

BAKER INSTITUTE
FOR ANIMAL HEALTH

because we care

ANNUAL REPORT 2017

ONLINE AT BAKERCORNELL.ORG



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A MESSAGE FROM OUR NEW DIRECTOR LUIS M. SCHANG

because we care

Because we care.

In this, my first message as Director, I will attempt to express in words why we do what we do. Why would a group of researchers, trainees, and other staff work tirelessly and diligently trying to find answers to new and difficult questions? Why would we wake up every morning with the desire and excitement of another day at the Institute?

Because we care.

Because we care about the dogs, horses, cats, and other companion animals that we all love so much. Granted, we thrive on challenge; we anxiously examine every new piece of information looking for that unexpected discovery. We love the search for the unknown, that unexpected finding that may happen any time we do the precise experiment that was needed. But we do not do it with the expectation of publishing another paper, or earning another grant or other funding. We do not do it for the occasional professional recognition or public accolade.

We do it because we are firmly convinced that it is for, and to the benefit of, our beloved animals. We do it with the expectation that perhaps, just perhaps, one of our discoveries that comes after so many years of hard work, will have a positive impact on them. We do it because we know that if we do not understand what is affecting them, then whatever it is cannot be cured or managed. We do it because we know that knowledge is critical for new cures, preventions, or at least managements that improve their quality of life.

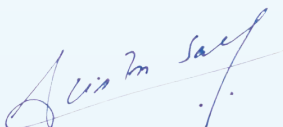
We know well that knowledge in itself is not sufficient. Knowledge has to find its application and be developed into a product, approach, or management practice to have an impact. That's why we do not stop at publishing papers or presenting our findings to other researchers, veterinarians, or anybody else. We strive to apply our discoveries to solve problems. We search for problems that may benefit from knowledge we already have. We work hard converting discoveries into leads and leads into products that positively impact the lives of animals and, on occasion, humans.

We only need to look at the history of the Institute to be convinced of the value in our approach to pursue the discovery, searching for the unknown, while keeping a close eye on its potential applications. We will continue on this path without doubt or hesitation. We will continue working hard, excited for the unexpected discovery, guided by our conviction that our work will continue to help all animals. But we cannot do it without your help and support. Only together can we convert our mission into reality, benefiting the companion animals we all love so much.

We and our cherished animals are extremely grateful for your support. And I hope that when someone asks why you are part of, and support, the Baker Institute for Animal Health, you will feel like answering:

"Because we care."

Thank you,



Luis M. Schang, MV, PhD
Director

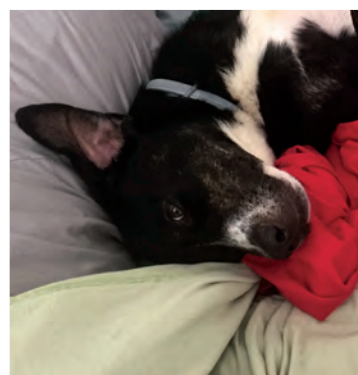
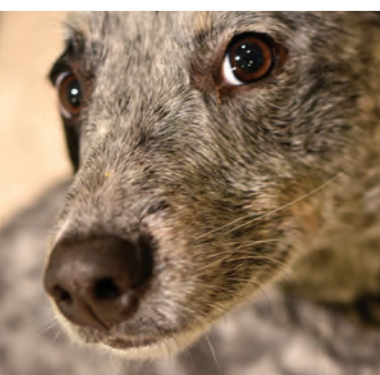


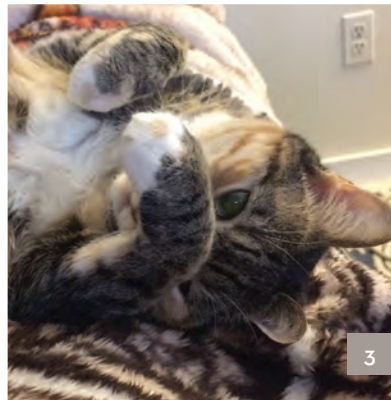
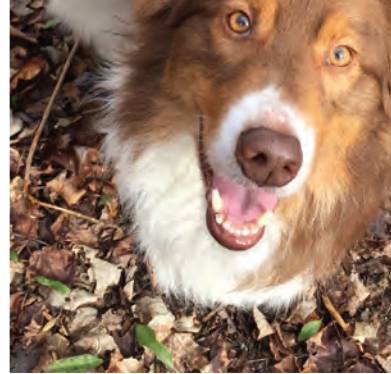
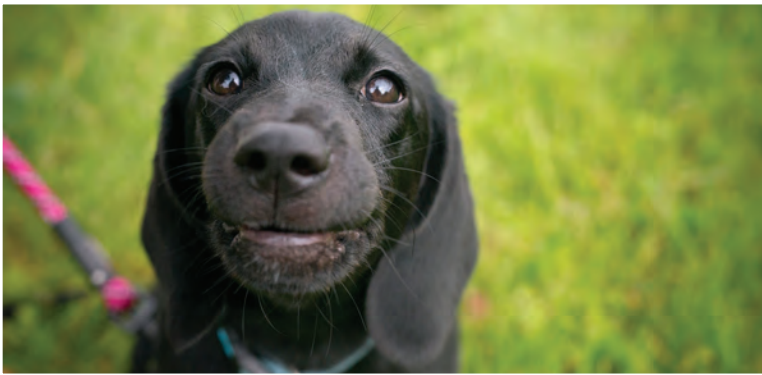
Dr. Schang and
his dog Maple

PETS OF THE INSTITUTE

because we care

Meet the pets that inspire us every day.





