certain protein-to-protein interactions that produce genes, telling the cell what to do. One of these proteins is called STAT3 (short for



signal transducer and activator of transcription 3). In a normal cell, STAT3 is switched on for a short time, then switched off. But in a cancer cell, STAT3 is often hyperactivated, as though the switch is stuck in the ON position. This causes the cancer cell to grow, divide, expand, form tumours and invade.

Gunning wanted to design a molecule that would target STAT3 in order to rip open this protein-to-protein complex. To make molecules, his lab uses organic synthetic chemistry, which is the creation of new chemical structures from carbon-based organic products. "It's a little bit like a jigsaw puzzle," Gunning explains. "You need to find the pieces that fit optimally and perfectly within the protein's active sites." Not only does the new molecule need to have a high affinity to the target protein, it also has to bind both potently—so that a minimal amount would be effective—and selectively, so it avoids binding to other proteins and leaves normal healthy cells alone.

To design molecules, Gunning's lab takes its inspiration from nature. Researchers look at what types of molecules bind to a specific protein in the natural world, and they try to optimize those molecules so they bind better. They use computational modeling to help guide the design process. Even when they design a molecule that binds well, they might have to tweak it to make sure it lasts long enough in the body. Their early molecules metabolized within 15 minutes, which would mean a drug based on those molecules wouldn't have enough time to kill the cancer cells and would need to be injected every few minutes. On the other hand, too slow a metabolism would leave a drug circulating in the body too long, potentially causing side effects. So Gunning's lab conducted a medicinal chemistry program to fix the instability. The molecules now have the desired metabolism of eight to 10 hours.

LABORATORY PHOTO: ELIF REY PHOTOGRAPHY

T

The lab has now designed and licensed four different molecules that have successfully caused cancer cells to die and that, in preclinical trials, have killed malignant tumours and prevented recurrence. So the cancer wasn't just in remission; it was cured. It's hoped the results will translate to humans. "The way our drug is designed, it might prevent a lot of cancers from coming back," Gunning says. "Our goal is not to turn cancer into a chronic disease but to stop it coming back altogether." Human clinical trials might use his drug in combination with current chemotherapy medications, albeit using lower-than-normal doses of the latter to reduce toxicity.

Gunning and his team are focusing on blood cancers such as acute myeloid leukemia (the kind that Nicholas had) and multiple myeloma, as well as brain cancers, including glioblastoma (the disease affecting the Tragically Hip's Gord Downie) and refractory medulloblastoma. Gunning says there's a huge unmet need for better drugs for these rarer and under-researched "orphan diseases." Glioblastoma, for instance, affects only four to six in 100,000 Canadians.

"There are far fewer patients, so there tends not to be as much commercial interest in developing drugs for them," he says. "But that's where we see our research, focusing on these orphan diseases." A recent exciting result from his lab found that their molecule was as effective against medulloblastoma tumours as radiation plus three lethal chemotherapeutic agents, which is the current standard of care. "And the toxicity associated with our molecule was way less," he adds.

The process may be translatable to other types of cancer, such as breast and lung. And the application may go well beyond cancer. A lot of the molecules that the Gunning lab is developing may also be suitable for treating, of all things, psoriasis. Interestingly, the autoimmune skin disease also has abnormal STAT3. So do Crohn's disease, irritable bowel syndrome and even Alzheimer's disease. "Hyperactivated STAT3 leads to inflammation, and the pathways in cancer and inflammation are pretty similar," Gunning says.

The team is also looking at targeting other proteins because some cancer patients don't have abnormal STAT3. For instance, with multiple myeloma, 30 per cent of patients won't respond to a STAT3 drug at all. That's where personalized medicine comes into play, with the examination of each patient's genetic profile to determine the best therapies. Gunning says, "It will actually save the health care system a lot of money, because you're not treating a patient with a really expensive

drug that has no chance of working." It's cost-effective, he says, to target the right drug to the right patient.

Gunning didn't always want to be a chemist. He hoped to be a professional tennis player. "I wanted to be the first Scot at Wimbledon," he says, adding wryly, "but Andy Murray beat me to it." Gunning was born 37 years ago in Paisley, near Glasgow, Scotland. He moved at the age of four with his mother and two younger siblings to the picturesque Isle of Bute: population 7,000, the most famous resident being the late actor Lord Richard Attenborough. Tucked into the Firth of Clyde off the country's west coast, Bute is known for its beaches, palm trees, golf courses and idyllic natural beauty. "I loved it," says Gunning in his soft Scottish burr. "It was a fantastic place to grow up." He jokes that since the island's shape is similar to the shape of STAT3, his career direction may have been predestined.

