



the crest

THE RESEARCH, TEACHING AND HEALTH CARE MAGAZINE OF THE ONTARIO VETERINARY COLLEGE

the LANDSCAPE of ONE HEALTH RESEARCH

New One Health Institute at U of Guelph
Bioinformatics in OVC Research
A Look at Backyard Chickens

contents



the LANDSCAPE of ONE HEALTH RESEARCH

10

From innovative discovery to outreach and education to lending expertise to policy development, Ontario Veterinary College (OVC) researchers are tackling One Health problems impacting animals, humans and the environment around the globe, page 10.



12

Potential movement patterns for pathogens. OVC researchers take a look at how birds play a role, page 12.



How Big DATA is opening new avenues of discovery in veterinary science to advance animal health, page 16.

3 From the Dean

3 OVC appoints new Associate Dean, Research

Prof. Shayan Sharif joins OVC's senior leadership team

4 Of Note News from OVC

6 The Intersection of Human, Animal and Environmental Health Hands-on training to solve life's 'messy' problems

8 One Health in History Veterinary medicine, One Health and discovery in Canada

9 Improve Life New One Health Institute at U of Guelph

10 The Landscape of One Health Research

A look inside new research at OVC

12 Canada Goose How pathogens can travel through the migration of birds

14 In conversation with ... Catherine Filejski

16 Bioinformatics Data driven health solutions

18 Backyard Chickens Research, education and outreach to help keep urban poultry owners and their birds healthy

20 Awesome Careers Scott Stevenson, OVC DVM 2013

21 OVC by the Numbers

22 Convocation Summer 2019

23 OVC Class Notes

back cover Veterinary History in Canada

back cover Coming Events

about the crest

The Crest is the research, teaching and health care magazine of the University of Guelph's Ontario Veterinary College.

crest magazine

The Crest is published two times per year by OVC for alumni, friends and partners of the college to share our collective strengths in evidence-based discovery, veterinary expertise and educating the next generation of leaders in animal, human and environmental health.

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From the Dean

The health of humans, animals and the environment are intrinsically linked, with the health of each dependent upon the health of the others. This fundamental concept

of One Health has been a part of research, teaching and outreach at the Ontario Veterinary College since our early days.

It is woven into our historical strengths in infectious disease research and public health, led by our Centre for Public Health and Zoonoses. It underlies our innovative discovery around surveillance and stewardship regarding antimicrobial resistance, our cutting-edge exploration of comparative and translational medicine and our investigation of the human-animal bond.

Our work is strengthened through partnerships and collaborations with government and industry, at the local, provincial, federal and international level. At OVC, we are fortunate to be in close geographical proximity to public health, agri-food and business partners and proud of our close working relationships with these groups.

To solve the complex health problems facing our world today, collaboration is critical.

At the University of Guelph, we are solidifying our interdisciplinary approach to solve multifaceted health problems where animals, humans and the environment intersect, with the recently announced One Health Institute (OHI). The new OHI also will be a key part of the University's wider One Health agenda.

I am excited by the opportunities this new initiative will provide for researchers working together across disciplines, for students training to be leaders in this area and to our partners as we continue to tackle complex issues of the 21st century.

Stay tuned to see what the future holds for this exciting endeavour!

Jeffrey Wichtel, BVSc, PhD, Dip. ACT
Professor and Dean, Ontario Veterinary College

OVC RANKS FIRST IN CANADA, TOP SEVEN WORLDWIDE



Photo credit: Jane Dawkins

For the fifth straight year, the Ontario Veterinary College is celebrating a top ten ranking among veterinary schools in the world through the Quacquarelli Symonds (QS) university rankings. The QS World University Rankings by Subject 2019 ranked OVC first in Canada, third in North America and seventh worldwide. Since QS first included veterinary science in their rankings in 2015 OVC has consistently placed in the top 10. The QS ranking methodology focuses on key areas of academic reputation, research impact and the desirability of graduates by employers. The most comprehensive global overview by discipline of higher education, QS looked at some 1,000 universities from 151 countries.

Photo credit: Karen Mantel



OVC APPOINTS ASSOCIATE DEAN, RESEARCH AND GRADUATE STUDIES

Ontario Veterinary College's (OVC) Shayan Sharif has been appointed incoming Associate Dean, Research and Graduate Studies. He begins a five-year term on September 1, 2019.

Sharif has been a professor in the Department of Pathobiology since 2001 and is the current chair. He holds a DVM from the University of Tehran and a PhD in Immunology and Immunogenetics from the University of Guelph.

Sharif's research interests focus on how the chicken immune system interacts with and responds to microbes, including immunity and vaccine development against Marek's disease virus and avian influenza virus. His lab also explores poultry gut health and development of novel probiotics for control of enteric pathogens in poultry.

As a key member of OVC's leadership team, Sharif will work closely with the dean, associate deans and department chairs to advance OVC research and graduate training priorities.

Prof. Gordon Kirby, Associate Dean, Research and Innovation, completed his term at the end of June 2019.

"I'm extremely grateful to Gord for his contributions in this vital role at OVC. Graduate programs and student numbers have grown tremendously under his leadership," says OVC dean Jeff Wichtel. "OVC research excellence is recognized and celebrated nationally and internationally. I look forward to working with Shayan to further enhance the college's research initiatives and successes."



Photo provided by University of Guelph

FEDERAL GOVERNMENT INVESTS \$1.5 MILLION IN GENOMICS PROJECTS

OVC professor Bonnie Mallard, in the Department of Pathobiology, heads up one of three U of G genomics projects which recently received federal funding worth \$1.5 million. Mallard was awarded \$426,622 to adapt high immune response technology developed for dairy cattle to help improve beef cattle health and welfare. The technology earned Mallard a 2017 Governor General's Award for Innovation. Dairy breeders use her patented test to identify animals with better natural disease immunity. Healthy livestock require less antibiotic treatment, combatting increasing antibacterial resistance and benefitting consumers. She will work with the Semex Alliance, the Canadian Angus Association and the American Angus Association to adapt the test to combat bovine respiratory disease (BRD) in beef cattle. North American producers lose about \$1 billion a year to BRD, the most common and costly disease of beef cattle raised on feedlots. *Story originally published on www.uoguelph.ca.*

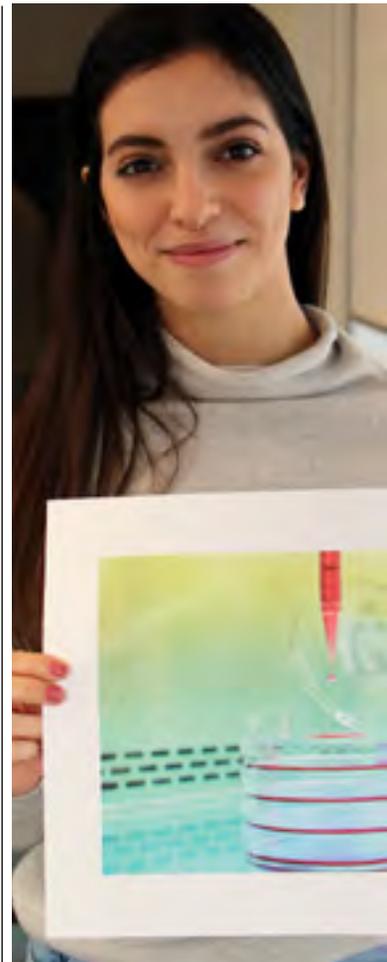


Photo credit: Dean Palmer

PET NUTRITION EXPERT RECEIVES U OF G RESEARCH EXCELLENCE AWARD

Prof. Adronie Verbrugghe, has received a Research Excellence Award from the University of Guelph to continue her studies of canine and feline nutrition. Created by U of G's Office of Research and the Office of the Provost, Research Excellence Awards highlight research achievements of recently tenured faculty members. As the Royal Canin Veterinary Diet Endowed Chair in Canine and Feline Clinical Nutrition, Verbrugghe explores how pet nutrition affects metabolic pathways, inflammation and immunity, as well as the microbial environment in the gut – all of which are factors in obesity. She's also looking at nutritional supplements for canine cancer patients and plant-based diets for pets. One of the few board-certified veterinary nutritionists in Canada, Verbrugghe provides a clinical nutrition service in the Companion Animal Hospital at the OVC Health Sciences Centre. She helped lead the development and introduction of a companion animal nutrition curriculum that enables DVM grads to help pet owners better feed their pets. Verbrugghe is currently leading plans for an inaugural Global Nutrition Summit called "What Does the Future Hold for Feeding Animals?" to take place at U of G in August 2020.



