The College of Veterinary Medicine at Cornell University hosted the eighteenth consecutive Leadership Program for Veterinary Students this year. The program's tradition of excellence has drawn thousands of applicants, but only 408 of the most promising students, representing fifty-five veterinary colleges, have been selected to participate. Although the life experiences, culture, and academic backgrounds of program scholars are diverse, all have distinguished themselves in a variety of professional and personal pursuits. They are highly motivated individuals who possess the ability to excel as research scientists and public-health professionals.

Research is the foundation of the Leadership Program, and the activity around which all other activities are structured. Program scholars pursue individual projects under the guidance of Cornell faculty members, who are successful scientists and experienced mentors. Their investigations are conducted in state-of-the-art facilities within the unsurpassed intellectual environment of Cornell University, an Ivy League institution located in the scenic Finger Lakes region of New York State. Program scholars also participate in modules and workshops that are structured as student-directed learning exercises. Topics include emerging infectious diseases and biodefense, leadership and its attendant responsibilities, and modules that illuminate characteristics of leadership and employment opportunities for veterinary graduates in academia, government, and industry. Vocational counseling is featured prominently in the program. The aim is to empower students to make informed decisions about graduate education and their careers. Field trips to federal research facilities are an additional feature of the program.

The Leadership Program has fulfilled its principal objective—to provide veterinary students with unique learning experiences that both clarify and strengthen their commitment to careers in science. One hundred and two of these individuals have earned the Ph.D. degree or are presently in training, while many others have been awarded other advanced degrees in science or veterinary public health. A legacy of the program has been the establishment of a network of alumni who have the motivation to assist one another and more junior colleagues. Together they can contribute broadly to the biomedical sciences.

Douglas D. McGregor, M.D., D.Phil.
Program Director

David R. Fraser, B.V.Sc., Ph.D.
Co-Director
Acknowledgements

The Leadership Program for Veterinary Students is made possible through awards from federal agencies, corporations, foundations, and other private-sector sponsors. For their generous support this year, the program organizers thank:

The Albert C. Bostwick Foundation
The Cornell Club of Germany
The Merck Company Foundation
Pfizer, Inc
The Wellcome Trust

The program organizers also thank the facilitators, counselors, and mentors who took part in the 2007 program. Thanks, too, to Ariana Blossom, the program coordinator, and to Jill King, Alexis Wenski-Roberts, and David Frank for their assistance. Finally, the organizers congratulate the scholars themselves. Their academic achievements, coupled with their dedication to discovery and service, mark these extraordinary individuals as future leaders of the veterinary profession.
2007 Leadership Program Agenda

June 4  Opening Meeting
June 5  Library Orientation
        Biological and Chemical Safety Training
June 6  Laboratory Orientation
June 9  Career Discussion
        Leadership Discussion Pre-meeting
June 11 Leadership Discussion I and II
        Program Dinner
June 12 Biological and Chemical Safety Training
June 13-15 Field Trips to the National Institutes of Health and the United States Department of Agriculture
       Radiation Safety Training
       Emerging Diseases Workshop
       Biodefense and Public Health Workshop
       Drug Design Workshop
July 9  Reunion Dinner
July 16 Careers in Industry Workshop
July 18 Leadership in Action
July 23 Residency Training
July 24 Research Training
July 25 Translational Science
August 8 Research Presentations
August 9 Research Presentations
August 10 Exit Meeting
### 2007 Leadership Program Scholars

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### College Affiliations

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- University of Sydney
- University of Bristol
- University of Cambridge
- University College Dublin
- University of Sydney
- Cornell University
- Freie Universität Berlin
- University of Sydney
- University of Cambridge
- University of California at Davis
- University of Cambridge
- Cornell University
- Freie Universität Berlin
- Universiteit Utrecht
- Shanghai Jiao Tong University

### Mentors

- Yrjo Gröhn
- Drew Noden
- Alexander Travis
- Martin Wiedmann
- John Parker
- Gary Whittaker
- Tracy Stokol
- Klaus Osterrieder
- Teresa Gunn
- Klaus Beyenbach
- Eric Denkers
- William Horne
- Joel Baines
- Colin Parrish
- Craig Attier
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- Marci Scidmore
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- Ruth Collins