YOUNG RESEARCHERS AT THE BAKER INSTITUTE EXCEL

The Baker Institute has a long history of leadership in advancing research to improve veterinary medicine, and that spirit is alive and well in the most recent additions to the faculty. Despite a competitive funding environment, the newest members of the Institute are wasting no time in earning funds and pursuing exciting and innovative directions in veterinary research.

Gerlinde R. Van de Walle DVM, PhD

Harry M. Zweig Assistant Professor in Equine Health

In the few years since Gerlinde Van de Walle joined the faculty of the Baker Institute in 2013, she has grown a research program with projects focused on understanding diseases that affect both humans and companion animals.

Van de Walle is interested in a group of viruses, the alphaherpesviruses, which defy vaccination and hide out within the body for decades, only to start sudden outbreaks that take the form of shingles, genital warts, or serious eye disease. Van de Walle has received funding from the Cornell Feline Health Center to investigate eye infections caused by one of these herpesviruses, and also by other infectious agents, in cats. In collaboration with Rockefeller University, and funded by the U.S. Department of Agriculture, Van de Walle is focused on two other viruses which cause liver disease in horses and are related to the hepatitis B and C viruses that affect people. She is also interested in other diseases of companion animals. The American Quarter Horse Association has awarded Van de Walle a grant to study equine mesenchymal stem cells, which can be collected from the blood and used to treat wounds and joint injuries. She is also interested in the differences in breast stem cells of species that are prone or resistant to breast cancer.

This year, Van de Walle was named the Harry M. Zweig Assistant Professor in Equine Health, a three-year endowed position given to a junior faculty member with potential to make significant contributions to equine research. She also received the Zoetis Award for Veterinary Research Excellence in 2016 and an Excellence in Teaching Award from Cornell, recognizing outstanding teaching in veterinary medicine. Van de Walle is excited to continue her cross-species research in the unique environment created by the Baker Institute.

Charles G. Danko PhD

Assistant Professor of Biomedical Sciences

Charles Danko began working at the Baker Institute in 2014 and wasted no time in applying his background in bioinformatics to develop a vibrant research program. He is interested in the regions of the genome involved in the regulation of the expression of proteins, regions which are responsible for turning genes on and off at the right time. His group is sorting out how these regulatory regions control the patterns of gene expression in animals and humans, and how those patterns contribute to evolution, development, and disease.

As a recognition of the quality of his work, Danko recently earned a highly competitive RO1 grant from the National Human Genome Research Institute, an impressive achievement so early in his career. With this support, he is constructing a set of computational tools for mapping gene expression and identifying regulatory regions in clinical specimens. He has begun applying those tools to investigate gene regulation in human breast cancer and canine hemangiosarcoma. He has also received funding from the College of Veterinary Medicine Research Grants Program in Animal Health for genetic mapping of Canine Arrhythmogenic Right Ventricular Cardiomyopathy. This disease causes an irregular heartbeat and the replacement of normal heart cells by abnormal tissue. It is a leading cause of death in the boxer breed and researchers have struggled to pinpoint a genetic cause. Danko is instead focusing on so called "epigenetic" causes.

Danko has also developed several software programs for analyzing genomic data, programs which are freely available and of great use to many researchers. Going forward, he intends to borrow tools from the fields of statistics and machine learning to advance his research on health and the development of disease in animals and humans.



Elia Tait Wojno PhD

Assistant Professor of Microbiology and Immunology

The Institute's newest addition, Elia Tait Wojno, has impressively secured major National Institutes of Health funding for her lab in less than three years. These grants support work on the immune system during parasite infection and allergic disease. She aims to learn how specific cells in the immune system and in the lining of the intestines work together to protect animals against parasitic worms. Tait Wojno is also analyzing how the regulation of these cells becomes impaired to cause inflammation and allergy.

The National Institute of Allergy and Infectious Diseases awarded Tait Wojno a Career Development grant for her research on inflammation, and a highly competitive RO1 award to study how rare immune cells called basophils regulate the response to parasitic worms. Excitingly, her second RO1 application just received a very positive review and will likely be funded next year. Tait Wojno has also received funding from the Cornell University College of Veterinary Medicine Research in Animal Health Grants Program to study allergic inflammation in dogs, from the President's Council of Cornell Women, and from the Cornell Stem Cell Program Seed Grant.

In a short time, Tait Wojno has assembled a strong research team. She is looking forward to seeing her team grow in the coming years and to continue learning how the immune system in dogs, mice, and humans works during health and disease.





Douglas F. Antczak VMD, PhD

Dorothy Havemeyer McConville Professor of Equine Medicine

► more online at bakercornell.org

Video featuring Douglas Antczak

What can a pregnant horse's immune responses tell us about organ transplants?

When a mammal becomes pregnant, the mother's immune system is prevented from attacking the fetus as if it were an unfamiliar infection, but the mechanisms for this state of tolerance are not well understood. The Equine Genetics Center at the Baker Institute has pioneered methods to study the horse placenta and to determine the role of the placenta in protecting the fetus from immune destruction by the mother. The group has developed a novel experimental system of trophoblast transplantation that has demonstrated that the placenta acts to affect its own survival independently of the hormonal state of pregnancy and, most recently, that it can survive not only primary immune responses, but also the stronger secondary responses of the type that occur after vaccinations.

The Antczak lab's work on the equine placenta contributes to the knowledge of reproduction and pregnancy loss in horses, and in humans, too. It also has relevance to the important question of why the immune system can tolerate the unfamiliar tissues of the fetus, but not a foreign organ transplant. Without this type of new information, we are unlikely to ever be able to replace the immunosuppressive treatment of transplant patients with other approaches that do not increase their vulnerability to infectious diseases.

Scott A. Coonrod PhD

Judy Wilpon Professor of Cancer Biology

How can we better treat breast cancer in people and hemangiosarcoma in dogs?