Photo credit: Karen Mantel

EXTERNSHIP BLOG PROJECT: FROM THE CLASSROOM TO THE CLINIC

Diagnostics, clinical skills, problem solving and working with clients are all critical pieces in a student veterinarian's education. Hands-on opportunities are invaluable. OVC student veterinarians heading into their final year of study move from lectures and labs into a year of intensive clinical and diagnostic training, beginning with an eight-week externship in a rural veterinary practice. It is a defining experience as they move from the classroom to the clinic. Supported by the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), students must complete the eight-week externship course between third and fourth year in a rural veterinary practice that works with food animals and/or horses, as well as companion animals. This summer five of our DVM students will share their experiences through the OVC Externship Blog Project. The students are among the 119 DVM students from OVC getting real-world practical experience through the externship course. *Follow their journey this summer at ovc.uoguelph.ca/externship.*



Photo credit: Karen Mantel

TIMING IS EVERYTHING

In science and in photography timing can be critical. Since beginning her Master of Science degree at the Ontario Veterinary College in fall 2018, Amira Rghei has often worked with cell culture. Her winning photo with the U of G Research in Focus contest, shows nutrient-rich pink media being dropped into petri dishes to help feed the cells that will eventually be added to each plate. She loves that the pink media adds a little colour to her "invisible science." The cell culture is used to produce an adeno-associated virus (AAV) containing genes encoding for antibodies against particular diseases. The work in Prof. Sarah Wootton's pathobiology lab (Amira's graduate advisor) investigates a novel AAV viral vector to express antibodies against diseases such as influenza, respiratory syncytial virus, which can cause bronchitis and pneumonia in young children and Ebola.

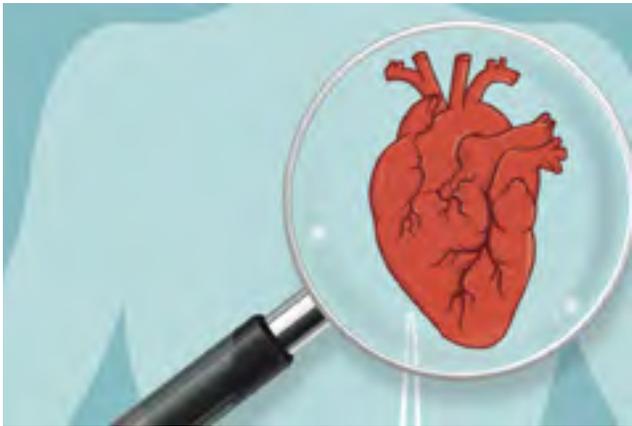


Photo credit: istock.com/mustafahacalaki

CARDIAC RESEARCH IN THE NEWS

Cardiovascular studies from the University of Guelph and the Ontario Veterinary College have been in the news recently. A study with Glen Pyle, a professor of molecular cardiology at OVC, using a unique mouse model is the first to reveal that subtle changes happen to the female heart during perimenopause, the stage before menopause sets in. His findings suggest the window for using hormone replacement therapy may be much earlier than previously believed. This research was supported by the Natural Sciences and Engineering Research Council. In another study, U of G researchers looked at why heart failure patients often suffer depression and impaired thinking, pointing to ways to prevent this through the emerging field of circadian medicine. The study is the first to reveal how cognition and mood in mice are regulated by the body clock and how pertinent brain regions are impaired in heart failure, says Biomedical Sciences professor Tami Martino, who heads up the Centre for Cardiovascular Investigations at the U of G.

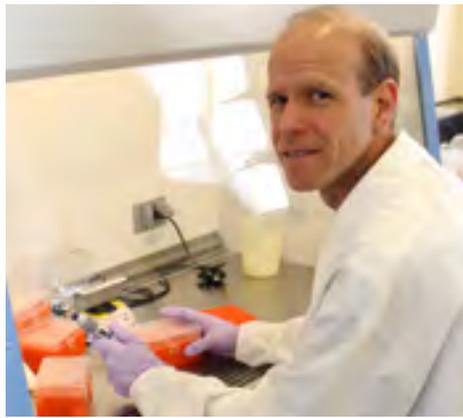


Photo credit: Karen Mantel

NEW DIRECTOR TAKES REINS OF CENTRE FOR PUBLIC HEALTH AND ZOOSES

A focus on public health at the animal-human-interface has defined the University of Guelph's Centre for Public Health and Zoonoses (CPHAZ) since its inception in 2006. Under the leadership of founding director, Prof. Jan Sargeant, who concluded her tenure as director in March 2019, CPHAZ has grown from the concept stage to the collaborative centre it is today. OVC professor Scott Weese, an infectious disease expert and Canada Research Chair in Zoonotic Disease, began a five-year term as director on April 1. Weese is a leading researcher on emerging and established zoonotic pathogens. By simultaneously studying people, animals and food, Weese is learning about the frequency of and factors associated with infectious disease transmission from animals to humans.



Photo credit: Karen Mantel

STUDENTS BRUSH UP ON DENTISTRY SKILLS WITH NEW LIFE-LIKE LEARNING MODELS

Ontario Veterinary College Doctor of Veterinary Medicine students are gaining hands-on experience with dentistry skills. A new curricular element focuses on prevention and treatment in dentistry including examination, cleaning and tooth extraction skills and is enhanced by high-fidelity models purchased with support from VetStrategy.



Photo credit: istock.com/coldsnowstorm

CFI FUNDS NEW RESEARCH INTO SUBSTANCE USE AND SERIOUS MENTAL HEALTH ISSUES

The Canada Foundation for Innovation (CFI) will invest nearly \$430,000 in four University of Guelph research projects, ranging from addiction and mental health, to disease resistance to cancer therapies. Jibrán Khokhar, a professor in OVC's Department of Biomedical Sciences, will use his funds to establish a neuroscience laboratory to study addiction and mental illness. Khokhar plans to explore the long-term and psychiatric disease-related consequences of adolescent drug use, including cannabis. He aims to inform the development of targeted medications and influence drug policies involving access or age restrictions. *Story originally published on www.uoguelph.ca.*

In photo: Veterinary students practicing tick-dragging techniques during the fourth year Ecosystem Health rotation.



THE INTERSECTION OF HUMAN, ANIMAL AND ENVIROMENTAL HEALTH

Hands-on training to solve life's 'messy' problems

Complex problems require collaborative solutions. An innovative elective course for final year Canadian student veterinarians is providing hands-on training in solving challenges at the One Health intersection of animals, humans and the environment.

“The Ecosystem Health rotation exposes students to complex real-world problems, the process they need to manage these issues and work they need to do to develop solutions to solve them,” says Prof. Claire Jardine, course co-ordinator and professor in the Department of Pathobiology at the University of Guelph’s Ontario Veterinary College.

For fourth year Doctor of Veterinary Medicine (DVM) student Alaina MacDonald, the rotation heightened her understanding of the role veterinarians play in solving multifaceted health issues on a global scale. “Examining multiple aspects of cases from the perspectives of public, animal and environmental health was great practice and a strong reminder of the challenges and rewards that come with being a veterinarian in today’s society,” she notes.

During the 2018 rotation, students worked with faculty from all five veterinary schools, including Profs. Katie Clow, Jennifer McWhirter, Cate Dewey and Claire Jardine from OVC, to tackle three issues: Lyme disease, a *Campylobacter* outbreak investigation and an over-abundant deer population at a national park.

“We approached the Lyme disease discussion from an animal health perspective, touching on issues encountered in veterinary practice, how we talk to our clients about it, how we educate and present a balanced, informative message, but we also looked at how Lyme disease is maintained in nature and where we’re going to find it,” adds Jardine.

Students learned about tick ecology—distribution, habitat, and potential hosts—in Southern Ontario. They analyzed tick surveillance data to determine the current level of risk in the Guelph area, practiced tick-dragging techniques and evaluated the pros and cons of different tick surveillance strategies. Ultimately the students brought all their findings together to develop a tick awareness communications plan to keep health professionals and the public informed and safe, presenting it to Wellington-Dufferin-Guelph Public Health (WDGPH) representatives for feedback and potential use in public education programs.

Sometimes solving complex health issues requires medical professionals to play

the role of the sleuth. Through the rotation students were introduced to scenarios that tapped their epidemiology skills, investigating a ‘fictional’ outbreak of gastrointestinal illness in the local population caused by a resistant strain of the bacteria *Campylobacter*. In this case, the only epidemiological or scientific link to instances of diarrhea in the human population was spending time at a local lake.

Lise Trotz-Williams, veterinarian and epidemiologist at WDGPH, described to the students an actual public health unit investigation, outlining the conclusions reached and how they attained them. “The students had the opportunity to put what they were learning during the course into the context of real-life outbreak investigations,” she notes.

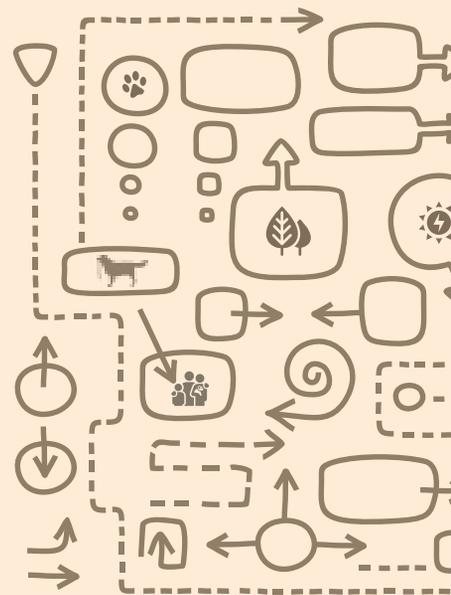
Through hands-on, case-based learning, students were asked to identify all potential sources of *Campylobacter*, including waterfowl and other wildlife, pets, potential run-off from farms and local urban areas, including human waste. They also had to consider how they would gather samples.

They visited the lake and an adjacent farm and analyzed simulated data to identify potential causes of the human outbreak. Ultimately, they developed and presented a written report for the local public health unit, describing potential sources of contamination and opportunities to prevent these events in future.