Gunning's love of the outdoors grew into a love for science. His mother, an elementary schoolteacher, made the family watch *The Horizon* episodes every week, the BBC documentary series featuring the latest science breakthroughs. His aunt was a chemistry teacher, and young Patrick received a chemistry set as a boy. But while he loved science, he also loved art and became a painter, producing canvases depicting landscapes, ships and ballet dancers. After high school, he seriously considered pursuing architecture but decided he didn't want to spend seven years at university when he could get a science degree in four. He attended the University of Glasgow (whose imposing Gothic exterior often draws comparisons to Hogwarts from the *Harry Potter* movies) but he didn't leave after four years. His undergraduate degree led to a PhD, then a two-year post-doctorate position at Yale University. There, he saw for the first time that the molecules he'd made were killing cancer, an effect that had a truly transformational impact on him and changed the direction of his career from basic science to medicinal chemistry. So,

WHEN HE STARTED DESIGNING MOLECULES... IT WAS ARCHITECTURE AT THE ATOMIC LEVEL.

ironically, instead of leaving school after four years as planned, he's spent a total of 20 years at university, and counting.

Art, architecture and science have always been inextricably linked for Gunning. He sold four of his acrylic paintings to raise enough cash to move to Yale. When he started designing molecules, he called on his skills and understanding of 3D structures; it was still architecture, but at the atomic level. He recognizes that when prestigious scientific journals accept his lab's studies for publication, beautiful and compelling molecular designs nab the covers, garnering more interest and support for the research. Gracing the top shelves of his UTM office are several of those covers, framed and proudly displayed.

"Good science is founded on imagination and innovation, and that's tied very much to art," he says. "Some of the most beautiful ideas in science are really quite artistic. Creativity is huge in science." In what little spare time he has—he's a workaholic who clocks in at 7 a.m., works till 6 p.m. and puts in another couple of hours in the evening at home, fuelled by many cups of tea—he paints, and he plans to do more of what he

calls science paintings. "I want to paint lab scenes, like a student working in a fume hood," he says, referring to the ventilated enclosure in a chemistry lab that limits exposure to harmful vapours. "That image is kind of nice."

As for his students, they say they benefit significantly from his never-flagging excitement about the research. PhD candidate Stacey Paiva, who has been working in the Gunning lab for more than five years, says, "There's never been a case where I've told him a result, good or bad, and he's not excited about the next step. Even though I might be disappointed about some result, he's like, 'We can progress it this way!' or 'We can go in this direction!' You need that motivation, because in research you get more failures than successes."

Students also remark on Gunning's collaborative approach and the synergy it produces. "He's always been very good about allowing other people to shape ideas and make it a real community effort," says PhD student Daniel Ball, who has also worked in the lab for five years. "Oftentimes, the group can create something bigger than what an individual can do."

The energy around the burgeoning Centre for Medicinal Chemistry is almost palpable and the momentum is reaching beyond its walls. It integrates a network of leading cancer researchers and health care institutions, including professors Mark Minden of the Princess Margaret Cancer Centre and Peter Dirks from the Hospital for Sick Children. It encourages entrepreneurship and will include start-up companies, enabling faster translation of innovation into the marketplace. This means huge potential economic impact, because a compound that becomes an effective anti-cancer drug is worth billions of dollars and could save millions of lives. Major pharmaceutical companies and venture capitalists are already expressing considerable interest.

"We're confident the centre will be the first of several research-based initiatives in the coming years," says Bryan Stewart, vice-principal, research and a UTM professor of biology. "Our growth and our hiring of enthusiastic, creative scholars in all disciplines is creating an exciting energy on campus that all of our students will benefit from."