Cancers are major diseases in humans and dogs. In humans, a drug that many survivors of breast cancer take to prevent a relapse, called tamoxifen, often stops working after several years of treatment. Unfortunately, it is still unknown why it stops working, and there is currently no way to predict which patients may or may not stop responding to it. In dogs, an aggressive tumor in the blood vessels, called hemangiosarcoma, kills up to 2 million dogs yearly, yet effective treatments do not exist. Most unfortunately, the extremely limited knowledge available about these dog tumors, which are unlike any prominent human cancer, is a major roadblock to the development of effective therapies.

Regarding human cancers, researchers in the Coonrod lab are working on finding cellular pathways that enable breast cancer cells to become resistant to tamoxifen. Finding these pathways is critical if we are ever going to discover new ways to prevent or block the tumor's resistance to this type of therapy.

With respect to dog tumors, Coonrod's group is applying the most advanced techniques in human cancer research to identify any particular genes, or groups of genes, that may drive the tumor's growth. Pinpointing these genes is only a first step, but a significant one in deciding how to best develop effective therapeutics against these tumors.

Understanding gene expression to determine the rules that underlie health and disease

Humans and animals have nearly 20,000 different genes which encode the myriad of proteins that affect all aspects of an individual – the way individual cells work, our organs, even influencing how we think and behave. Other animals have basically the same 20,000 genes – so why are you a human and your dog isn't?

The smallest difference in expression of any of those genes and proteins affects everything from an individual's health to the subtle differences that make animals or people differ from each other, or the bigger differences between species. Danko and his group have developed a technique called ChRO-seq, which allows them to look at the subtle differences in gene expression in cells under different conditions. ChRO-seq tags RNA polymerase, the enzyme in cells that converts the DNA encoding our genes into RNA, allowing scientists to see which genes are being used by the cell. It also defines the location of control switches in our genomes, called "enhancers", that control which parts of our body use which genes.

By understanding the detailed patterns of expression of all genes, the Danko laboratory is decoding the rules that underlie our health and well-being. This information also helps us to understand what happens when disease occurs, whether it be cancer or one of the many other diseases that arise when gene regulation is altered, causing the usually well-functioning gene orchestra to play out of tune.

Vicki N. Meyers-Wallen VMD, PhD, DACT

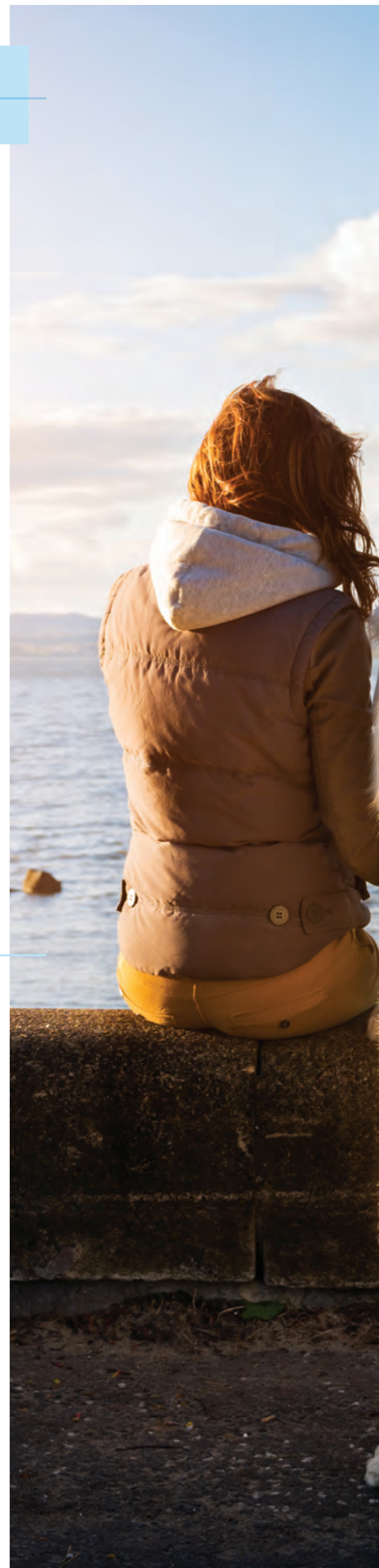
Associate Professor of Genetics and Reproduction

How can we diagnose and eradicate reproductive disorders in dogs?

Many dog breeds are susceptible to inherited disorders of sexual development, or DSDs. One such disorder, XX DSD, can lead to mismatched reproductive organs, sterility, tumors, and infections. XX DSD is a bane to breeders, but so far has been impossible to remove from the gene pool.

Meyers-Wallen's group is working to pinpoint the cause of XX DSD and to understand how the disorder is inherited. By working with a family of dogs that carries the disorder and performing DNA sequencing and genetic screens, they have narrowed down the location of the relevant area on the dog genome connected to the problem. Her work has demonstrated that the inheritance of the disorder is not straightforward and she suspects that epigenetic factors, which are inherited changes that regulate gene expression, may also play a role.

Meyers-Wallen's research has yielded a clearer understanding of the genetic cause of XX DSD. This knowledge is necessary for the development of any diagnostic test that could be used to ultimately eradicate this harmful disorder in purebred dogs.





John S. L. Parker BVMS, PhD

Associate Professor of Virology

How do viruses trick cells into creating viral “factories”?

Although they are not often heard of, reoviruses cause disease in multiple animal hosts. Rotaviruses, for example, commonly cause diarrhea in young children, a disease which is often deadly in developing countries. Unfortunately, there are no antivirals that are effective against reoviruses.