The exercise highlighted that “these sorts of problems are messy and complicated and there is often no one clear solution,” Jardine states.

In some ways, the most difficult scenario for the group involved deer overpopulation at Point Pelee National Park in Southern Ontario. Students had to consider how the high deer count impacted the park ecosystem, such as environmental risks including over-browsed plants and health risks involving an abundant tick population. They also had to factor in communicating with the park’s multiple stakeholders as they discussed strategies to manage and reduce the deer population.

The students took on different roles during a town hall session—the species-at-risk coordinator, farmers, hunters, animal rights activists, First Nations groups, park visitors and park staff—to try to understand the problem from many perspectives. By deepening their exposure to the complexity of One Health issues, students learned what needs to be considered, how to negotiate, stay open to other expertise and ultimately how to establish joint priorities and build consensus. 🐾



The Ecosystem Health Rotation

The Ecosystem Health rotation is hosted at a different Canadian veterinary school each year. It was originated in the late 1990s by Ontario Veterinary College (OVC) professors Bruce Hunter and University professor emeritus David Waltner-Toews, in conjunction with veterinary faculty across Canada.

The 2018 rotation, hosted at OVC, benefitted from the diverse expertise of faculty from each of the veterinary colleges across Canada as well as local public health unit staff.

Members of OVC 1970 raised more than \$200,000 through the OVC 1970 Robert Brandt Fund to support the rotation at OVC, as well as supporting a student from a university outside of Canada to attend. The 2018 rotation included two students from Mahidol University in Thailand.

“Our class came from all over the world, including the Caribbean, Japan, Malaysia, Nigeria and the United States,” notes Clayton MacKay, OVC 1970. “It was a life-changing opportunity for me to spend four years with these classmates.”

In photo: Toronto's Agricultural Hall located at Queen and Yonge Street in Toronto, ON. It is here that Andrew Smith (founder of the Ontario Veterinary College) delivered his first lectures in veterinary medicine, ca. 1860s. (C.A.V. Barker Collection, Archival Collections, University of Guelph Library.)



While “translational medicine” and “One Health” may sometimes sound like recent developments in veterinary science, in reality they have deep historical roots. Ontario Veterinary College graduates and the college itself have a long history of involvement in zoonoses research and intervention, as well as the more broadly defined area of translational medicine.

1902

The Health of Animals Branch (now the Canadian Food Inspection Agency) is created and OVC 1879 graduate John G. Rutherford succeeds Duncan McEachran as Canada's Chief Livestock Inspector. In 1904, Rutherford reorganizes the branch and is named Veterinary Director General. Rutherford would implement national initiatives to contain several diseases such as hog cholera, a highly contagious swine fever, and dourine, a venereal disease in horses. Arguably his greatest initiative was implementing programs to eradicate bovine tuberculosis in Canada, a serious public health threat to both people and animals. Hundreds of OVC graduates would serve as inspectors, isolating and testing animals for diseases and containing their spread.

1907

The first federal meat inspection legislation is passed by the Canadian government under Rutherford's leadership. Shortly after, OVC incorporated meat inspection into its curriculum. Since then, the OVC has prepared generations of graduates to participate in this essential service, ensuring the quality and safety of Canada's meat supply, as well as the humane and appropriate treatment of food animals. To this day veterinarians play an important role in food safety and security, both for the food we eat as well as protecting our economic status and ability to trade in international markets.

1920s

Charles McGilvray, OVC 1900, Principal of the OVC from 1918 to 1945, established a veterinary investigation extension service soon after the college relocated from Toronto to Guelph. The service provided laboratory and diagnostic services to veterinarians and livestock owners. In addition, the college became involved in laboratory services and testing for *Salmonella pullorum* in poultry and *Brucella abortus*, the bacteria responsible for brucellosis in cattle and undulant fever in people.

1922

OVC pathologist Frank Schofield, OVC 1910, publishes research linking hemorrhagic disease in cattle to the consumption of mouldy sweet clover. This research would contribute to the development of the anti-coagulant Warfarin, used in human medicine to prevent conditions that are caused by abnormal clotting.

1946

OVC principal Andrew MacNabb (OVC 1923) oversees the establishment of the first regional veterinary laboratory in Kemptville, Ontario. MacNabb, who had been head of the Ontario Public Health Laboratories prior to his appointment at the college, carried on his predecessor McGilvray's goals of integrating public health into the OVC's curriculum. By establishing labs that matched the protocols used in human health, MacNabb ensured that laboratories were collecting data in the same way, thereby laying an important foundation for future comparative health researchers.

ONE HEALTH IN HISTORY

VETERINARY MEDICINE, ONE HEALTH AND DISCOVERY IN CANADA



IMPROVE LIFE.

NEW ONE HEALTH INSTITUTE AT U OF GUELPH

Collaboration is a natural fit at the University of Guelph with researchers across campus tackling large, complex health problems facing our world today.

A new One Health Institute at the University, approved by the U of G Senate in June, is primed to take these efforts to the next level, bringing researchers across disciplines together to solve multifaceted health problems at the animal, human and environment intersect.

The multidisciplinary approach has been a game changer in research.

“It enriches you as a researcher when you start working outside of your discipline,” says Prof. Cate Dewey, U of G associate vice-president (academic) and interim director of the One Health Institute. “It makes you think more broadly about the research question you are addressing and how we might change people’s attitudes and behaviour and also policy to reduce the transmission of diseases to people and animals.”

The initiative will include new undergraduate and graduate curricular opportunities, partnerships with medical schools and a community of practice to encourage faculty, staff and students to come together to talk about One Health teaching, research and service.

Charlotte Yates, provost and vice-president (academic), said, “The One Health Institute will provide a platform to spur collaboration among many of our most successful researchers and will create synergies among existing centres and initiatives, including the Centre for Public Health and Zoonoses, the Guelph Institute for Development Studies and the Ontario Agri-Food Innovation Alliance.”

A working group under Dewey’s leadership is focusing initial efforts on

curricular components, including undergraduate and graduate options.

Profs. Jane Parmley and Katie Clow, recently hired under the One Health umbrella in the Ontario Veterinary College’s Department of Population Medicine, are developing graduate options, including collaborative PhD and Master degrees in One Health, and concurrent Doctor of Veterinary Medicine-Master of Public Health and BSc / MSc in One Health degrees.

“These are accelerated models for exceptionally talented people,” notes Dewey. “These students will be learning how to work across disciplines to solve complex health problems. Ultimately we want to train students to understand how policy is developed and how to make policy happen to address complex problems.”

A key component of the U of G One Health initiative will be mutually beneficial collaborations with medical schools.

U of G is building relationships with both McMaster University in Hamilton, Ontario, and Western University in London, Ontario, looking at research and curricular opportunities. Both universities have renowned medical school programs and growing One Health strengths.

“The time is right for strengthening collaborations between human and veterinary medicine, but also, with a variety of other disciplines and stakeholders to address complex health challenges locally, nationally and globally. Using a One Health approach not only can positively contribute to the improvement of the health of humans, other animals, plants, and the environment, it can also provide opportunities for innovative educational approaches to build future generations with a better understanding of the delicate

interconnection between the health of different species in the planet we share,” says Prof. Francisco Olea-Popelka, Beryl Ivey Endowed Chair in One Health, Department of Pathology and Laboratory Medicine, Schulich School of Medicine and Dentistry, Western University.

Dewey acknowledges the One Health concept may initially push researchers out of their comfort level as they strive to understand another discipline and how to incorporate new approaches into their own projects.

“Systems thinking is the understanding that when we change human, animal or environmental health there is the potential to impact all three areas,” she explains. “For example, climate change impacts habitat which ultimately increases the likelihood of vector-borne diseases. If we don’t consider all the levels where we want to make change it is like putting a band aid on a problem. A multidisciplinary approach brings together expertise in multiple areas.”

A vital component will be building connections through a community of practice to encourage faculty and students to come together to share what they are doing in research and teaching.

Research strengths on campus also will be expanded with a Canada Research Chair in One Health at OVC and another at the College of Social and Applied Human Sciences.

Adds Dewey: “This initiative will bring together teams of researchers to tackle these complex health questions at this confluence of animal, human and environment in a way that one discipline couldn’t do.”

From innovative discovery to outreach and education to lending expertise to policy development, Ontario Veterinary College (OVC) researchers are tackling One Health problems impacting animals, humans and the environment around the globe. They bring expertise to the wicked problems of the 21st century: to antimicrobial resistance, when bacteria, viruses and pathogens become resistant to the medicines used to treat them; to ensuring a safe, secure food supply; to diseases that can be transmitted between animals and people, led by expertise in the Centre for Public Health and Zoonoses. They explore the similarities between disease in animals and people, expanding our understanding and treatment of these illnesses through comparative and translational medicine; enhance the practice of public health; and protect and celebrate the critical human-animal bond that brings us all together. Here are samples of our impact.

the LANDSCAPE of ONE HEALTH

ANTIMICROBIAL RESISTANCE (AMR)

Patrick Boerlin is leading an international genetic study to learn how bacteria resistant to critically important antibiotics called cephalosporins and their resistance genes spread in animals and humans and when best to intervene to limit this movement. **Claire Jardine** is working with government and public health agencies to understand how wildlife may transmit AMR in the rural and urban environment. **Amy Greer** is collaborating with Canadian, Swedish and Israeli researchers to develop an antibiotic stewardship tool for medical doctors and veterinarians to explore if this impacts how they approach prescribing. **Scott Weese** brings his expertise to antimicrobial guideline development through the International Society for Companion Animal Infectious Diseases, a leader in clinical guideline development for companion animals. Clinical guidelines provide veterinary practitioners with evidence-based advice to prevent and treat disease focusing on rational and effective antimicrobial therapy.