### Department Affiliations

- Population Medicine/Diagnostic Sciences
- Biomedical Sciences
- Baker Institute
- Food Sciences
- Baker Institute
- Microbiology/Immunology
- Population Medicine/Diagnostic Sciences
- Biomedical Sciences
- Biomedical Sciences
- Microbiology/Immunology
- Clinical Sciences
- Microbiology/Immunology
- Baker Institute
- Baker Institute
- Population Medicine/Diagnostic Sciences
- Population Medicine/Diagnostic Sciences
- Microbiology/Immunology
- Parasitology
- Clinical Sciences
- Baker Institute
- Molecular Medicine

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The Leadership Program combines faculty-guided research with student-directed learning through participation in modules, workshops, and group discussions. The activities encourage responsible leadership; the development of analytical, critical thinking, and teamwork skills, and an awareness of professional training opportunities that will enable program alumni to broadly impact the veterinary profession.

**Research**

Independent research is the foundation of the program. Each scholar is assigned a project and a faculty mentor to guide his or her investigations. The projects enable the students to gain practical experience by exploring problems of interest to them. Simultaneously, they hone the students' communication skills through participation in group modules and by presenting their research findings in a public forum at the conclusion of the program.
Leadership

Leadership and its attendant responsibilities are central considerations in the Leadership Program. Critical thinking and decision-making are featured in a scenario-based module that explores veterinary public health, and economic, political, and social issues. Scholars and facilitators are assigned roles that oblige them to state, defend, and sometimes alter their positions as details of the scenario unfold. At the conclusion of the module, the facilitators comment on the exercise and discuss leadership principles that have guided their own careers. David Fraser moderated this year's discussion with assistance from Alan Doyle and Andrew Sage II.
**Leadership in Action**

Program scholars viewed the film *A Few Good Men*, which illustrates the strengths and deficiencies of individuals cast in the role of leaders. Discussion of the film was facilitated by Maurice (Pete) White, David Fraser, and Douglas McGregor.

**Emerging Diseases**

A workshop moderated by Colin Parrish, John Parker, Philip Carter, and Peter Jahrling featured a discussion of diseases that are emerging or reemerging in nature. From a prepared list, the program scholars selected four diseases on which to focus. They conducted library research on the diseases, then engaged their peers and the facilitators in a lively and informative discussion.

Later in the evening, the facilitators commented on related issues and the need for veterinary scientists who contemplate careers in infectious disease research.
Biodefense and Public Health

A similarly structured workshop addressed problems connected with the deliberate release of infectious agents that can have catastrophic consequences for animals and people. As in the Emerging Diseases workshop, the scholars worked cooperatively in preparing and presenting their findings. The panel of facilitators from the Emerging Diseases workshop also took part in this meeting. During the evening session, the facilitators commented on their own experiences and the preparation required for veterinarians to function as public-health professionals.
Drug Design

Michelle Haven of Pfizer, Inc., moderated a mock competition, in which the students had opportunities to exhibit creativity and teamwork in resolving problems connected with the discovery, development, and marketing of therapeutic drugs. Michelle was assisted by two colleagues from Pfizer, Mary Craig and Robert McCall.
Career Explorations

Career planning is featured prominently in the Leadership Program. In five meetings, scholars considered opportunities for veterinary graduates to broadly influence their profession.

In the first of these, David Fraser, Amanda de Mestre, and Amy Warren commented on the importance of a veterinary degree for individuals who aspire to careers in science. The three counselors emphasized the importance of selecting a superior environment for research training and a mentor who has a successful training record.
In the second, Gerard Hickey, Christopher DeMoula, and William Feeney conducted mock interviews with program scholars. The students prepared for the interviews by reviewing announcements for three job positions and hypothetical résumés of three veterinarians who were candidates for those positions.