When a cell detects a viral infection, its first response is to shut down its protein-making machinery so that the virus can't use it to reproduce itself. Researchers in the Parker lab work with reoviruses that infect mammals, viruses which have evolved an ingenious way of overcoming this cellular response. Reoviruses form viral “factories” inside cells. They make a gooey compartment that sequesters away the cellular protein-making machinery, effectively allowing the virus to corner the market on protein production. Recently, the Parker group identified the two viral proteins that form these blob-like factories.

Parker's work illuminates this poorly understood viral strategy. The more we learn about these viruses, the more likely we are to eventually cure these serious viral infections in humans and animals.

Colin R. Parrish PhD

John M. Olin Professor of Virology

How a virus affecting birds 7,000 miles away created problems for our dogs

A virus that was identified as the H3N2 strain of influenza, first seen in the Chicago area in early 2015, underwent a resurgence in the United States this year. Infected dogs experience a respiratory disease which lasts for a few days, accompanied by a fever and cough as seen with influenza in humans, and are infectious to other dogs for about a week.

One focus of the Parrish laboratory is to study how viruses emerge and spread among animals and humans, and then use that information to identify new ways to control them. Parrish and his group figured out that the new flu virus had originally jumped from birds to dogs in Asia circa 2005 and that the strain in Chicago came from Korea, where it had been circulating in dogs for several years.

A new outbreak of canine influenza was reported in Los Angeles earlier this year. Parrish and his group were able to use the methods they have developed to examine the genetic fingerprint of this virus and identify it as an H3N2 variety. However, they discovered that it was a different strain than the one that originated in southern China, and was probably brought to the United States by dogs that were rescued from dog markets. The infected dogs were quarantined until they were no longer contagious, thus preventing the spread of a new strain of influenza virus in the United States.



Elia Tait Wojno PhD

Assistant Professor of Microbiology and Immunology

Why do different animals get different kinds of allergies?

The same skin allergies and rashes make dogs and humans itch, but dogs don't often develop lung allergies like humans. Allergies in all species occur when the immune system, which normally fights infections, mistakenly attacks a harmless allergen like pollen. However, we don't understand why some species are more prone to certain allergic diseases and how the immune system can work for an animal during infection, and against it during allergy.

To answer these questions, Tait Wojno studies parasitic worm infections and allergies in multiple species. She and her team analyze how dog, mouse, and human immune systems function to create good responses that control infections or bad responses that lead to allergies. Specifically, they are looking at how rare types of white blood cells called basophils and innate lymphoid cells contribute to immune responses during worm infections and allergies.

Through this work, Tait Wojno is filling a major gap in our understanding of why different species suffer from different types of allergies. This research is also helping to reveal how the immune system can have both good and bad effects in all species.

Alexander J. Travis VMD, PhD

Professor of Reproductive Biology

How can we improve environmental sustainability and public health through reproductive technologies?

A keen understanding of reproduction is vital to helping endangered species, domestic dogs, and people. Travis first became interested in research to obtain this understanding with the goal of eventually being able to manage zoo and wildlife populations with effective contraceptives and by enhancing their fertility. The reproductive technologies resulting from such approaches can also be leveraged to improve human health.

As an example, his investigations into sperm structure and function resulted in scientific discoveries that led to the development of a diagnostic test currently used in human fertility clinics to determine sperm quality, thereby helping clinicians counsel patients about optimal treatment using assisted reproduction. His idea to copy a design from the sperm tail led to a method for attaching enzymes to microscopic, nano-sized, particles. Travis is now looking for ways to apply these "tethered enzymes" in the diagnosis of diseases and to power implantable medical devices.

His work on assisted reproduction included performing the first successful in vitro fertilization in dogs in 2015. Travis' group is now advancing that work to develop gene repair technologies. Such technologies are critical to correcting genetic diseases without losing genetic diversity in domestic dogs. They could also be applied to the preservation of endangered species, such as the red wolf or the African painted dog.

Gerlinde R. Van de Walle DVM, PhD

Harry M. Zweig Assistant Professor in Equine Health

► more online at bakercornell.org

Video featuring Gerlinde Van de Walle

How can stem cells be harnessed effectively to treat disease and prevent the growth of tumors?

Treatments using stem cells, which can replenish tissues with new cells, offer tremendous potential for healing wounds and treating various diseases, but we need to learn much more about these cells before this potential can be realized.

Van de Walle's research on adult stem cells spans multiple veterinary species to understand the roles of these cells in healing and cancer formation. Members of her lab are looking at how equine mesenchymal stem cells, stem cells collected from horse blood, encourage wound healing and protect against bacterial and viral infections in horses. They also study how epithelial stem cells, the cells that are thought to originate several cancers, are regulated in the mammary gland of horses. These studies are aimed at understanding why horses rarely develop breast cancer, a cancer that is so common in humans, cats, and dogs.

A better understanding of both the benefits and limits of stem cell treatments is required before stem cells can be used to develop safer, more targeted therapies. Through this comparative approach using multiple species, Van de Walle's work is also finding differences in mammary stem cells in species that are more or less prone to suffer from breast cancer, looking for clues to how breast cancer can develop.

Luis M. Schang MV, PhD

Professor of Chemical Virology

Can we develop broad-spectrum antiviral drugs to treat multiple viral infections?

A host of viruses have evolved ingenious ways to cause disease in humans and animals. We have vaccines to prevent viral infections, but only for a few selected viruses. Although antiviral drugs exist, they treat an even smaller number of viral infections. Each of these antiviral drugs targets just a single virus, resulting in the need for a new drug for every virus. New viruses are constantly infecting animals and humans, requiring frequent development of new drugs. Other viruses only infect very few people or animals, resulting in limited commercial interest in developing drugs against them.

On the other hand, each bacteria-killing antibiotic is effective against many different bacteria. As a result, we always have an antibiotic available to treat even new or rare bacterial infections. It would be ideal to also have broad-spectrum antiviral drugs that work against as many viruses as possible. Researchers in Schang's group are looking for common strategies used by unrelated viruses to enter cells and reproduce. This approach is well-suited to identify viral Achilles' heels to aid in the development of broad-spectrum antiviral drugs.