On the policy side, **Scott McEwen** consults on food safety, antibiotic resistance and veterinary public health matters with provincial, national and international governmental and non-governmental organizations.

INFECTIOUS AND ZONOTIC DISEASES

Infectious disease researchers at the Hospital for Sick Children in Toronto tested air filtration systems on Ontario swine farms with **Zvonimir Poljak**, exploring their ability to detect a specific strain of swine influenza and potential as a surveillance tool for aerosolized influenza.

A tapeworm that can infect dogs and humans and lead to potentially fatal illness was discovered in nearly one in four coyotes and foxes tested in southern Ontario through research with **Andrew Peregrine** suggesting the potentially dangerous parasite is now well established in the region.

The www.petsandticks.com website, created by **Scott Weese** and **Katie Clow**, provides public-friendly tick

education and houses the Pet Tick Tracker, a citizen science tool. Public submissions of tick findings are used to develop maps to inform Canadians of the risk of tick species throughout the year.

SAFE, SECURE FOOD

Shayan Sharif is studying probiotics as an alternative to traditional antimicrobials to combat pathogens in poultry, including *Campylobacter jejuni*, one of the main causes of food-borne illness in Canadians. **Vahab Farzan** is collaborating with researchers at veterinary and agricultural colleges across Canada to identify the core microbial population in the gut that can protect pigs from becoming infected with pathogens, ultimately reducing AMR in Canadian pork. **David Kelton, David Renaud** and **Stephen LeBlanc** are working with colleagues from Canadian veterinary colleges and the Public Health Agency of Canada to better understand antibiotic use on Canadian dairy farms and the relationship to AMR development.

TRANSLATIONAL MEDICINE

OVC researcher **Thomas Koch** studies the potential of stem cells to repair damage to joints and cartilage in horses and potentially people. He is the only veterinarian on the Ontario Institute for Regenerative Medicine's council, comprised of researchers and specialists working primarily in human regenerative medicine across the province.

COMPARING ANIMAL AND HUMAN DISEASE

Cancer researcher and clinician **Paul**

Western University in London, Ontario.

A new gene mutation discovered in dogs by an international research team including OVC professor **Fiona James** and researchers in Finland and Germany, may help better diagnose and treat one of the most common kinds of epilepsy in people. The team found a defective DIRAS gene that causes myoclonic epilepsy in dogs.

HUMAN ANIMAL BOND

The human-animal bond is a core interest for OVC researchers exploring the critical connection between people and the animals in their lives. For example, **Jason Coe** and U of G applied human nutrition professor John Dwyer's health promotion research aimed to educate the public on the health benefits of walking, for both people and pets, and **Deep Khosa's** work is providing valuable insight and expertise to veterinarians to enhance interactions with clients around difficult euthanasia decisions.

PEOPLE, WATER AND FOOD IN CANADA'S NORTH

The world's highest rates of enteric illness, including diarrhea and vomiting, are reported in Canada's North. Through the interdisciplinary People, Animals, Water and Sustenance project Sherilee Harper, University of Alberta, and OVC researcher **Jan Sargeant** are investigating if water, clams and dogs – significant parts of Inuit life – are linked to parasites, *Giardia* and *Cryptosporidium*.

PUBLIC HEALTH

OVC researchers maintain close ties with public health agencies at the local,

provincial and federal level on topics from food safety to sun safety to emerging tick diseases.

The **Master of Public Health (MPH)** program at OVC is a leader in infectious and zoonotic disease in MPH education across Canada and provides students with hands-on, experiential practicums at local, provincial, federal and international public health agencies and organizations. The MPH is a competitive program with more than 300 applicants vying for the 25 spots available each year. A recent practicum focused on developing One Health communications for veterinarians, with the College of Veterinarians of Ontario. Another focused on a One Health perspective on impacts of infection prevention and control practice guidelines for small animal veterinary clinics, with the Ontario Ministry of Agriculture, Food and Rural Affairs. 🐾

Woods is collaborating with the U.S. National Cancer Institute's Comparative Oncology Trials Consortium to evaluate treatments to delay or prevent metastases of osteosarcoma (bone cancer) in dogs. Osteosarcoma is a common cancer in dogs and in teenagers like Terry Fox, developing 10 times more often in dogs than in humans. **DOGBONE**, an OVC group of researchers, are utilizing each other's expertise in their separate fields to look for more accurate ways to assess bone cancer at the cellular and molecular level.

The **RaPPID Group** (Rapid prototyping of patient-specific implants for dogs), with **Alex Zur Linden, Fiona James** and **Michelle Oblak**, is studying use of digital rapid prototyping for surgical planning and patient-specific 3D printed implants for reconstruction with the Additive Design in Surgical Solutions (ADEISS) Centre with

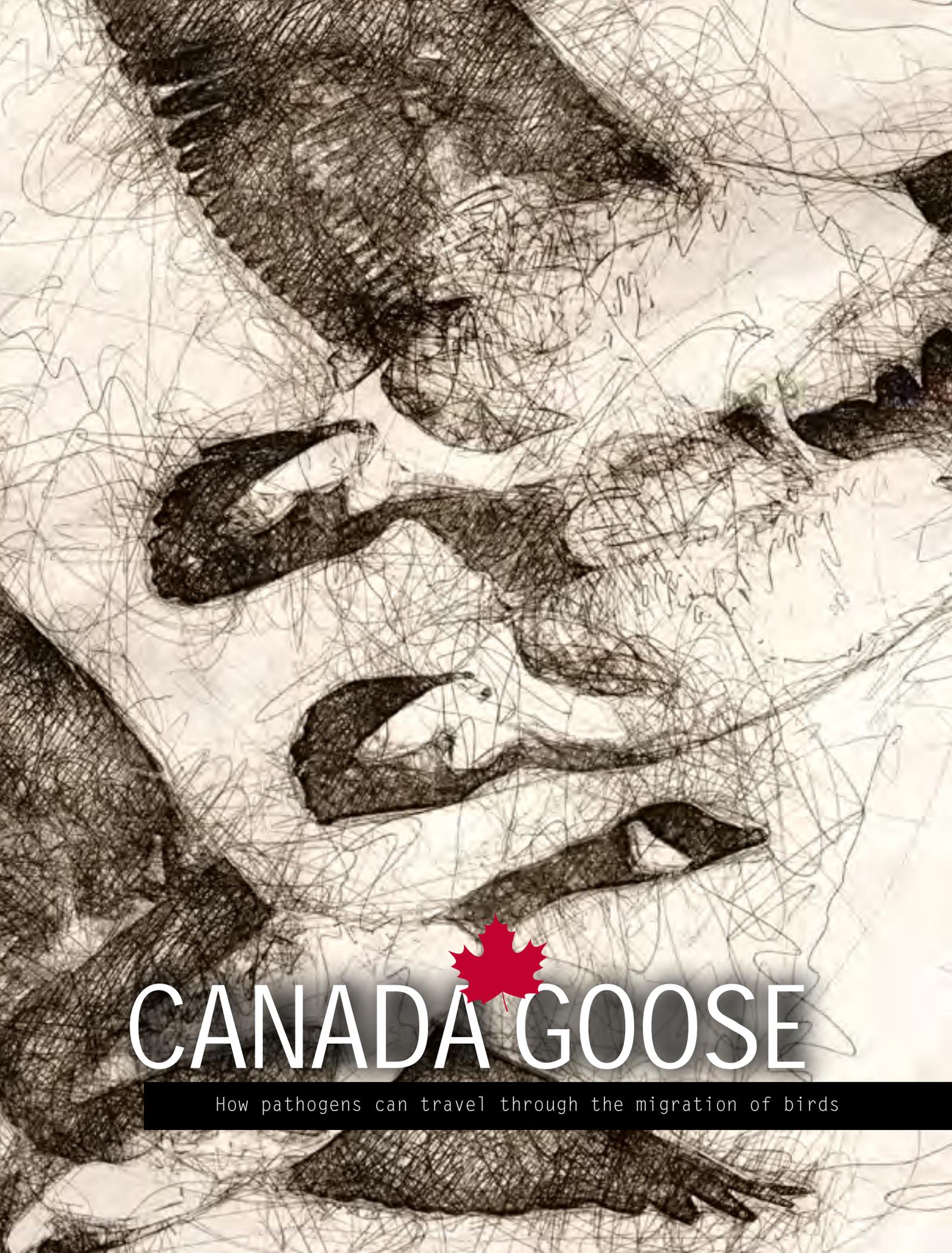
NEW ONE HEALTH EXPERTISE AT OVC

Prof. **Katie Clow**, OVC DVM 2011, PhD 2017, emphasizes a One Health approach to research focusing on the epidemiology and ecology of zoonotic diseases that are transmitted from animals to humans, usually by vectors (e.g., ticks, mosquitos). She has studied Lyme disease, specifically examining how ecological factors influence the establishment and spread of the disease, as well as other tick-borne zoonoses of public health significance.