This may only be the beginning. **M**

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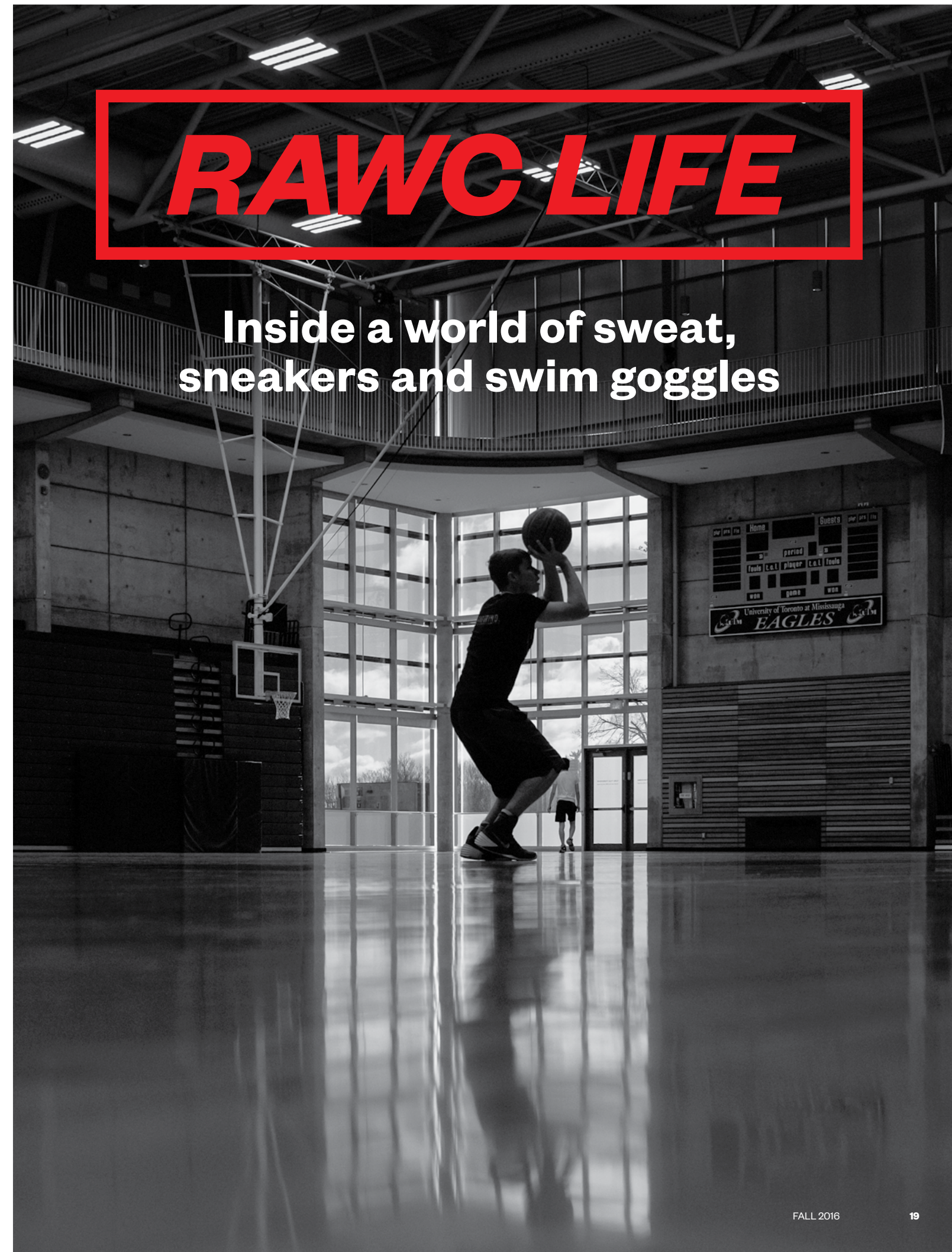
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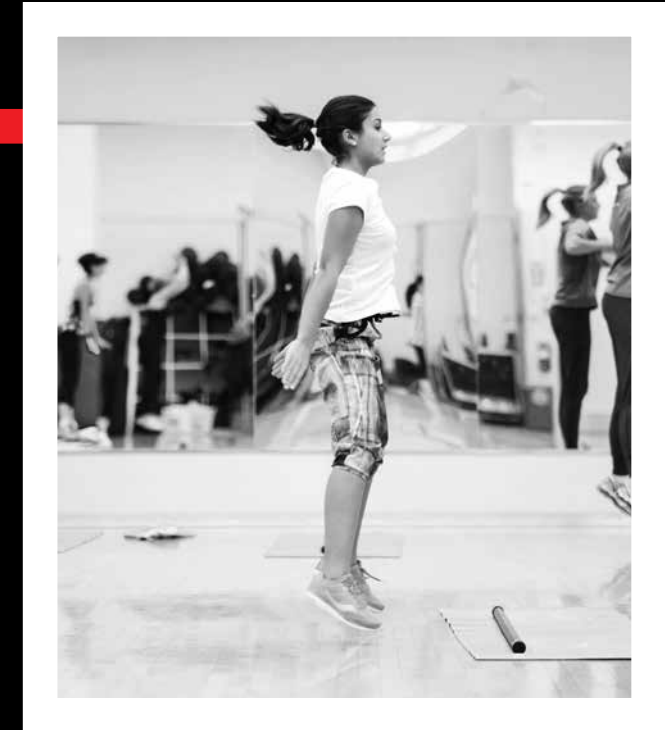
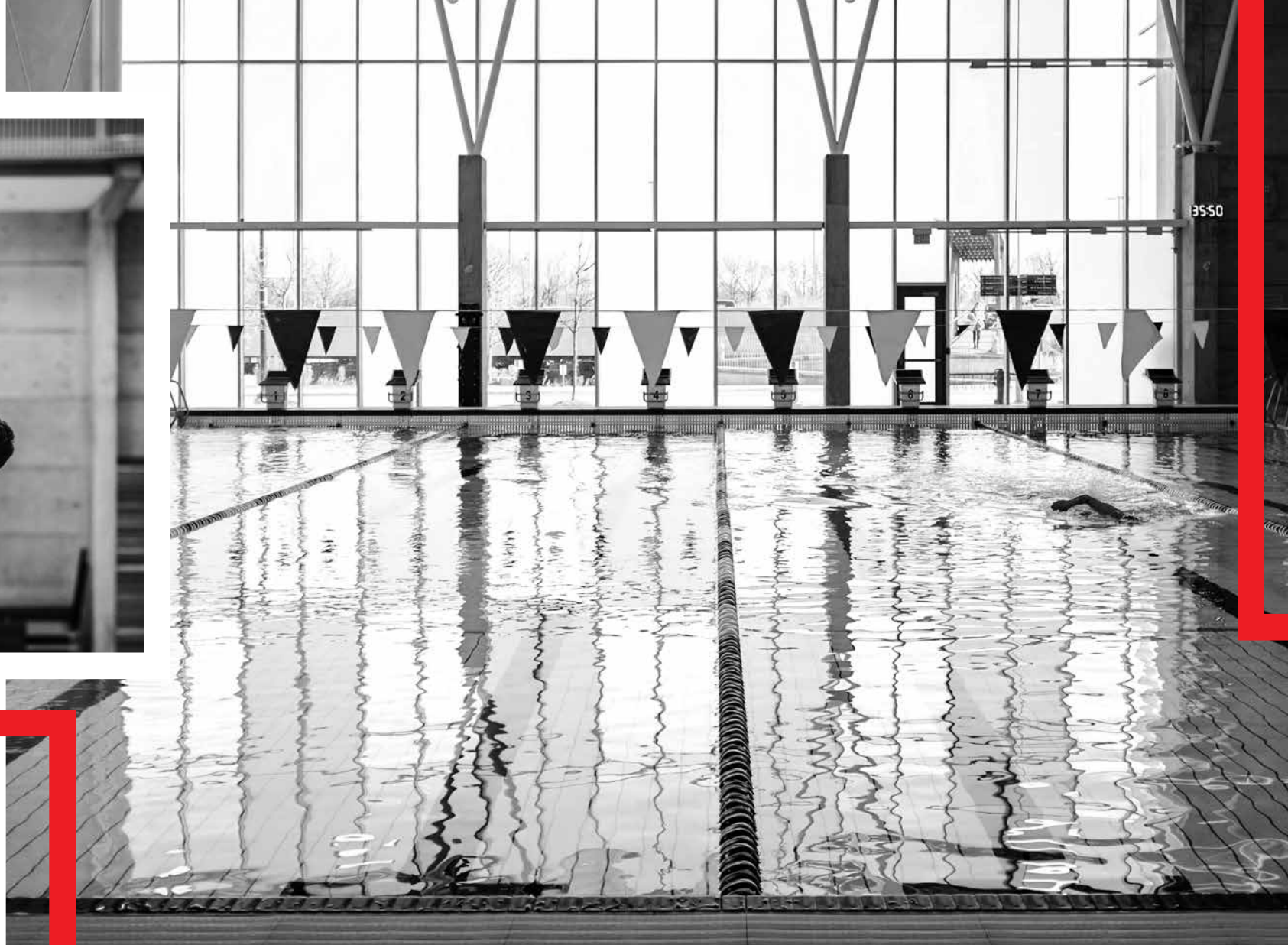
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RAWC LIFE