Most viruses have a coat of oily lipid molecules called an envelope, which is very similar to a cell membrane. The virus envelope must fuse with the cell membrane to dump the viral contents into the cell. Schang and his group have identified molecules that block this fusion, preventing viral entry and its consequent replication. These molecules are active against a number of viruses that infect humans and companion animals.

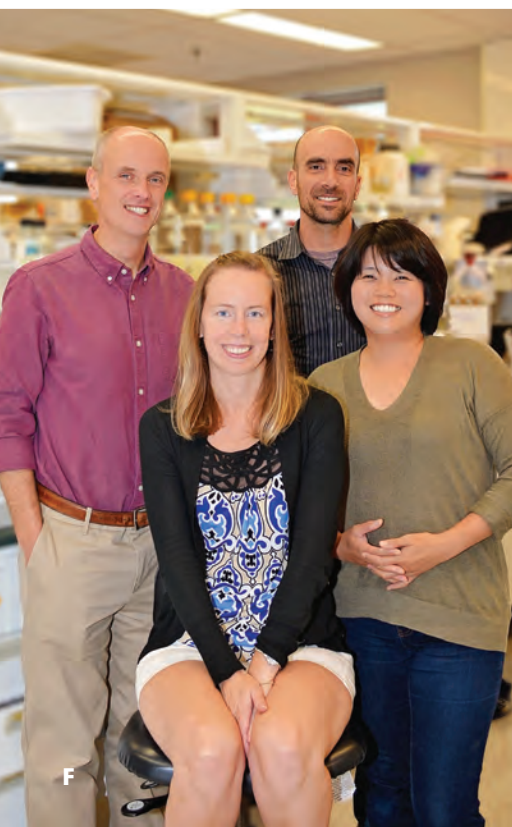
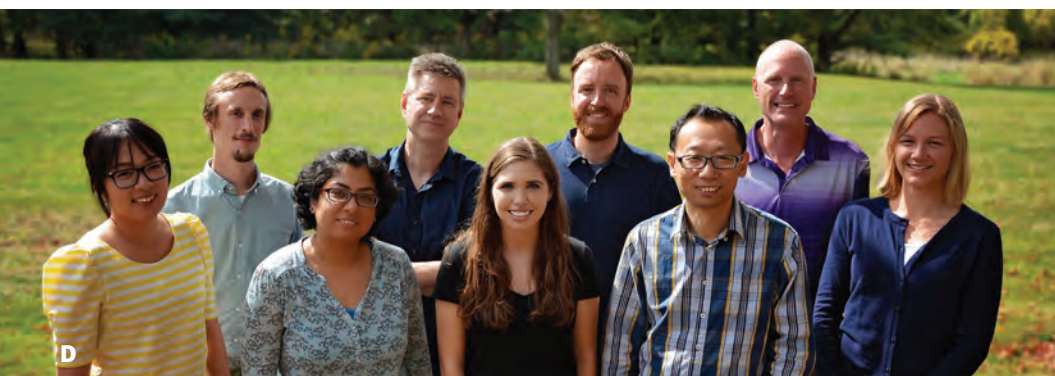
A related project also aims to keep viruses out, by preventing them from latching onto sugar molecules on the cell surface. Most viruses latch to one of two different types of sugars, but Schang's group has discovered a family of molecules that blocks latching to both, thus preventing infection by a number of viruses that infect companion animals and humans.

Schang and his group are finding common principles among many different viral infections, while also bringing to light novel molecules that can be further tailored toward life-saving antiviral drugs. The most advanced of Dr. Schang's molecules has been optioned by a startup, which is exploring its clinical potential.

MEET THE TEAMS

because we care

Each person at the Baker Institute contributes their skills to creating a healthier future for animals.





Facing page:

Group A Meyers Wallen Lab
 Group B Facilities Team
 Group C Schang Lab
 Group D Danko Lab
 Group E Coonrod Lab
 Group F Travis Lab
 Group G Animal Care Team
 Group H Parrish Lab

This page:

Group I Communications & Marketing Team
 Group J Antczak Lab
 Group K Tait Wojno Lab
 Group L Parker Lab
 Group M Van de Walle Lab
 Group N Grants & Administration Team
 Group O Administration Team

BICKNESE FAMILY PRIZE WINNER HONORS GRANDMOTHER THROUGH CANCER RESEARCH AT THE INSTITUTE

Ms. Melissa Ledet

PhD Candidate, Comparative Biomedical Sciences

The Bicknese Family Prize was established in 2005 by Dr. Joanne Bicknese, '76, DVM '78, as an annual award to support research activities of a female scientist-in-training. The award strives to provide support at a critical point in the trainee's academic development and help launch her into a successful career. The award honors Dr. Bicknese's parents, Helen and Louis Bicknese, and her aunt and uncle, Grace and Carl Bicknese.

This year's Bicknese prize winner is Ms. Melissa Ledet. A current graduate student in Dr. Gerlinde Van de Walle's lab, Ledet came to the Baker Institute in August of 2013 as a rotation student. While doing her three graduate rotations at the Institute, she learned of Dr. Van de Walle's research in mammary cancer and became especially interested in this project, as she had lost her grandmother to breast cancer.

Since then, Ledet has been studying mammary stem cells of species that are resistant to mammary cancer, such as horses, and of species that are as susceptible to mammary cancer as humans are, such as canines. Looking for clues to what makes one species more susceptible to mammary cancer than another, Ledet's current focus is on comparing equine to canine mammary stem cells and observing how they respond differently to carcinogenic agents.