Prof. **Jane Parmley**, OVC PhD 2005, has worked on messy but fascinating health problems such as antimicrobial resistance (AMR) and emerging zoonotic diseases with government, non-governmental and university-based organizations. She takes a whole system approach to research, whether focusing on wildlife health, AMR or zoonotic disease, considering the many drivers that influence health and the interconnections between humans, animals and our shared environments.

Prof. **Nicole Ricker** has expertise in bacterial genetics, antibiotic resistance in bacterial pathogens and especially antimicrobial resistance genes in food producing animals and how these genes are disseminated in the environment. Her research will focus on using big data techniques to predict food borne disease outbreaks in agriculture, as well as developing tools to evaluate effective strategies to reduce antibiotic resistance, ranging from nutritional changes to manure management.

ALTH RESEARCH



CANADA GOOSE

How pathogens can travel through the migration of birds



Canadians know spring has finally arrived when the infamous V formations fill our skies, bringing a familiar honk as the Canada Goose comes home to nest for the season. But not everyone loves the iconic Canada Goose. As their numbers increase in parks and on beaches around the country, they are sometimes tapped as nuisance birds.

Scientists at the University of Guelph's Ontario Veterinary College (OVC) believe there is much to learn from these winged wonders.

For One Health researchers Claire Jardine and David Pearl, geese are particularly important to study, because of their movement patterns between different environments, from south to north, from urban to rural.

Both researchers have an interest in how pathogens (bacteria, viruses, or other disease-causing microorganism) spread through the migration of birds or wildlife and are intrigued by the role geese might play in transmitting antimicrobial resistant bacteria.

Antimicrobial resistance (when bacteria, viruses, fungi and parasites become resistant to the medicines used to treat them) is recognized as one of the most pressing health concerns of the 21st century and there is an ecological component, notes Jardine. "Even though antimicrobial resistance

may develop in humans or in livestock it doesn't stay there, it has the opportunity to move into our waterways and soil. Wildlife are often left out of this equation but potentially have a role in transmitting resistance."

With graduate student Nadine Vogt, the team studied how common a few key enteric (gut) bacteria are in Canada geese. They looked at *Salmonella*, *Campylobacter*, and antimicrobial resistance in *E. coli*.

An initial two-year study conducted between 2013 to 2015 included birds from three sources: birds provided by hunters, birds submitted to the Canadian Wildlife Health Cooperative (a cross-Canada network of partners and collaborators dedicated to wildlife health) and swabs from fresh goose droppings in parks in the Guelph area. A second study, conducted over a six-month period from May to October in 2016 focused on examining fresh fecal swabs from geese in the Guelph area.

The team found virtually no *Salmonella* in the fecal samples they tested. However, the overall prevalence of antimicrobial resistant *E. coli* was almost eight per cent in one study.

Campylobacter, one of the main causes of food-borne illness in humans in Canada, showed up in 9 to 11 per cent of birds sampled in the two studies.

As may have been anticipated, seasonal behaviour showed that when geese were stationary during the summer nesting season they were less likely to carry pathogens and risks are much higher in spring and fall when the birds migrate between different environments. The results suggested the geese would be good sentinels for the movement of these pathogens between different environments.

The researchers hope to expand the initial findings. "Ideally, we would like to follow the birds over a number of years, tracking where they go and see what impact this has on the pathogens they are shedding," says Pearl.

The OVC team collaborated closely with the Public Health Agency of Canada and study funders from the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), relationships that helped in terms of the scope of the research.

"We talked to our partners about the nature of the project and sought advice from them," said Jardine. "This expertise helped in terms of reframing questions, considering human and animal health policy perspectives and in asking questions that we might not have initially considered."

"Ultimately the results of our wildlife research can play a part in the development of various risk assessment models by government collaborators and identify needs and priorities for their surveillance programs," adds Pearl. "Similarly, the pathogens or genetic elements associated with antimicrobial resistance we chose to investigate are highly influenced by both public health and OMAFRA's surveillance and research programs, which in turn are influenced by emerging pathogens or genetic elements in Canada or elsewhere in the world."

Collaboration will be key to next steps of the research. Notes Pearl, these types of projects need to integrate animal behaviour, molecular biology, geographic information systems, spatial analysis, statistics and epidemiology. "To solve and analyze complex health issues, we need to work with many partners as no one can answer these types of questions on their own," says Jardine. 🐾

In conversation with...

CATHERINE FILEJSKI

Catherine Filejski, OVC DVM 2007, grew up wanting to be a veterinarian, but studies in international relations and policy at the University of Toronto and College of Europe in Belgium led to an entirely different pathway in international relations and academia before she completed her Doctor of Veterinary Medicine degree and a large animal internship at Moore and Company in Calgary, Alberta.



Trained to tackle life's complex and big issues.

Q As a veterinarian with the Ontario Ministry of Health, you provide veterinary public health advice and expertise on zoonotic disease issues in the human health arena. What led you to pursue a career in public health and regulatory and policy development?

A I was originally looking at going into the animal health side of things in government but an opportunity came up at the Ministry of Health in 2008. I'm not sure public health was a conscious choice at that point in time but certainly government work was because it brought my two streams of educational experience and skills together. I came back full circle to my government roots and also am able to incorporate my veterinary medical expertise.

Q Can you give us a behind-the-scenes look at your life as a public health veterinarian, what you value most about this role and the greatest challenges?

A One of the great things about this job is that I never know what is going to end up on my desk next week, but it's likely to be something unusual and interesting.

The public health role in the Ministry of Health has evolved a lot in the 10 years I have been here. When I joined the ministry it was a veterinary consultant position and more epidemiologically based, focusing a lot on enteric disease, things like *Salmonella* and *E. Coli* and listeria. It has really evolved away from that. The position has been formally renamed to that of Public Health Veterinarian and involves a lot more proactive policy and program development and a lot of outbreak response on an ongoing basis. There are also many educational components in terms of educating regulated health professions and local public health units on concepts related to One Health.

A lot of my work revolves around trying to anticipate where the zoonotic risks are going to be and how we can most proactively address them so we don't end up in an outbreak situation.

You can affect the big picture with government work. It's a different type of veterinary practice that in the long run has a very different sort of outcome. It is a fascinating way of applying the skills and knowledge you learn in veterinary college to solve some very complex and big issues.

I think one of the big challenges can be getting the two sides of the human-animal health spectrum to come out of their respective silos and be aware of what is happening on the other side of the fence. It is getting physicians to pay attention to

what we know about animal health issues, but I have found it is also frequently difficult to get veterinarians to pay attention to human health issues and the public health requirements around them.

I do some volunteer work with the Food and Agricultural Organization of the United Nations (FAO) headquarters in Rome. I also sit on the board of directors of the Rabies in the Americas (RITA) Conference, an international conference that moves from country to country each year, and facilitates knowledge dissemination about rabies treatment in humans and prevention in animals. As a result of my work with the RITA conference, I also get to do a lot of collaborative work with the Mexican government.

You can affect the big picture with government work. It's a different type of veterinary practice that in the long run has a very different sort of outcome. It is a fascinating way of applying the skills and knowledge you learn in veterinary college to solve some very complex and big issues.

Q You were involved in piloting an innovative veterinary public health project in Ontario's remote Northern communities. Can you tell us about what this project involved?

A This was a large-scale dog population management project that we launched across one of only two First Nations regional health authorities in the province, the Weeneebayko Area Health Authority, which covers six communities along the James and Hudson Bay coastline.

During the two-year pilot project, we mapped out the dog population in the entire region, about 1,500 dogs. Every dog we could get our hands on was micro-chipped and vaccinated for rabies and parvovirus and dewormed. In addition, female dogs received an injectable contraceptive. This project was really a fantastic opportunity to look at both engaging the com-

munities in improving community health and gaining an understanding of how they themselves could implement some of these tools going forward.

I also was recently asked to consult on a dog population management project in Bolivia to look at bringing canine rabies under control and apply some of the work we developed in Northern Ontario. It is a completely different cultural context, but one that is facing some of the same kinds of challenges.

Q Who has influenced you the most, either through personal support or professional mentorship? What is their impact on the choices or decisions you have made?

A I have had the opportunity to work with some really great leaders both through the Ontario Public Service and more broadly through the regulatory veterinary world. I touch base routinely with some of my veterinary colleagues such as the Chief Veterinary Officer of the FAO, who does what I do on a much broader international scale. A major early influence in my career as a public health veterinarian was Canada's Chief Veterinary Officer, Brian Evans. I think he was remarkably skillful in terms of balancing the responsibilities and the ethical obligations of being the Chief Veterinary Officer while having to negotiate his way through the political necessities of the government world. It's tough to find people who can really strike that balance.

Q What advice do you have for DVM graduates who are contemplating public health and One Health career opportunities?

A The best advice I could give is be prepared to be really proactive in terms of creating the job you want. One Health is a great career path but you have to shape it yourself. Networking in this career also is incredibly important.

Veterinarians who want to get into this area should think in terms of what they specifically want to do. What is a project or issue where they could create an innovative approach and how could they go about starting to realize that? Talk to your local public health unit. There are tons of opportunities but you have to be proactive and innovative in terms of who you market yourself to in that broader One Health community. Be willing to put in some time volunteering to show your worth. Frequently that is where the actual job opportunities start to come up. 🐾

BIOINFORMATICS

DATA DRIVEN HEALTH SOLUTIONS

Technological advances have led to an explosion in the amount of biologic, genetic and health data available to veterinary scientists.