Inside a world of sweat,
sneakers and swim goggles





“The music is louder, but even it can’t cover the sounds of exertion.”

A day at the Recreation, Athletics & Wellness Centre starts at 6 a.m. The early arrivals head for the elevated, three-lane running track or for the workout equipment on the second floor. On every level, massive windows facing southeast bring the day’s first light into the airy facility, illuminating the eight-lane, 25-metre pool, the high-tech workout equipment and the warm wood of the main gym’s full-size basketball court.

As more students, staff, faculty and community members arrive, the RAWC comes to life. In the mirrored Dance Studio, pounding hip-hop accompanies a Tabata class, a high-intensity interval training program developed in Japan.

Down the hall in the High Performance Centre, members of the Varsity football team are lifting weights. The music is louder, but even it can’t cover the sounds of exertion, the clang of weights dropping and the shouts of the athletes as they cheer on their teammates’ efforts.

Overlooking the busy basketball court, the Fitness Centre fills for the Cycle-Yoga Fusion class, a lunchtime favourite. A combination of intense spinning followed by calming yoga, it takes place in a room overlooking the main gym, with glass walls that can be shaded to provide private, women’s-only fitness space.

The action continues with volleyball tournaments, Aqua-Fit Bootcamp and archery. At 9 p.m., swimmers make their last waves before the pool closes for the night. The final visitors ride stationary bikes, swing kettlebells and circle the track until the RAWC doors finally close at 11 p.m. After that, the building’s only visitors are security guards and cleaning staff until seven hours later, when the doors open and another day at the RAWC begins. **M**



RAPID RESPONSE

Alumnus brings relief supplies and hope following disasters

By **ELAINE SMITH**

Making his way through countryside flattened by a hurricane or flooded by heavy rains is just another day at the office for alumnus Matt Capobianco.

Capobianco is the deputy director of GlobalMedic, an international aid organization that provides relief supplies and equipment to areas in need worldwide, especially those whose populations are internally displaced after a disaster such as an earthquake or flood. GlobalMedic utilizes a Rapid Response Team comprising an emergency water unit, an emergency medical unit and a rescue unit.

In his nine years with GlobalMedic, Capobianco has been deployed to assist with disasters in other countries more than 50 times. "I'm pretty skilled at packing," Capobianco says. "I do it blindly now. Really, all I need is a couple of shirts and pairs of pants."

It was far from routine in 2007 when Capobianco took part in his first mission, a trip to northern Bangladesh to respond to flooding.

"There were six of us," said Capobianco. "I didn't really know what to expect. It was my first time setting up a field

hospital and distributing clean drinking water. I took everything in and learned as I went.