While studying species-specific responses to breast cancer stimuli, she and Dr. Van de Walle discovered that horses

secrete a factor that kills cancerous human breast cells. Moving forward in her research, she will be seeking to identify this cancer killing factor. Most recently, Ledet has

been using RNA-sequencing to compare gene expression of cells that originally came from human mammary cancers in an attempt to learn what makes them vulnerable to the killing factors secreted by horse cells. She is also continuing her research into why horse and canine cells respond differently to carcinogens.

Ledet has used the funds given by the Bicknese prize to purchase software that allows her to better analyze results, make figures, and work remotely on projects. She plans to use the rest of the funds to obtain a new laptop, which will help her work more efficiently.

"I am honored to receive this award and am very grateful to Dr. Bicknese and her family for helping me follow my passion for breast cancer research," says Ledet.



DAVERSA FAMILY SCHOLARSHIP WINNER FINDS THE PERFECT FIT AT THE INSTITUTE

Mr. Tinyi Chu

PhD Candidate, Computational Biology

Dr. Maria Daversa and Mr. David Gulley established the Daversa Family Scholarship Fund in 2008 with the goal of providing financial assistance to undergraduate or graduate trainees involved in research at the Baker Institute. This year's recipient Mr. Tinyi Chu, a graduate student in Charles Danko's lab, started at the Institute in 2014 as a computational biology student. Chu found the interdisciplinary collaborations that exist at the Institute to be the perfect fit for him.

"When I applied for the award, I was analyzing the transcriptional changes in glioblastoma, an extremely devastating brain cancer. A good treatment doesn't currently exist and patients usually die within a year and a half of being diagnosed. I was focusing on the mechanism of these oncogenic changes and the dynamics of evolution across time," explains Chu.

Currently, Chu is working in the field of computational and systems biology. He is particularly interested in developing bioinformatic tools and addressing biological questions combining state of the art machine learning and statistical learning algorithms. "I lead the development of bioinformatic tools for analyzing PRO-seq, which ultimately amounts to mapping cancer-specific transcriptional network rewiring."

Seeing how afflictive cancer is, including within his own family, Chu has decided to focus on cancer biology in the future. "I would like to apply my background in statistics

and computer science to study cancer biology in a genome-wide approach using high-throughput sequencing technologies." This technology is capable of sequencing multiple DNA molecules in parallel, allowing for hundreds of millions of DNA molecules to be sequenced at one time.



Chu has used some of his award money to travel to research institutes in Hong Kong, where he was invited to speak about his research projects. In doing so, he was able to discuss his research with various professors and found many exciting ideas for new applications for his work. "I also used some of the funds to present my work at the prestigious Cold Spring Harbor Asia conference this fall, where my poster on experimental and computational technology won the first prize fellowship.

I am so grateful for the unique opportunities I've been given as a result of this award."

TRAINEE ACHIEVEMENT

Pablo Moral-Lopez PhD

Pablo Moral-Lopez grew up in the city of Madrid, but it was his family's rural homeland in the north of Spain that made him fall in love with the natural world. He chose to study biology in college, and a series of experiences working in microbiology labs across the U.S. lead him to the fascinating world of viruses.

Today, Moral-Lopez is tapping into his love of virology as a postdoctoral researcher in John Parker's lab. He is investigating reoviruses, a family of viruses that causes many respiratory and intestinal infections in people and animals. He is looking at how reoviruses take over the cell's protein-making machinery to reproduce themselves.



Parker had discovered that reoviruses form "viral factories", which are bodies within the cell where viruses replicate, assemble, and churn out new viral proteins. "This virus is hacking the cellular equipment so that those factories only produce viruses instead of the other things that the cell requires," says Moral-Lopez. He is trying to find whether the reovirus can manipulate the cellular protein making machines, called ribosomes, so that only the virus can use them.

The Parker lab conducts research to reveal the basic underpinnings of how viruses function. The reovirus that Moral-Lopez works with is one that is being evaluated as a "drug" to kill cancer cells. The more that is known about how the virus works, the better we will be able to understand how to use it for cancer treatment.

"For me, the most beautiful part of this work is that it is focused on knowledge," says Moral-Lopez. "Knowledge that is required in fields ranging from cancer therapy to biotechnology."

Moral-Lopez has found the Parker lab and the Baker Institute to be a welcoming research home. He hopes to make a career in academia so that he can continue learning new things about the natural world, knowledge that can then directly impact lives.



BAKER PET TALKS EXTENDING CORNELL'S REACH, ONE SEMESTER AT A TIME

Right: In addition to public education events such as the Baker Pet Talks, Dr. Fletcher's robotic dog is also used to teach veterinary students critical care techniques.



The Baker Institute, in collaboration with the Cornell Feline Health Center, has successfully organized and sponsored “Baker Pet Talks: Tips from Cornell Experts” since early 2016. The Baker Pet Talks series invites pet owners to learn about a variety of pet issues many of us face, directly from experts of Cornell University’s College of Veterinary Medicine.

Since its inception, Baker Pet Talks audiences have learned about:

- Pet CPR
- Behavior issues in dogs and cats
- Canine flu
- Heart disease in cats
- Allergies in dogs

“Great information – thank you for having this available for the public!” –Anonymous

“Thank you. Seminar very informative and easy to follow!” – Caroline

“Excellent broadcast, many thanks for making it available!” – Natalia

Originally intended as an in-person event for our local community, the success of the first Baker Pet Talks lead us to realize that this valuable resource should be shared with as many pet owners and lovers as possible.

Thanks to a recent partnership with CornellCast, we are able to livestream the event – making it accessible to anyone with internet connection. It also enables us to accept questions submitted prior to and during the event, and to archive the presentation so viewers can watch them at their convenience.