In the third, Julia Flaminio and Amy Warren commented on residency programs in animal medicine and pathology. The facilitators emphasized factors one should consider in seeking a residency; the expectations of program organizers, and the satisfaction of an academic or veterinary-service career.
In the fourth, Susan Bliss, Alex Travis, and Douglas McGregor identified aspects of training one should weigh in selecting an environment for graduate study; the subject of one's thesis research, and the individual to guide one's development as a research scientist.

A case study of "translational science" occupied the final meeting. The ensuing discussion led by Kenneth Simpson and William Horne revealed how individuals trained to a high level of proficiency as both clinical specialists and research scientists can extend the frontiers of knowledge through their unique capacity to define disease mechanisms at the cell or molecular level.
Cornell’s Partnership with the National Institutes of Health 2007

The National Institutes of Health and the Cornell University College of Veterinary Medicine have forged a partnership that offers program scholars an opportunity to learn about research conducted at the National Institutes of Health, the nation’s premier biomedical research institution. This year’s participants gathered on the main campus of the NIH for a full day of scientific presentations and discussions. Speakers included distinguished scientists and administrators drawn from the agency’s intramural research program.
Topics and Speakers

Welcome and Introduction
Joan P. Schwartz, Ph.D.
Assistant Director, NIH Office of Intramural Research

The Cornell/NIH Partnership
Douglas D. McGregor, M.D., D.Phil.
Director, Cornell Leadership Program for Veterinary Students

Neuronal Migration and Maturation: Development of the GnRH-1 System
Susan Wray, Ph.D.
Chief, Cellular and Developmental Neurobiology Section
National Institute of Neurological Disorders and Stroke

Calcium Storage and Release: Redefining the Role of Calsequestrin in Heart Rhythm
Karl Pfeifer, Ph.D.
Genome Imprinting
National Institute of Child Health and Human Development

Aggression, Serotonin, and Gene–Environment Interactions in Rhesus Monkeys
Stephen J. Suomi, Ph.D.
Chief, Laboratory of Comparative Ethology
National Institute of Child Health and Human Development

HIV Infection and the Mucosal Immune System
Jason Brenchley, Ph.D.
Research Fellow, Vaccine Research Center
National Institute of Allergy and Infectious Diseases

Proteomics as a Biomarker Tool for Diagnosis and Prognosis
Christina M. Annunziata, M.D., Ph.D.
Medical Oncology Branch
National Cancer Institute

Closing remarks
Joan Schwartz and Douglas McGregor
The USDA and Animal Agriculture 2007

The United States Department of Agriculture has been another valued partner in the Leadership Program. This year's scholars visited the USDA's Animal and Natural Resources Institute in Beltsville, Maryland. Institute scientists commented on their research and opportunities for advanced training at this prestigious institution.
Topics and Speakers

Introduction and Overview of the Beltsville Agricultural Research Center
David Granstrom
Associate Director, Animal and Natural Resources Institute

Genetic Engineering in Livestock
Robert Wall
Research Physiologist, Biotechnology and Germplasm Laboratory

Searching for Genes that Control Resistance to Internal Parasites of Cattle
Louis Gasbarre
Research Leader, Bovine Functional Genomics Laboratory

Avian Coccidiosis: Past, Present, and Future Control
Mark Jenkins
Microbiologist, Animal Parasitic Diseases Laboratory

Ecology of Foodborne Pathogens on the Dairy Farm
JoAnn Van Kessell
Research Animal Scientist, Environmental Microbial Safety Laboratory
The program scholars discussed their research in a series of presentations over two days at the conclusion of the program. A book prize was awarded to Sarah Caddy for best overall project as judged by her underlying hypothesis, project design, research results, and presentation. Additional prizes were awarded to Sonja Bröer, Elva Cha, and Amy Fulton for exceptional projects in integrative biology, cell biology, and molecular biology, respectively. The Selection Committee for the 2007 Leadership Program salutes these individuals and congratulates all of the fellows for their commitment to research and the excellence of their presentations.