"It was about 40 to 45 degrees there, and at the end of the first day, I had sweated so much that water collected in my boots and I was swishing as I walked. The next day, I put newspapers in my boots to keep them dry."

He learned quickly that on missions, "you work until you drop, but it's a great feeling. When I set up a water purification system in a relief camp with 15,000 people, I could see immediately the impact of the work I was doing."

When he entered university, Capobianco didn't have a grand plan to do international aid work, but he always knew he wanted to do something to help people. He enrolled in the political science program at UTM and took some international relations courses that "stoked my passion."

"My education informed my decision and helped me to create and identify this path," says Capobianco, who graduated with an honours BA in political science in 2005.



“You have to be prepared to work hard and deal with tough situations. Most of the people you meet, you meet on the worst day of their lives.”

“Seeing the good side of humanity is something I value about this job, something that grounds me and gives me perspective on my own life.”

He recalls a mission to northern Iraq where he and others—both aid workers and locals—spent the day assembling 1,000 water purification units in 45° Celsius heat. At day’s end, everyone sat down on the floor to share whole cooked chickens that they ate with their hands.

“It was one of my favourite meals,” Capobianco says. “There was a real connectedness with the community. When you spend two weeks working side-by-side in a crisis situation, you form close bonds.”

First and foremost, however, is the work of making sure people get the aid they need.

It can be challenging dealing with red tape and bureaucracy, which is where partner agencies and translators come in handy. He and his volunteers meet whatever challenges they face head on and their determination to succeed keeps them moving.

“I remember clearing 11 million water purification tablets through customs in Pakistan to help with flooding that was affecting 20 million people,” he says. “We had a convoy of 10 tractor-trailer trucks that had to drive right through Islamabad [the capital city] to get to our destination. It was crazy and stressful, but it was an amazing success in the end.”

One of the recent additions to GlobalMedic’s international work is the installation of blast film, a protective layer that is applied to windows to prevent them from shattering during a blast and injuring the occupants of a room. “It’s a new and different program that helps save lives,” Capobianco says. “We’ve applied it to [windows in] kindergartens, maternity wards, schools and hospitals on the eastern front of the Ukraine.”

Another innovative approach uses drones, or unmanned aerial vehicles (UAVs). “We have created a team that uses UAVs to provide aerial information to help inform our aid allocations, as well as to map areas and cities.”

Capobianco believes that GlobalMedic, which was founded by a Toronto paramedic in memory of his best friend, reflects Canadian values. “As Canadians, we’re accepting, we bring people in and we learn from others,” he says. “Canadian values are a huge part of who I am and who we are as an agency.”

To succeed in this line of work, he says, people need to have patience, a sense of humour, an appreciation of reality, openness to all types of experiences and willingness to learn and innovate.

“Every deployment I go on, I learn something,” he says. “I never want to have the attitude that I think I know it all. I want to absorb information coming in from around me and I welcome the input.”

His advice to others interested in getting involved with international aid programs is to start by volunteering, as he did, whether with a local organization or by travelling to another country and volunteering with an agency there.

“If you’re looking to get paid well, this is not the industry for you,” Capobianco says. “You do this because you love it and want to make a difference in the world.”

“You have to be prepared to work hard and deal with tough situations, akin to those an emergency worker faces. Most of the people you meet, you meet on the worst day of their lives when they’ve lost family and friends. Your job is to say, ‘How can I help as many people as possible?’ You can’t get caught up in the emotion—you need to remove yourself and focus on the work at hand.”

Fifty missions abroad prove that Capobianco has mastered those lessons. ■

After graduation, he worked for Youth Assisting Youth, an organization that paired at-risk youth with youth mentors. One of his colleagues there was a volunteer with GlobalMedic, and Capobianco started volunteering there, too. After a time, GlobalMedic “started taking off as an agency” and hired its first staff members. Capobianco was one of them.

Today, he is one of only four paid staff members. The organization relies largely on highly skilled volunteers, because its mission is to give as much aid to communities in need as financially possible. It relies on grants and partnerships to handle administrative and logistical costs for items such as salaries and flights to disaster areas. When GlobalMedic arrives on scene, they

work in concert with partner agencies that have complementary skills and strengths, such as familiarity with the local area and a base in the locally affected communities.

“Last year,” he says proudly, “we were a \$6 million agency with four full-time employees and 15 deployments overseas.”

Capobianco believes that his solid understanding of international relations, combined with an ability to do “anything and everything” helped him gain employment in an organization that is the living definition of hands-on. “My father is an Italian immigrant, so we’d fix everything ourselves,” says the Etobicoke native, “but a lot of things, I learned on the job.”

Today, at GlobalMedic, Capobianco has responsibility for the day-to-day operation of

the charity, as well as for overseeing its relief work. His job description includes raising money, writing grant proposals, overseeing logistics and warehousing, deploying and managing teams and doing media and donor relations. “I’m involved in every facet of the organization’s activities,” he says.

He, along with his colleagues and volunteers, are always searching for ways to accomplish their tasks more efficiently and inexpensively so that the people they assist reap the most benefits from aid.