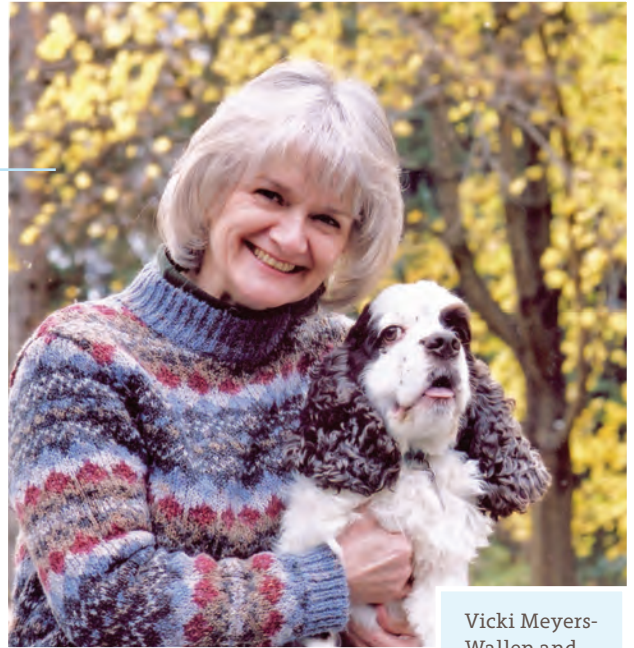
Last year’s Baker Pet Talks – Pet CPR – was watched by more than 200 people in over 10 countries! **If you missed the last two presentations** (Pet CPR or Behavior issues in dogs and cats), you can watch them here:

www.cornell.edu/video/pet-cpr-webinar

The topic for the next Baker Pet Talks is Pet Nutrition and will take place on December 6. If you can’t join us, be sure to catch the livestream or a recording of the event!

VICKI N. MEYERS-WALLEN: BUILDING A NEW RESOURCE FOR GENETIC DISEASE RESEARCH

Vicki Meyers-Wallen has dedicated more than 30 years of her life to research, to improve the health and well-being of dogs. Her investigations into canine genetic disorders have led to multiple discoveries of genes involved in sex organ development in dogs, but it will also yield a final culminating project: a Canine Embryonic Atlas that will serve as an online resource for scientists investigating the genetic underpinnings of developmental disorders.



Vicki Meyers-Wallen and her dog, Rudy

Meyers-Wallen began her career at the University of Pennsylvania where she received her degree in Veterinary Medicine in 1976 and her doctorate in Comparative Medical Sciences in 1986. She established her research program there as an assistant professor, but joined Cornell University in 1989. Ultimately, she decided to move up the hill to the Baker Institute in 1991, based on its reputation for supporting research that benefited the health of animals.

"People are here because they're not just interested in doing science, they're interested in doing science that helps animals," says Meyers-Wallen. "To me, that is very important."

One disorder of sexual development (DSD) she focused on was Persistent Mullerian Duct Syndrome (PMDS), which causes otherwise healthy male dogs to develop a uterus and oviducts. Her research group discovered a single causative mutation. Subsequently, they developed a genetic test for PMDS that is now available through commercial labs.

Another disorder of interest is XX DSD, in which dogs with female chromosomes develop one or two testes. While the condition runs in families, its inheritance is complex and the genetic basis has been difficult to pin down. Through multiple genetic and genomic studies, Meyers-Wallen has narrowed in on the chromosomal region that contributes to the disorder.

Through her investigations into DSDs and the embryonic development of the sex organs, Meyers-Wallen collected tissue that she is repurposing now to create an online Canine Embryonic Atlas. She is building a catalogue of photos of organs at different developmental stages, which will include data on which genes turn on and off in selected tissues at each stage. The information will be free and publicly available on the Baker Institute's website. The Atlas will serve as a resource for teachers and researchers, to help others rapidly identify genes involved in developmental disorders.

"I hope people will use the Atlas and add to it as they do additional studies," says Meyers-Wallen. "It will facilitate further research in dogs that ultimately will benefit dogs."





JUDY WILPON: TURNING LOSS INTO HOPE FOR A CURE

When asked at what point her passion for animals began, Judy Wilpon said, "I've had a love for animals for as long as I can remember. We always had dogs, cats, and even a parakeet while I was growing up. No horses, even though I wanted one desperately. My dad was a dentist in a tiny town in Michigan and there were no obvious chances for horses in my future at that time. I think I must have been born with a love for horses and dogs."

Judy's introduction to the Baker Institute came from her veterinarian, Dr. Henry "Hank" Travis, a 1974 graduate of Cornell's College of Veterinary Medicine and an active Baker Institute Advisory Council member at the time. In 1994, Judy was asked to join the Advisory Council. She had wanted to be a vet growing up and was intrigued by the research and discoveries being done at the Institute. She felt this would be her opportunity to help the animals she loved so dearly.

Throughout her time on the Council, Judy became especially interested in cancer research and made the decision to endow the Judy Wilpon Professor of Cancer Biology, a title currently held by Dr. Scott Coonrod, whose main research at the time was on human breast cancer.

Judy had experienced the devastation of canine cancer firsthand, having lost three entire litters of Golden Retrievers, ranging in age from 2 to 9 years, to the disease. The tipping point came when Judy lost her outstanding obedience, agility, and TDI therapy dog, Lefty, to hemangiosarcoma. This lethal canine cancer is so insidious that its presence is rarely noticed until an affected dog collapses or the tumor has spread throughout the body. The survival rate is almost zero.

It is vital to identify hemangiosarcoma early in an animal's life, but this early detection is not yet possible.