**Program Prize**
Sarah Caddy
Investigating the Effects of Proteolytic Capsid Cleavage on Feline Calicivirus Virulence

**Cell Biology Prize**
Elva Cha
Structure-Function Studies of a Rhabdovirus Glycoprotein: Insights into the Pathogenesis of Viral Hemorrhagic Septicemia

**Integrative Biology Prize**
Sonja Bröer
FGF8-mediated Control of Muscle-Specific Transcription Factors

**Molecular Biology Prize**
Amy Fulton
Using siRNA as a New Therapeutic Approach to Target and Prevent EHV-1 Replication and Infection
Patrick Ayscue | Cornell University, Epidemiology

Elucidating Persistence and Transmission of Virulence Factors Encoded by Verotoxin-producing E. coli in Pre-harvest Beef Cattle

Taking part in the Cornell Leadership Program for Veterinary Students has allowed me a unique opportunity to put my academic efforts and goals into perspective at the beginning of my Ph.D. program of study. It has given me the opportunity to explore and gain a better understanding of the possibilities available to me as a veterinary epidemiologist in the dynamic world of infectious disease research while engaging with some of the foremost investigators in the field.

My research efforts this summer have focused on applying analytical tools to datasets describing the shedding of *Escherichia coli* in feedlot cattle, one of the major reservoirs of *E. coli* that cause disease in humans. I have worked to answer a number of questions with these data that have not been robustly addressed in the current literature. What are the persistence patterns of *E. coli* at the individual and pen level? What virulence factors influence the survival and persistence of *E. coli*? What is the expected long-term prevalence of the organism in a variety of management systems? And does *E. coli* shedding match a pattern we might expect to see from an infectious agent? The preliminary work conducted this summer on data describing *E. coli* 0157:H7 shedding will inform efforts in the coming months to expand the work being undertaken in Yrjo Gröhn’s lab by better defining research questions of interest and directing specific aims of grant proposals currently in development for more comprehensive work.

I would like to thank Douglas McGregor and David Fraser for their support and efforts across the summer and beyond. I am also indebted to my laboratory colleagues for their continual support and companionship.
Sonja Bröer | Leibniz Universität Hannover, Embryology

**FGF8-mediated Control of Putative Muscle-Specific Transcription Factors**

This summer I have learned that it is possible to combine my interests in clinical veterinary medicine, research, and teaching, to contribute both to human and veterinary medicine.

My research focused on control of gene expression during eye muscle development. Fibroblast growth factor 8 (FGF8) is a key regulator of trunk myogenesis. Exposure of head mesoderm to FGF8 causes variable effects: loss of some eye muscles and overgrowth of jaw muscles. The gene myoR codes for a transcription factor that is initially expressed throughout head mesoderm and only secondarily becomes restricted to muscles. My project examined whether FGF8 affects expression of myoR in all mesoderm cells or only those that will form muscles. To test this, I implanted sepharose beads soaked in FGF8 into head mesoderm of chick embryos.

Using in situ hybridization, I found that expression of myoR in branchial regions was greatly enhanced while in periocular regions it was diminished or lost. These results suggest that later expressed muscle-specific transcription factors such as myf5 may be downstream of—i.e. dependent upon—myoR expression.

The Leadership Program has been an excellent experience in many ways: First, I want to thank Drew Noden and all members of his laboratory, who supported me tremendously and taught me technical skills as well as helping me practice thinking like a scientist. David Fraser and Douglas McGregor and the other facilitators shared their experience with us and provided us with useful career tips that helped me formulate my future plans. Last but not least, I also want to thank Ariana Blossom, Jill King, and all my new friends for making this program perfect and the summer unforgettable.

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Rosemary Brungs | University of Sydney, Reproductive Biology

**Identification of the Molecular Mechanism by which the Ganglioside GM1 Influences Signaling Pathways in Murine Sperm**

When I enrolled in veterinary science four years ago, I envisaged a purely clinical career path. My interest in research developed throughout my studies due to my strong curiosity for understanding the basis for how things work coupled with an increasing desire to maximize the impact I could have on improving both animal and human health.