The power of informatics to analyze and interpret this information has opened new avenues of discovery in veterinary medicine, providing opportunities to advance animal health and better understand and combat disease.

Coined in the 1960s, the term informatics is by definition the science of processing data for storage and retrieval. Essentially, it uses computational techniques to bring together information from multiple sources of data.

A recent scoping review of veterinary medical and animal health literature conducted by Ben Ouyang (PhD candidate in epidemiology) with guidance from Jan Sargeant and Theresa Bernardo, researchers in the Ontario Veterinary College's Department of Population Medicine, found the term informatics has trended upward over time with 'bioinformatics' first appearing in 1999 and rising rapidly since then. Bioinformatics studies tend to use genetic or protein data sources, compared to informatics studies which use a wider variety of data sources, such as electronic medical records, sensors and global positioning systems.

THE POWER OF BIOINFORMATICS

For Brenda Coomber and Geoff Wood, cancer researchers at OVC, bioinformatics helps them understand more about cancer genetics to potentially impact clinical treatment.

Along with OVC researchers Paul Woods and Dorothee Bienzle, Coomber and Wood are studying canine lymphoma, trying to determine why some dogs respond well to a four-chemotherapy combination called CHOP (a treatment also used in human lymphoma patients) while others do not.

Finding those answers began with a clinical study where they isolated and sequenced RNA and DNA collected from dogs who had been diagnosed with naturally-occurring lymphoma. The researchers wanted to look

at RNA expressed by the dogs' tumours and also compare differences in DNA between normal and cancerous tissues, an enormous amount of data.

"If you think of DNA as a string of four different letters, sequencing essentially takes all the DNA in a sample and makes a very long list of letters," says Coomber. "Bioinformatics is able to take that enormous file of letters and make it into the equivalent of words and sentences."

That's really the power of bioinformatics, she adds. It translates information from biological systems and uses computer tools to make sense of it.

With this information, researchers can look for similarities and differences in genetic data, or identify where chunks of data are missing or moved around. Ultimately, from thousands of genes, they identified differences in eight genes that, collectively, seem to separate dogs that did well on the chemotherapy from those that did poorly. The researchers hope study results will help better predict which dogs will respond to the CHOP treatment.

Wood has used bioinformatics in a number of studies, most recently in a collaboration with Wellcome Sanger Institute in the United Kingdom in the first-ever cross-species DNA sequencing study to compare cancer genomes across human, canine and equine tumours.

The tri-species study was designed to pinpoint key genes that are mutated in mucosal melanoma, a rare subtype in humans that is much more common in dogs, which can occur in non-skin locations such as nasal passages and mouth. The researchers sequenced the genomes of mucosal melanoma tumours from 46 humans, 65 dogs and 28 horses. Numerous canine and equine samples were provided by Wood and the Companion Animal Tumour Sample Bank, part of the Institute for Comparative Cancer Investigation at the University of Guelph.

"From a bioinformatic point of view it is meaningful to look at cancer genetics across species," says Wood, "the differences and similarities can inform biology. Finding mutations that are common across species can help determine the most biologically relevant drug targets."

INVESTIGATING DISEASE

The advanced availability of DNA sequencing is also impacting disease informatics, allowing researchers to sequence the entire genomes of both bacteria and the host animals they target to better understand when disease may occur.

Lots of animals may carry a pathogen but whether or not disease occurs depends on a number of factors – the pathogen, the animal host and the environment which together make up the disease triangle, says Nicole Ricker, a professor in pathogenomics and disease informatics at OVC. The microbiome, a collection of bacteria, viruses and other microorganisms that live in and on our bodies, is impacted by all three, she adds.

"We can look at a particular pathogen's genomics and compare it to the genomics of the host animal and the microbiome so we can see which animals get disease versus which animals carry a pathogen but don't show any evidence of disease," says Ricker. Environmental factors, such as how many animals are housed together or if the host animal received antibiotics, are also important.

"Disease informatics brings all this information together to understand when a pathogen is going to be able to be successful and helps researchers identify ways to combat disease," says Ricker.

INFORMATICS FOR BETTER HEALTH

The wide variety of data sources available also can enhance preventative medicine.

Health informatics is relatively new territory for veterinary medicine, but offers immense opportunities for veterinarians to offer new services to pets and their families, managing chronic diseases such as obesity, says Bernardo, IDEXX Chair in Emerging Technologies and Bond Centered Animal Healthcare.

She points to weight management for companion animals as an up-and-coming area with activity monitors for pets gathering information, similar to their human companions' fitbits.

She envisions a future where pet owners can access an interactive app with a dashboard holding historical data about their pet, such as genomic and microbiome data, which will aid their veterinarians in defining diagnosis and treatment, as well as preventative approaches.

Adds Bernardo: "I think this is going to change the nature of what veterinarians do and presents new possibilities for them to offer a preventative medicine approach and ongoing coaching over the life of the pet."



The wealth of biologic, genetic and health data available and the power of informatics are providing veterinary science with new opportunities to advance animal health and better understand and combat disease.



BACKYARD *chickens*

Research, education and outreach to non-poultry veterinarians and small flock owners are top of mind for poultry experts in order to provide medical care for these birds and create awareness of reportable diseases such as avian influenza.



Small poultry flocks are gaining big interest, particularly among some urban dwellers.

The move highlights the importance of educating small flock owners and non-poultry veterinarians around care for these birds. There is also a need for surveillance and research to identify the risk of disease in backyard flocks and to manage public health concerns.

The definition of 'backyard chickens' technically can refer to anything from six birds in an urban backyard to small flocks of 50 or up to 300 birds on a hobby farm, but small poultry flocks are predominantly an urban issue in Ontario.

"As communities continue to permit the establishment of small flocks, it is important to ensure animal owners and urban farmers, some of whom have little or no experience with food production animals, have access to appropriate veterinary services for their animals," says Jan Robinson, Registrar and Chief Executive Officer of the College of Veterinarians of Ontario (CVO) that licenses veterinarians in the province. "While the public may view their chickens as pets, urban companion animal veterinarians may not have current poultry experience or the veterinary facilities to tend to backyard birds."

Research, education and outreach to non-poultry veterinarians and small flock owners are top of mind for poultry experts at the Ontario Veterinary College, the University of Guelph's (U of G) Animal Health Laboratory and the Ontario Animal Health Network (OAHN), which is comprised of expert networks across the food animal and companion animal spectrum, including wildlife.

"Not only is it important

to be able to provide medical care for these birds, there is also a need to create awareness of reportable diseases such as avian influenza," says Kate Todd, veterinarian and OAHN coordinator.

OAHN recently offered a one-day workshop designed for non-poultry veterinarians. It included information on small flock medicine and Ontario regulations regarding backyard poultry. Pathology lab sessions demonstrated how to complete a post-mortem on a chicken and collect samples if needed. Information also was provided on appropriate and humane euthanasia techniques.

During the workshop, Kim Lambert, Associate Registrar, Quality Practice with CVO, also explained that veterinarians must work from an accredited food animal mobile to treat chickens being used for food production. This accreditation can be obtained by companion animal veterinarians with an interest in working with small flocks.

While the number of small flocks has markedly increased over the past few years, there is a knowledge void about the type of diseases that affect this segment of the poultry sector, says Csaba Varga, Lead Veterinarian, Disease Prevention, Poultry, with the Ontario Ministry of Agriculture, Food and Rural Affairs and co-lead of the OAHN Poultry Network.

OVC and AHL researchers recently completed an infectious disease surveillance study in small, non-commercial Ontario flocks. Their goal: to establish a baseline for the prevalence of important viral, bacterial and parasitic diseases in these birds.

The good news was that no highly pathogenic avian influenza or foreign animal diseases were found.

The most prevalent conditions were upper respiratory infections. The researchers also focused on potential zoonotic pathogens that can be transmitted between animals and humans.

While *Salmonella* levels were low, *Campylobacter* samples were higher than expected, says Varga. Both pathogens can cause gastrointestinal illness in humans, including diarrhea.

The findings highlight why preventative practices are key when working with backyard poultry. Hand washing is one of the simplest strategies to reduce transmission of bacteria or pathogens between birds and people, notes Varga.

A key takeaway from the research is outreach. Study results will be shared through poultry associations, research days, workshops and social media opportunities to raise awareness of common poultry diseases among veterinarians and small flock owners.

Further study focused on the public health aspects of backyard poultry is already underway.

OVC professor Scott Weese, an infectious disease expert and director of the U of G Centre for Public Health and Zoonoses, is working with Public Health Ontario and local public health units to learn more from backyard poultry owners.

The work will help them learn where urban poultry owners are located, how they house their flock, what measures they take to reduce the risk of human disease and how they obtain information about caring for their chickens.

It will provide needed data to better understand the current landscape and help develop education tools to help urban poultry owners keep themselves and their birds healthy. 🐔



Photo credit: John Serviss

SCOTT STEVENSON, OVC DVM 2013

AWESOME CAREERS

Working on black-legged tick and Lyme disease research in Gananoque, Ontario with the Canadian Wildlife Health Cooperative after his first year of veterinary studies at the Ontario Veterinary College (OVC) was a game-changer for Scott Stevenson. It was then he fell in love with the region and kick-started an ongoing passion for tick education.