When Coonrod joined the Baker Institute, his research seemed most likely to aid in this project. His goals became supported by the Judy Wilpon Professor of Cancer Biology Professorship. But research of this type requires time, effort, and money. Dedicated to the fight against cancer and inspired by her love for animals, Judy has pledged additional support to spearhead the Institute's research on hemangiosarcoma. The project is being expanded to accelerate research on this devastating disease. With additional funding matching this generous donation, the team will have the ability to speed up researching the best ways to identify, mark, isolate, or eliminate the genes that lead to hemangiosarcoma, thereby ridding future generations of dogs of the disease.

"The research needs more support for hemangiosarcoma to be detected earlier in the animal's life", Judy said. "Together, we can help Dr. Coonrod and his team at Baker achieve great advancements toward a solution which will save the lives of millions of dogs."



Judy Wilpon and Lefty in September 2000, at his first obedience trial where he won first place

If you'd like to support the Institute's hemangiosarcoma research, please visit caninecancer.bakercornell.org

40 SCIENTIFIC PUBLICATIONS AND PATENTS

Peer reviewed publications are an important way for scientists to communicate their research findings to the scientific community and establish a public record of their research. These types of publications allow other researchers to test and challenge results and conclusions in their own labs. The conclusions that are supported after these challenges then become regarded as likely correct and advance our knowledge of the system under study, opening the door for practical applications. Publications also provide researchers with a way to connect and collaborate with other researchers around the world, enabling the sharing of knowledge and experience so vital in the scientific community.



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Emeriti

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Patents

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- Canadian patent No. 2,679,257, issued on April 4, 2017.

Travis, AJ; **Cohen, R**. Immobilized protein system for rapid and enhanced multiplexed diagnostics.

- US patent No. 9,547,014, issued on January 17, 2017.

Legend:

Bold denotes Tenured Track Faculty

Underlined denotes Other Institute Member

ACTIVE GRANTS

The Institute continued to excel at raising research funds from a variety of granting agencies this past year. Nevertheless, nearly three quarters of all sponsored grant dollars received in fiscal year 2017 came from the National Institutes of Health (NIH).

NIH research funding is becoming increasingly competitive each day, with the percentage of funded grants dropping by almost half in the last 40 years. NIH funding has also moved sharply away from any research on companion animals. Nonetheless, we are proud to have reaffirmed our standing in this extremely competitive environment by securing three new NIH grants this year.

The challenges posed by the NIH's restricted funding is being overcome by identifying, and applying to, a variety of funding sources. We are fortunate to have entrusted funds from our generous supporters. We also have consistently succeeded in earning funding from state agencies, nonprofit foundations, corporations, and internal competitions. This year, approximately a quarter of all sponsored grant dollars came from such entities. As the grants from these institutions are smaller than those from the NIH, however, raising this funding requires submitting numerous applications (61% of Institute grants are from such agencies). Our relationships with these funding sources are becoming increasingly more important and demand significantly greater effort and resources, beyond those already dedicated to raising NIH and similar funding.

To secure the financial resources needed to accomplish our mission, we will continue on our path of obtaining research funds from the NIH and a multitude of other sources. Should you wish to help us accomplish our mission, please consider making an unrestricted donation today.

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Grayson-Jockey Club Research Foundation

Cytotoxic T-Cell Immunity to Equine Herpesvirus Type 1

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Genentech, Inc.

Understanding Resistance to Endocrine Agents in Breast Cancer Cells

NIH (Department of Health & Human Services)

Mapping RNA Polymerase in Tissue Samples with ChRO-seq

Vicki N. Meyers-Wallen

Cornell University

Identifying the Molecular Basis of Canine Genetic Disorders and Developing Preventative Therapies

John S. L. Parker

NIH (Department of Health & Human Services)

Graduate Training Program in Comparative Medicine

Cornell Feline Health Center

Development of Feline Monoclonal Antibodies for Use as Therapeutic and Diagnostic Tools

NIH (Department of Health & Human Services)

Mechanisms of Virus-Mediated Compartmentalization of the Host Translational Machinery

Burroughs Wellcome Fund

Becoming Faculty Workshop at the NIH-Merial Veterinary Scholars Conference

Colin R. Parrish

NIH (Department of Health & Human Services)/University of Southern California, San Diego

Sialoglycan-Recognizing Probes for Defining Sialoglycomes in Biological Systems

NIH (Department of Health & Human Services)

Structural Controls of Functional Receptor and Antibody Binding to Viral Capsids

NIH (Department of Health & Human Services)

The Evolutionary and Biological Bases of Host Switching in Viruses

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Our Clinic Memorial Giving Program offers veterinarians the opportunity to make gifts to the Baker Institute in memory of their clients' deceased pets as a way of offering solace to their clients while helping to support the Institute's efforts to advance the health and well-being of animals every day. Thank you for your support!

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2017 FINANCIAL INFORMATION

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For every dollar received from Gifts and Bequests,
three additional dollars are raised through other means.

14.2% Grants and Contracts

25.9% Gifts and Bequests

13.7% Faculty Support

36.8% Endowment Income

1.7% Other Sources

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EXPENSES TOTAL: \$9,887,730

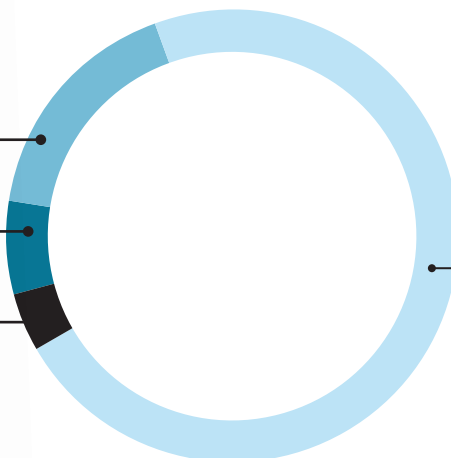
Over 72¢ on every dollar was spent on research support.

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16.9% College and University
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6.5% Infrastructure

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