He cites the example of the water purification units that GlobalMedic first used, systems manufactured in Detroit. They found a Richmond Hill company to manufacture the units to the organization’s exact specifications, and the price dropped by 50 per cent.

PHOTO: JIMMY VIGNEUX, COURTESY GLOBALMEDIC



The Danger of Drones Autonomous weapons could be ticking time bombs

If we replace human soldiers with drones, we can reduce errors, be more effective and save lives.

It's a compelling argument for using digital technologies to fight wars, and it's one that's being embraced by more and more militaries worldwide. On the surface, the logic seems sound: war is a dangerous, deadly business, and when humans do it, our limited brain power and irrational feelings can get in the way. But robots, with their superior processing speed, memory and storage capacity, could allow us to defeat enemies more efficiently and with less death and destruction.

But Assistant Professor Jeremy Packer is warning that using more drones, robots and artificial intelligence in warfare may very well be a ticking time bomb. The Institute of Communications, Culture, Information and Technology researcher studies how the U.S. military is pursuing increasingly advanced automatic weaponry. He's concerned that the incredible ease that drones offer in eliminating targets will be so seductive, it will only lead to more bloodshed.

"I would not be too excited about any technologies that allow us to kill more efficiently. The flip side is since we have this capacity to kill more effectively, we might find more situations in which to kill," Packer says.

Packer is working on a book about the rise of automation in military operations, including the U.S. military's drone program. What he finds especially alarming is the trend toward a "human-ectomy"—his term for the removal of human decision-making in war in favour of semi- or fully autonomous weapons. As he explains, current robotic weapons have an off switch so they can be controlled—but this leaves them vulnerable to enemy hacks. A growing number of military strategists are supporting weapons that can act independently of their commanders, which are now being researched by several countries. He says such super-intelligent robots could exponentially increase the damage caused by war and terrorism. Packer's concerns have been echoed by more than 1,000 scientists and computing experts, who have signed an open letter warning of a military AI arms race and calling for a ban on autonomous weapons.

"When you give a robot a goal to achieve, anything that decreases the likelihood that they can achieve that goal is seen as a problem to be overcome. At what point do humans become a deterrent that need to be eliminated?" Packer says.

It's a subject Packer explored in detail in "Taking People Out, Drones, Media/ Weapons, and the Coming Humanectomy", a chapter he co-authored for the forthcoming book *Life in the Age of Drones*. He also engages UTM students on these issues through the course Drones, Robots, and Artificial Intelligence, which deals with the ramifications of robots infiltrating domains typically considered intrinsically human, such as writing literature and lovemaking. One group of students produced a YouTube video called *7 Days of Artificial Intelligence*, a dystopian sci-fi retelling of the story of creation with AI supplanting the role of God. The video has so far attracted almost 150,000 views.

"This could be an existential threat to our survival," Packer says, "so it's important to look at the practical concerns and the pathways on which this could lead us."

— Sharon Aschalek

PHOTO: © GENLOOKI / ISTOCKPHOTO

Underage Anger Researcher explores emotional, biological underpinnings of childhood aggression

Broken marriages, lost jobs, substance abuse, health problems, criminal records—they're often linked to adults who are violent. What is less known, however, is that the propensity for violence can be traced back to one's early years. It's a question U of T Mississauga researcher Tina Malti is investigating by looking at the dynamics of childhood aggression.

Malti is examining how certain emotional and physiological characteristics in children contribute to persistent, disruptive and aggressive behaviour. Called the Longitudinal Study on Emotions, Aggression, and Physiology, or LEAP, the study is looking at what kids feel during moral conflicts, and the links that arise between specific traits—such as empathy and anger—and physiological functions associated with emotional arousal, such as heart rate. Malti says a better understanding of the root causes of aggression makes it easier to help children manage their anger and promote their wellbeing.

"The emotional and biological responses to conflict serve an important function for understanding the origin of aggression," says Malti, director of the Laboratory for Social-Emotional Development and Intervention and an associate professor of psychology. "By identifying the key factors in aggression, we can better help children and families overcome mental health problems early and effectively."

The four-year study involves 300 children in two different age categories—4 to 5, and 8 to 9. Each age group is split into two further groups: one with children who demonstrated high levels of aggression, and a healthy control group for comparison.

PHOTO: BLAKE ELIGH

Once a year, the researchers show them illustrated vignettes featuring children in scenarios of social conflict and moral transgression, such as stealing a chocolate bar from another child, pushing another child out of line, or excluding another child from play. The children are asked to imagine how they would feel if they were the transgressor, and how the victim would feel.

The researchers are evaluating the children's responses to these vignettes of emotional harm by studying their facial expressions, and measuring their reported levels of guilt, empathy, sympathy, pride and anger. They are also using biological measurement systems to monitor their heart rates, respiration and skin conductance, which can indicate a person's emotional and sympathetic responses. They are also reviewing data provided by the parents on their children's aggression level.

The LEAP study is entering its second year, but earlier this year, two smaller studies were published that involved some data from the LEAP research. One involved comparing the children's self-reported levels of guilt against 10-day diary data of their behaviour completed by their caregivers. It found a connection between a high level of self-reported guilt in children and fewer instances of aggressive behaviour. The other looked at the children who reported they would feel more guilt as the transgressor in the vignettes. When describing how the victim would feel, they had elevated heart rates, which is associated with emotional sensitivity.