"In 2010, Lyme disease was an emerging disease in this part of the province and we found most people didn't know much about it," says the OVC DVM 2013 graduate. "Many people had very little idea what ticks looked like or where they would be found in the environment."

Scott returned to the area each summer during his four-year veterinary education. He is now the sole owner of Thousand Islands Veterinary Services (TIVS).

Today, educating clients about ticks and the threat of tick-borne illnesses is an important part of regular communications for Stevenson and his staff.

"I believe veterinarians have an obligation to be advocates for One Health (the interconnection of animal, human and environmental health) and educate our clients to protect themselves, their families and their animals from zoonotic diseases (those that can be passed between humans and animals) such as Lyme disease," he says.

With the emergence of parasites such as *Echinococcus multilocularis* (EM) and the increase in the number of reported rabies cases in Ontario over the past few years, the risk of exposure to diseases shared between humans and animals appears to be on the rise.

For this reason, Stevenson emphasizes the importance of client education in his practice, outlining how animal owners can protect themselves and their pets. In the case of EM, Stevenson ensures pet owners understand that if their dogs eat rodents, a potential host for the disease, they require year-round deworming for tapeworms. He also provides clients with public health tips to reduce human exposure, such as hand washing after working in the garden and avoiding handling feces from wild canids.

Stevenson values the teaching opportunities a veterinary career can offer, whether with colleagues, clients, or by providing a supportive environment to his team to learn as well.

"My interest in education stems from saying yes to doing one public talk," notes Stevenson. An opportunity prompted by one of his past professors at OVC, parasitologist Andrew Peregrine, who asked him to provide a tick presentation to the Quinte District Veterinary Association just shortly after graduation.

Today Stevenson is on the board of directors for the Companion Animal Parasite Council and is a contributor to the Canadian Parasitology Expert Panel. He regularly speaks to veterinarians and clinic staff across North America about ticks and tick-borne illnesses and worked with the Canadian Veterinary Medical Association to launch a public-facing awareness campaign in 2018 that addressed common questions about ticks.

He urges fellow graduates to seize similar possibilities. "Don't back away from opportunities because you never know where they might lead." 🐾

478
DOCTOR OF
VETERINARY
MEDICINE
STUDENTS

200
MASTERS
STUDENTS

49
DOCTOR OF
VETERINARY
SCIENCE
STUDENTS

118
PhD
STUDENTS

118
FACULTY
MEMBERS

\$ 45,937,123
TOTAL RESEARCH FUNDING IN 2018

OVC BY THE NUMBERS



FEDERAL
(NSERC, SSHRC,
CIHR, Canada
Council, Federal
Departments,
Canada First
Research
Excellence
Fund)

\$27,491,562

INTERNATIONAL
(Business
and Industry,
Charitable
Organizations)

\$1,625,012

INDUSTRY
(Business
and Industry,
Charitable
Organizations)

\$10,010,191

PROVINCIAL
(Ontario
Government
Ministries)

\$1,364,639

OTHER
(OVC Pet
Trust, Equine
Guelph, private
donations and
misc.)

\$5,445,719

NUMBER OF PATIENT VISITS
TO THE OVC HEALTH SCIENCES
CENTRE AND ANIMALS
TREATED ON FARMS IN 2018

21,049
COMPANION
ANIMALS

3,429
LARGE
ANIMALS

2018 # of Refereed ARTICLES PUBLISHED BY
RESEARCHERS AT OVC

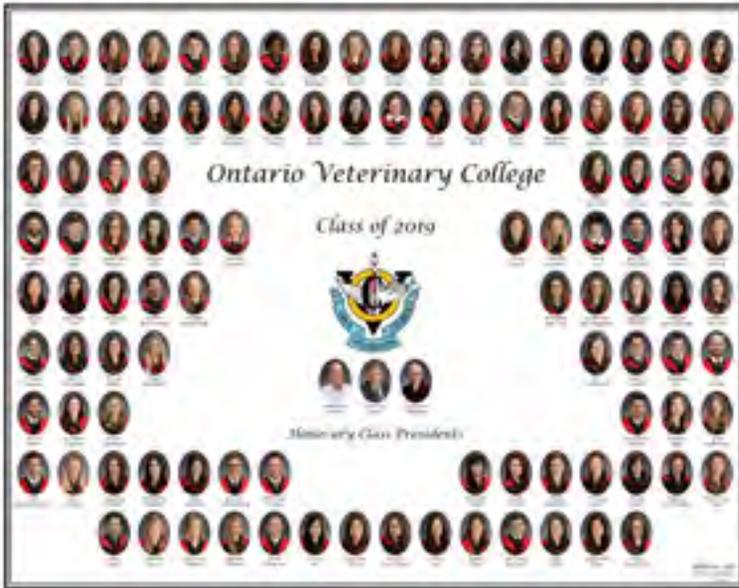
- 147 VETERINARY SCIENCES
- 29 AGRICULTURE DAIRY ANIMAL SCIENCE
- 18 MULTIDISCIPLINARY SCIENCES
- 12 FOOD SCIENCE TECHNOLOGY
- 11 MICROBIOLOGY
- 10 INFECTIOUS DISEASES
- 10 REPRODUCTIVE BIOLOGY
- 10 ZOOLOGY
- 9 IMMUNOLOGY
- 8 PUBLIC ENVIRONMENTAL OCCUPATIONAL HEALTH
- 7 VIROLOGY
- 6 ENVIRONMENTAL SCIENCES
- 5 BIOTECHNOLOGY APPLIED MICROBIOLOGY

- 5 CELL BIOLOGY
- 5 MEDICINE RESEARCH
- 4 BEHAVIORAL SCIENCES
- 4 GENETICS HEREDITY
- 4 NEUROSCIENCES
- 3 PHYSIOLOGY
- 3 BIOCHEMISTRY MOLECULAR BIOLOGY
- 3 EDUCATION SCIENTIFIC DISCIPLINE
- 3 PATHOLOGY
- 3 RADIOLOGY NUCLEAR MEDICINE
- MEDICAL IMAGING
- 2 ANATOMY MORPHOLOGY
- 2 BIODIVERSITY CONSERVATION

19s

CONVOCATION

CONGRATULATIONS TO OUR NEWEST ALUMNI



DOCTOR OF VETERINARY MEDICINE

Ashley Amber Albright
Amanda Kristen Avison
Hannah Lauren Bagnall
Kaitlin Marie Barber
Kevin De Medeiros Barbosa
Christina Ann Barnes
Kelia Bascom
Catherine Rose Belanger
Marissa Lyn Bessell
Jennifer Elizabeth Brenner
Alyssa Chronis Brown
Julia Maria Bulfon
Courtney Burstein
Amy Rose Capraro
Angelique Castelo
Goldia Chan
Rebecca Laurel Chant
Samantha Beverly Clarke
Carmon Co
Amber Covello
Jaden Ashley Maura Dales
Sarah Lorraine Depaulo
Manali J. Desai
Navleen Dhaliwal
Kristen Ashley Dienst
Sarah Divito
Kelly Christina Donaldson
Kassandra Dusome
Thisuri Umayya Eagalle
Katelyn Elliott
Robert John Frantz
Jacqueline Lorraine Gallienne
Alina Grace Gardiner
Stephanie Jean Gerritsen
Deanna Jacqueline Glasgow
Hannah Renton Golightly
Lisa Jayne Gordon
Rebecca Jean Greenwood

Jaelyn Guest
Megan Teresa Haley
Danielle Christine Harkness
Ashley Morgan Harrison
Laura Rae Janet Hartman
Stewart Charles Higginbotham
Macy Lynne Holliday
Alexandre Benjamin Jalbert
Jordan Christopher James
Samantha Johnson
Brittany Kathleen Jones
Megan Rose Kitts
Eric Justin Kwok
Natalie Marcelle Lapointe
Anna Constance Lazurko
Monika Lechowicz
Sumin Lee
Mitchel Stewart Littlejohn
Brittany Rose Lostracco
Latasha Anne Ludwig
Ho-Yi Lui
Courtney Adrienne Lun
Christina Marie Lyn
Mathew R. A. MacCormick
Alaina Grace Clarkson
Macdonald
Brieanne Sadie MacKay
Catherine MacNaughton
Kayleigh Mahony
Anujah Jenifer Mariampillai
Candace Lesley Martins
William Norris MacLean
Nurin Merchant
Jasmine Danielle Morrell-Bellai
Nicole Norris
Ronja E. Ogrodnik
Elri Oosthuizen
Alexandria Oswald
Daniel Alexander Pecoskie

Mathias Nathan Joseph Peel
Julia Perit
Eric Francois Perrin
Derek Jonathan Peters
Adriana Prystay
Claire Marie Kristina Redman
Jonathan Riccio
Megan Righi
Julia Frances Lee Robertson
Max Alexander Rochman-Fowler
Laura Anne Rooney
Meaghan Marie-Helena Roque
Samantha Emily Rudkins
Julia Saturno
Garrett John Schuilenberg
John-Paul Edward Settimi
Shannon Yiclong Shum
Paula Marie Simons
Kayla Ann Skubowius
Kristyne Leigh Smith
Hanna Sonek
Cai Qian Song
David John Sparks
Andrea Storm-Suke
Katherine Anne Sum
Joey Tang
Courtney Elisabeth Thomas
Shauna Linden Lorraine Thomas
Brian James Thomsen
Tracy Wing Man To
Marissa Torres
Marika Bettina Van Schaik
Julia Emma Wan
Alysha-Ann Kristen Ward
Gerald Eastman Welsford
Kadi White
Rebecca Elizabeth Wilson
Stephanie Vay-Young Wong
Kathryn Grant Wycherley