Over this past summer I had the privilege to work in Alexander Travis's laboratory, involved in identifying the molecular mechanism by which the ganglioside GM1 influences capacitation in mouse sperm. Previous work within the lab had found that GM1 hastens capacitation, increases motility, and induces acrosomal exocytosis in mouse sperm. As GM1 is present in high but varying concentrations in the common cryoprotective reagent, egg yolk, a better understanding of how GM1 influences capacitation may aid in the development of superior cryopreservation media. I used western blot to analyze the level of protein tyrosine phosphorylation, as a marker of capacitation, in sperm incubated with various gangliosides. These gangliosides differed from GM1 in one or more of its three main molecular structures; the ceramide tail, sialic acid residue, and oligosaccharides. I discovered that tyrosine phosphorylation is enhanced to a similar degree by a range of these structurally different gangliosides, indicating that the interaction was more complicated than just a single-molecule effect.

The Leadership Program has been an invaluable experience, introducing me to a range of amazing people, both research professionals and students, and broadening my appreciation of the wide vista of career options available. I would like to thank everyone in the Travis lab for their guidance and encouragement, and for making the experience so enjoyable. I would also like to thank Douglas McGregor and David Fraser for providing me with this wonderful and inspiring opportunity.
Stephen Burr | University of Bristol, Bacteriology

**Probing Sigma B-dependent Transcription of mcsA and hrcA in Listeria monocytogenes**

I will begin the fourth year of my veterinary science degree at the University of Bristol this fall and have spent the last year studying for an intercalated B.Sc. in veterinary pathology. As I have progressed through the veterinary curriculum I have become more aware of the wide range of career paths open to a veterinary graduate. I came to Cornell to explore these options.

This summer I have been working in Martin Wiedmann's lab under the supervision of Sarita Raengpradub. My project focused on networks of transcriptional regulation in the food-borne pathogen *Listeria monocytogenes*. The changes in gene transcription necessary to cope with the environmental stresses encountered by *Listeria* are coordinated by transcriptional regulators, including the alternative sigma factors. Each sigma factor is associated with regulation of a specific set of genes related to a particular stress response. However, sigma factors may also modulate regulatory factors involved in other stress responses, forming complex regulatory networks. I investigated the effects of sigma B (which regulates genes involved in the general stress response) on two genes (hrcA and mcsA) involved in the heat shock response. The highlight of my project was the identification of the sigma B promoter region upstream of mcsA. This was achieved using 5' RACE-PCR and disproved data from computer models, which suggested that the promoter sequence was located further upstream of the gene.

The Cornell Leadership Program has given me a firm basis upon which to make future career choices. The laboratory experience and course modules have provided me with an invaluable insight into the opportunities available to me in the fields of biomedical and veterinary research.

Sarah Caddy | University of Cambridge, Virology

**Investigating the Effects of Proteolytic Capsid Cleavage on Feline Calicivirus Virulence**

I began my veterinary studies at Cambridge convinced I wanted to work in rural mixed practice when I graduated six years later. This view started to change during my intercalated third year when I majored in infectious disease and became involved in prion research. I realized I had more career options than I first thought. This prompted me to apply to the Cornell Leadership Program, where I hoped to learn more about the world of veterinary research and gain valuable career advice.

My research project focused on feline caliciviruses (FCV) within the Parker lab at the Baker Institute. FCV usually causes mild clinical signs, but in the past decade more virulent strains have emerged. These strains can have up to a 67 percent mortality rate, and a key aim of FCV research in the Parker lab is to elucidate the mechanisms of this increased virulence. My project investigated the hypothesis that more virulent isolates are able to infect a greater range of cells because they have an altered sensitivity to host proteases. I showed that the pattern of trypsin cleavage of three FCV isolates differed, and the infectivity assays I carried out revealed that virulent isolates digested with trypsin appear more resistant to degradation than the vaccine strain of FCV. This paves the way for much more investigation into the role of proteases in FCV infection.