Malti says these initial findings provide useful insights on the characteristics of early anti-social behaviour. As her research



"The emotional and biological responses to conflict serve an important function for understanding the origin of aggression."

unfolds, she's optimistic that future results will help empower mental health professionals, teachers and families to deal with childhood aggression in more productive ways.

"Even if a child is low on empathy, there is hope," Malti says. "By understanding their emotional life more fully, we can help them become more behaviourally adaptive."

— Sharon Aschalek



Rio Wrap Great athletes winning awards at the Rio Olympics

U of T Mississauga was well-represented at the Rio Olympics this past summer—on the track, in the ring and on the court. Alicia Brown, who holds an honours bachelor of arts in Communication, Culture, Information and Technology, ran the second leg of the 4x400m relay. The team finished fourth for Canada's best result in the event since 1992. In the dressage competition—often described as the art of dancing on horseback—Belinda Trussell and her 16-year-old German-bred gelding, Anton, finished 27th individually. Trussell graduated from UTM in 1994 with a bachelor of commerce degree. And while she wasn't competing in Rio, UTM staff member Alison Dias made her mark as one of the elite tennis officials selected to work at the Games. Dias, a graphic artist in Information & Instructional Technology Services, served as a line umpire in multiple games, including the bronze medal match between Rafael Nadal and Kei Nishikori. Congratulations for making Canada—and UTM—proud!

Put your name here

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We would love to hear about what you've been up to since your graduation. Share your milestones, awards and other updates at m.magazine@utoronto.ca, and we may publish it in the next issue of *M!*

PHOTO: (LEFT) KENJI LE; (RIGHT, TOP AND BOTTOM) COURTESY, CANADIAN OLYMPIC TEAM

Richie Mehta India in a Day

Alumnus Richie Mehta, who received his honours BA in art history and cinema studies in 2001, released his latest feature film, *India in a Day*, at this year's Toronto International Film Festival.

Shot on October 10, 2015, *India in a Day* is a new form of non-fiction filmmaking that uses entirely crowdsourced photos and video to capture modern India in all its diversity, while revealing how the internet and digital communications are reshaping our world. The film is executive-produced by Ridley Scott, the British filmmaker known for films including *Blade Runner* and *Black Hawk Down*.

Born in Toronto, Mehta's previous full-length films *Amal* and *Siddharth* both screened at TIFF. In 2016, Mehta was the recipient of UTM's Desmond Parker Outstanding Young Alumni Award for his contributions to excellence in his profession and community service.



PHOTO: (TOP) MATTHEW PLEXMAN; (BOTTOM) COURTESY INA FOALEA



Ina Foalea Valedictorian moved from student leadership to global health work

Since graduating from UTM with a bachelor's degree in commerce in 2012, Ina Foalea has dedicated her career to health care, taking her all the way to Uganda for a year as an early infant diagnosis coordinator with the Clinton Health Access Initiative. Foalea, who won a 2012 Gordon Cressy Student Leadership Award and was her year's valedictorian, is currently completing her MBA at Harvard Business School.

Class Notes



Alumni Events

Discover the benefits of being a UTM alumnus! Enjoy events, experiences and keynotes delivered by UTM faculty, alumni and other leading and engaging speakers from the community, business, media, and the arts and sciences. See www.utm.utoronto.ca/alumni/events.

<p>Backpack to Briefcase: Dining Etiquette Learn the art of fine dining at Mondello Ristorante as you sample Italian cuisine and make new friends. Tickets are \$35.</p>	<p>JANUARY 30</p>
<p>Alumni Ski Day Bundle up and hit the slopes for an exhilarating Alumni Ski Day! Tickets are \$60 for adults and \$50 for youth and include a full-day lift pass and winter warm-up lunch social.</p>	<p>FEBRUARY 4</p>
<p>One Million Trees Celebrate the return of spring with other UTM alumni and friends as we plant trees at Erindale Park. Ideal for all ages.</p>	<p>MAY 13</p>
<p>Spring Reunion Save the date for U of T's annual alumni weekend!</p>	<p>MAY 31 TO JUNE 4</p>



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Some of our favourite pictures of UTM have been taken by students, alumni, faculty and staff. We would love to see the campus through your eyes—send your photos of U of T Mississauga over the last 50 years to m.magazine@utoronto.ca, and we may use it in the magazine or on social media!

ILLUSTRATIONS: KATE BURNS. PHOTOS: (TOP) COURTESY OF MELYNDA WHITE, CLASS OF 1978; (BOTTOM) STEVE JAUNZEMIS

LI DIDN'T KNOW HE HAD A PASSION FOR LAW.

UNTIL HE STUDIED IN GENEVA.