GRADUATE STUDENTS

DOCTOR OF PHILOSOPHY
PATHOBIOLOGY
Alexander Bekele-Yitbarek

POPULATION MEDICINE
Mary Ellen Alexandra Watters

DOCTOR OF VETERINARY SCIENCE

CLINICAL STUDIES
Monica Lynn Jensen

PATHOBIOLOGY
Karee Kristen Lorraine Craig
Rebecca Jane Egan
Britta Janis Elisabeth Knight

MASTER OF PUBLIC HEALTH

Jacqueline Baker
Andrew Beardsall
Gevorg Charchoghlyan
Laura Caeris Duncan
Kimberly Ann Wendy Gibbens
Amber Irene Gillespie
Rachel Lisa Goodland
Gillian Frances Hachborn
Leah Elizabeth Hagerman
Saarah Sofia Hussain
Nasra Abdulkadir Hussein
Apiramy Jeyapalan
Juan Jose Medina Briceno
Julia Mielczarek
Michaela Alexandra Penwarden-Watson
Nicole Frances Pinto
Jessica Victoria Tomasik
Monica Vythilingam
Madison Faith Wimmers
Kaitlin Mae Young
Hanna Gray Cameron Zaidlin

MASTER OF SCIENCE
BIOMEDICAL SCIENCES
Samira Rezaei

CLINICAL STUDIES
Bianca Leigh Di Sabatino
Kristen Lamers

PATHOBIOLOGY
Ryan Gordon Eagleson
Alexander Leacy
Megan Kavanagh Neely
Corinne Schut

POPULATION MEDICINE
Jeanette Eliza Cooper
Christopher McLaren-Almond
Michael Gregory Sawras
Kayla Janet Scott
Mohamed Ugas
Maggie Elise Williamson

MASTER OF BIOLOGICAL SCIENCES
Sarah Marjorie Gallinger
Stefan Lazic

CELEBRATING OUR

60s

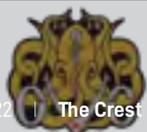
OVC DVM 1966 graduates, **Ted Clark, Don Wilson, and Ross Fitzpatrick**, have started the wheels in motion for a vintage veterinary exhibit in Calgary's Heritage Park Historical Village to tell the story of early veterinary history in Western Canada. More information at vintageveterinaryexhibit.ca.

70s

James Mantle, OVC DVM 1978, and **Michael Ritter**, OVC DVM 1978, each received the Ontario Veterinary Medical Association Golden Life Membership Award. James Mantle spent most of his 40-year career at the Lindsay Animal Clinic where he focused on large animal clients. Michael Ritter spent his entire veterinary career at the New Hamburg Veterinary Clinic.

80s

Brian MacNaughton, OVC DVM 1980, was posthumously inducted into the Glengarry Agricultural Wall of Fame. Brian MacNaughton passed away in September 2014.



OVC CLASS OF 2019
THE GOLDEN KRAKENS



Photo credit: C.A.V. Barker Collection, Archival Collection

OVC Alumni Class Notes

OUR GRADUATES' AWARDS, HONOURS AND ACCOMPLISHMENTS.

40s

Gordon Leslie Davis, OVC DVM 1945, passed away on February 2, 2018. His entire career was spent in Delta, BC practicing on both large and small animals.

Ken Fisk, OVC DVM 1949, passed away in March 2019. A native of Walkerton, Ontario, Ken Fisk practiced in Harriston, Ontario.

50s

Dennis Michael Meagher, OVC DVM 1959, passed away on February 20, 2019. In 2010, he received the Ontario Veterinary College Distinguished Alumnus award.

60s

Bruce Wilkie, OVC DVM 1965, professor emeritus, passed away on February 25, 2019.

Wilkie joined the OVC faculty in 1973 and served as Department of Microbiology and Immunology chair from 1987 to 1992. Bruce Wilkie is widely recognized for his work along with colleague Patricia Shewen, professor emerita, in developing and commercializing the shipping fever vaccine Presponse®.

70s

C. E. 'Ted' Clarke, OVC DVM 1972, passed away Saturday, April 27, 2019

Chris Crombie, OVC DVM 1974, passed away in March 2019. Chris Crombie practised with equine and companion animals and later with exotics.

80s

Wayne Cross, OVC DVM 1982, passed away December 6, 2018.

90s

John McCleary, OVC DVM 1995, passed away in March of 2019 after a courageous battle with cancer. He practiced emergency medicine in Victoria, B.C.



Photo credit: Atlantic Veterinary College, UPEI

OVC ALUM NAMED TO THE ORDER OF CANADA

OVC alumnus **Ian Dohoo** has been named to the Order of Canada, in recognition of his contributions to veterinary and human epidemiology in developed and developing countries. Dohoo, OVC DVM 1976, PhD 1983, joined the Atlantic Veterinary College (AVC) in 1985, the year before the college accepted its first class of students. He led the development of the college's internationally recognized research program in veterinary epidemiology, becoming the first director of the University of Prince Edward Island (UPEI) Centre for Veterinary Epidemiological Research at AVC. He retired in 2012 as professor emeritus UPEI. He received a University of Guelph honorary degree in June 2012. Created in 1967, the Order of Canada is one of the country's highest honours, recognizing people who make extraordinary contributions to the nation.

90s

Mark Gemmill, OVC DVM 1993, received the OVMA Outstanding Veterinarian Award, presented to a veterinarian for their outstanding contributions to the veterinary profession. After graduation, he joined Cornell Animal Hospital in Guelph, purchasing the practice in 2003.

Scott Bainbridge, OVC DVM 1999, received the OVMA Award of Merit. It is awarded for distinguished public service to the veterinary profession in any form. Scott Bainbridge co-founded his first practice, Queen West Animal Hospital, in 2000 and then opened Dundas West Animal Hospital in 2008.



00s

OVC GRAD RETURNS TO DELIVER U OF G'S LAST LECTURE

A veterinarian devoted to raising awareness about the connections among human health, animal health and animal welfare urged graduating students at the annual U of G Last Lecture to follow their hearts and do what they

love. OVC DVM 2009 graduate **Scarlett Magda**, founder and president of Veterinarians International (VI), told students finding what they are passionate about "can drive you through the difficult times. When we fail at something it isn't actually failure, it is the universe redirecting you to go on a different path." Veterinarians International is a volunteer-driven organization based in Manhattan that aims to improve the lives of people in developing countries through the concept of One Health.

New Faculty

Prof. **Jane Parmley** joined OVC's Department of Population Medicine as associate professor in One Health.

Prof. **Katie Clow** joined OVC's Department of Population Medicine as assistant professor in One Health.

Prof. **David Renaud** joined OVC's Department of Population Medicine as assistant professor in Ruminant Health Management.

Prof. **Francesca Samarani** joined OVC's Department of Clinical Studies as assistant professor in neurology.



1904

VETERINARY HISTORY IN CANADA

VETERINARY CONTRIBUTIONS TO EARLY PUBLIC HEALTH IN CANADA

John G. Rutherford joined the Dominion Department of Agriculture in 1901, having graduated from the Ontario Veterinary College, practiced veterinary medicine in Manitoba, and served as a Liberal in both the Manitoba Legislature and the Canadian House of Commons. In 1904,

two years after the Health of Animals Branch (now the Canadian Food Inspection Agency) was formed, Rutherford was named Canada's first Veterinary Director General, a role he served in until 1912. Rutherford's time as Veterinary Director General saw the creation of a number of programs such as initiatives to contain diseases like hog cholera, dourine (a venereal disease of horses), and bovine

tuberculosis, a disease critical to Canadian public health. He was also instrumental in the development of Canada's federal meat inspection legislation that was introduced in 1907. This was a period of transformation in Canadian veterinary medicine, which saw the profession participate more formally in public health matters.

John G. Rutherford. (C.A.V. Barker Collection, Archival Collections, University of Guelph Library; Meat packing industry, 1920. (Canada. Dept. of the Interior / Library and Archives Canada / C-036964.)

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**Attention: OVC Marketing Communications,
OVC Main Building, Dean's Office**

COMING EVENTS

Watch the OVC website for more information on these and other events:

**OVC PROFESSIONAL WELCOME CEREMONY
OVC Class of 2023
September 2019**

**OVC ALUMNI RECEPTION AT THE VETERINARY MEETING AND EXPO (VMX)
Orlando, Florida
January 18 to 22, 2020**

**OVC ALUMNI RECEPTION AT THE ONTARIO VETERINARY MEDICAL ASSOCIATION CONFERENCE
Westin Harbour Castle
Toronto, ON
January 30 to February 1, 2020**

**OVC ALUMNI HOCKEY TOURNAMENT
Guelph Gryphons Arena
March 27 to 28, 2020**

**U OF G ALUMNI WEEKEND
June 19 to 21, 2020**

DID YOU KNOW ALUMNI AFFAIRS HELPS ORGANIZE CLASS REUNIONS?
Find more information at www.alumni.uoguelph.ca/alumniweekend/reunions or contact OVC's Alumni Advancement Manager, Amy Tremaine at tremaina@uoguelph.ca or 519-824-4120 ext. 56679.

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