Summer 2007 has been a really unique experience for me, and I shall take back to England a new passion for virology and many more ideas (though not decisions just yet!) about my future career. I wish to thank my wonderful mentor, John Parker, for giving me such an inspiring project, Oz for all his guidance, and ultimately those who selected me to be a program scholar and made this summer possible.
Elva Cha | University of Sydney, Virology

**Structure-Function Studies of a Rhabdovirus Glycoprotein: Insights into the Pathogenesis of Viral Hemorrhagic Septicemia**

I became interested in epidemiological research at an early stage of my veterinary studies and this prompted me to undertake an epidemiological honors project in 2007. I aspire to a career in public health aimed at investigating the epidemiology of zoonoses and emerging infectious diseases. The outbreak of viral hemorrhagic septicemia in fish in the Great Lakes caused by a rhabdovirus, viral hemorrhagic septicemia virus (VHSV), has stimulated research on VHSV pathogenesis and host specificity. This virus is specific to fish, while a prototype virus in the Rhabdoviridae, Vesicular Stomatitis Virus (VSV), is infectious to mammals. Recent studies have demonstrated that viral infection can be halted by interference with cell entry events. The viral glycoprotein G, which allows virus binding and fusion with host cells, was the focus of the current project. The molecular tools developed for the study of VSV infection were applied to VHSV. All VHSV G sequences, unlike those of VSV, have a block of four cysteine residues on the inner surface of the viral membrane that may assist in viral fusion and stability. Mutations of VSV G and a chimera (a combination of genomes) of VSV G and VHSV G were produced with the aim of identifying the role of the four cysteines on viral function and stability, using cell–cell fusion assays.

The Leadership Program has afforded me the opportunity to meet with distinguished researchers in a variety of fields and fuelled my ambition for a career in research. The Whittaker lab provided an energetic, vibrant, and interactive environment for me to cultivate my learning. I sincerely thank Sandrine Belouzard, Gary Whittaker, and other lab members for their exceptional mentoring.

Boran Choi | Seoul National University, Hematology

**Measuring Tissue Factor Procoagulant Activity on Feline Monocytes**

I have been like a fish in a lake looking forward to reaching the sea, so I recall how excited I was to hear of the Cornell Leadership Program, which could give me the opportunity to gain experience in scientific research. Even though I was certain of my area of interest, I kept wondering what specific field I wished to work in and what qualifications I might need to enter that field.

I worked in Tracy Stokol’s lab. The project I was assigned had never been done before, which provoked my curiosity. The aim was to develop an assay for the diagnosis of thrombosis in cats. My role was to measure the procoagulant activity of tissue factor, expressed on feline monocytes. This factor triggers thrombin activation, ultimately leading to thromboembolism. Peripheral blood monocytes were isolated by single density separation from blood. I then initiated the extrinsic pathway of procoagulation by adding FVIIa and FX. The tissue factor activity was determined using a chromogenic substrate that is cleaved by the tissue factor–FVIIa–FX complex. Lipopolysaccharide (LPS) has been found to stimulate tissue factor expression on monocytes of other species. I discovered that LPS induced a dose-dependent increase in tissue factor procoagulant activity on feline monocytes. This activity also depended on the number of stimulated cells.

This experience has given me insight into a specific field of research and has also shown me the role of a leader in that field. Following my graduation, I now plan to undertake a Ph.D. in immunology in another country. I appreciate the great mentorship that Tracy Stokol has provided me, over the past ten weeks. I also thank Douglas McGregor and David Fraser for giving me the opportunity to participate in the Cornell Leadership Program, which has helped me define my research interests.
Amy Fulton | Cornell University, Virology

Using siRNAs as a New Therapeutic Approach to Target and Prevent EHV-1 Replication and Infection

My love of a challenge, as well as the desire to make a difference in the lives of animals, drew me to a career in veterinary medicine. After completing my first two years of veterinary school, I realized that I find the challenge of being more than a practicing veterinarian very attractive. I applied to the Leadership Program to help me explore other options, and to see if my inclination toward a career in academia, where I could combine teaching, research, and medicine, was more than just an inclination.

My project this summer in Klaus Osterrieder's laboratory was focused on using small interfering RNA molecules to downregulate replication of Equine Herpesvirus type 1. EHV-1 is an alpha herpesvirus that spreads rapidly through nasal secretions, causing symptoms of fever, nasal discharge, as well as late term abortions and neurologic sequelae that have serious consequences for both the individual horse and the equine industry. Currently, infected horses can be treated only symptomatically. The goal of my project was to test whether siRNA, which targets specific mRNA sequences for cleavage as part of the RNA interference pathway, could be used to prevent or treat EHV-1 infection. I was able to show that siRNA treatment does significantly inhibit viral replication in vitro, therefore making siRNAs a good candidate for further in vivo studies.