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BOUNDLESS

Three years before Erindale College opened in 1967, U of T acquired the Artist's Cottage, originally designated as the Schreiber-Watkins Cottage, when it purchased the land around Lislehurst (the Principal's residence). The name "Artist's Cottage" comes from the artist-in-residence program—David Blackwood, the first UTM artist-in-residence (for whom the Blackwood Gallery is named) was the first Erindale College employee to occupy the cottage, from 1969 to 1974. The cottage was, until recently, lived in by Henry Halls, a professor of geology in the Department of Chemical & Physical Sciences. Now, the small building has become a unique teaching space—a "crime scene house" run by UTM's Forensic Science program. Elementary, secondary and UTM students comb through the house and its yard for clues to staged crimes: dusting for fingerprints, hunting for murder weapons and searching for possible burial sites. For a tiny building, the Artist's Cottage is rich in UTM history.



1964



PHOTO: UTM ARCHIVES

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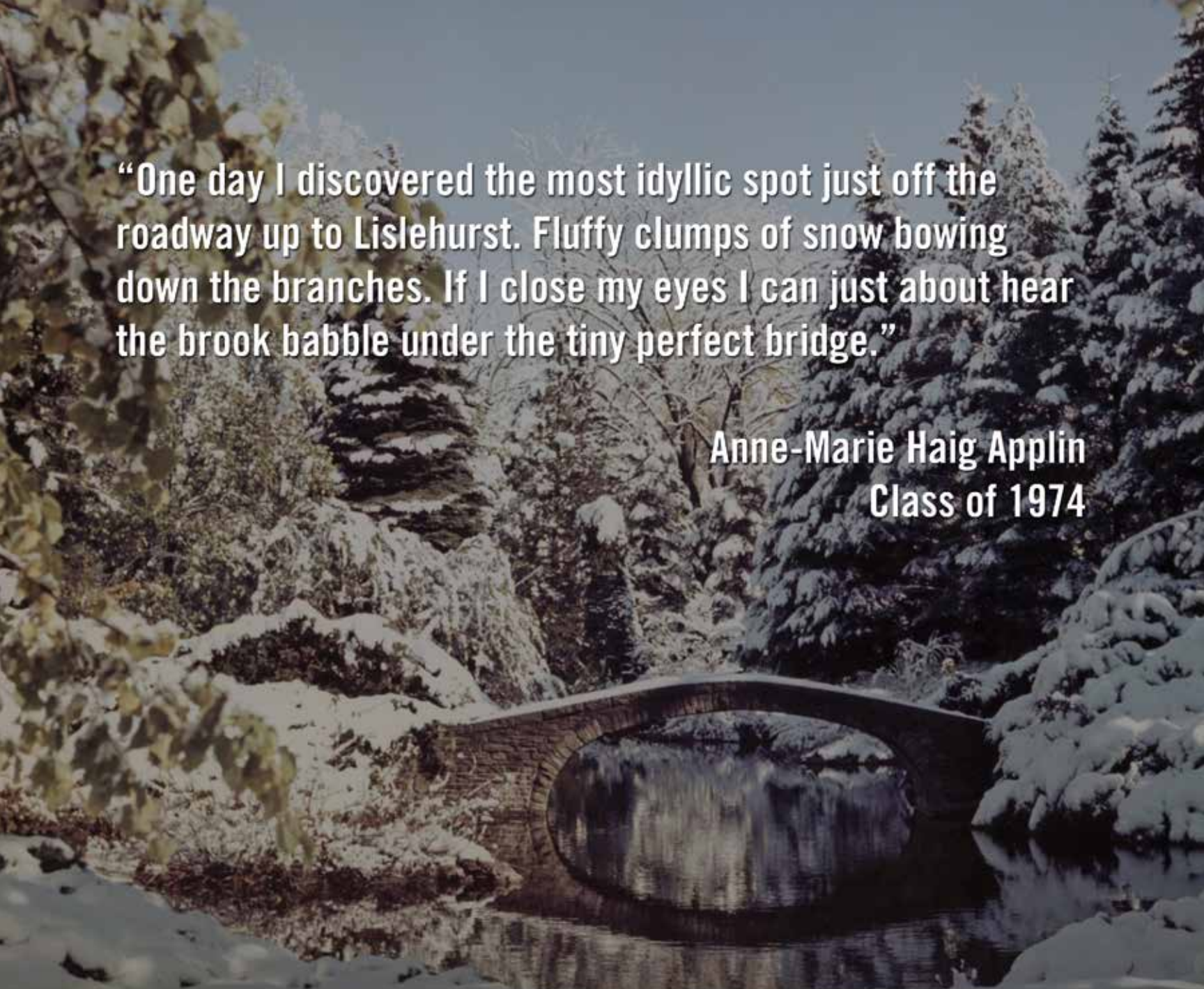
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Patricia Elena Quintero Salgado

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A photograph of a stone arch bridge over a stream in a snowy forest. The bridge is made of dark stone and has a single large arch. The water in the stream is dark and reflects the bridge. The surrounding trees and rocks are covered in snow. The sky is a pale, overcast blue.

“One day I discovered the most idyllic spot just off the roadway up to Lislehurst. Fluffy clumps of snow bowing down the branches. If I close my eyes I can just about hear the brook babble under the tiny perfect bridge.”

Anne-Marie Haig Applin
Class of 1974

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