I would like to thank Gerlinde van de Walle for her invaluable guidance, Klaus Osterrieder for giving me the opportunity to work with his lab, and the rest of the Osterrieder lab for their support. Thanks also to Douglas McGregor and David Fraser for organizing this enlightening experience, and to my fellow students and Ariana Blossom, all amazing and wonderful people who made this an unforgettable summer.

Ludwig Groeblen | Freie Universität Berlin, Genetics

Developmental Defects in Dark-like Animals

I started my studies at the veterinary school in Berlin in 2002. Internships in different organizations have acquainted me with a variety of veterinary disciplines, and provided insight into career options other than clinical practice. I worked in a pharmaceutical company where I gained knowledge about the practice of drug design. There I recognized that I had a deep desire to take part in the creation of future technologies and innovations. Valuable experience was gained in a research project that examined the health status of cheetahs in Namibia. The collaboration with biologists in interdisciplinary teams confirmed my wish to pursue a research career. For the last year of my studies I was awarded a scholarship to work on avian pathogenic E. coli, using a technique called Signature-tagged Transposon Mutagenesis to detect new virulence factors.

During my time at Cornell, I had the opportunity to work under the supervision of Teresa Gunn. The aim of my project was to study developmental heart defects in dark-like animals, a spontaneous mouse mutation displaying significantly higher mortalities in embryos and weaning pups. For this I analyzed sections of 18.5 day-old embryos and described the pathologic findings of cardiovascular defects. Furthermore, I examined the expression of Nodal, a gene playing a key role in left-right asymmetric morphogenesis of visceral organs, and found different forms of mis-expression in E 18.5 day-old embryos.

I would like to thank Douglas McGregor and David Fraser for organizing this unique program and making these unforgettable experiences possible; my mentor, Teresa Gunn, and my supervisor, Christina Cota, for showing me new aspects of research not usually offered in vet school education; and all the people who supported and motivated me during my stay at Cornell.
Laura Grogan | University of Sydney, Renal Physiology

Cloning of an SLC4 Anion Exchanger in the Malpighian Tubules of the Yellow Fever Mosquito (Aedes aegypti)

After my preclinical veterinary studies I completed a one-year research degree in wildlife ecology. This experience reinforced my aim to pursue a scientific career. After graduation with my veterinary degree, I wish to obtain a Ph.D., combining my love of wildlife ecology and epidemiology. My long-term career goal is to lead tropical wildlife ecological and epidemiological research in the hope of finding sustainable solutions to contemporary environmental concerns.

I am very fortunate to have worked this summer with a wonderful group of researchers under the supervision of Peter Piermarini and Klaus Beyenbach. Members of our laboratory have been studying molecular biology and electrophysiology of Malpighian tubules in the yellow fever mosquito—an insect that is a pertinent physiological model for understanding mammalian renal function. Following hypotheses concerning acid secretion into the tubule lumen, the aim of my project was to identify, characterize, and clone a putative anion exchanger in mosquito Malpighian tubules. I employed several genomic and molecular techniques to do this, and was somewhat surprised that I not only achieved this goal in the short time available, but was fortunate to have been the first to clone an anion exchanger in any insect to date. This work has been especially relevant as it coincides with the release of the fully sequenced genome of Aedes aegypti, and lends some interesting perspectives on the validity of genomic algorithm predictions and the evolutionary differences between species.

This program has been a defining period in my pursuit of a veterinary research career, and I am deeply appreciative of all who have contributed to making this summer so enlightening and valuable, especially my two brilliant mentors. Thank you.

Kate Johnson | University of Cambridge, Parasitology

Role of JNK/SAPK MAPK in Dendritic Cell IL-12 Production During Toxoplasma gondii Infection

I have been working with Toxoplasma gondii, a parasite from the same phylum as the protozoan causing malaria. It can infect virtually any mammalian cell and is important as a cause of abortion in sheep and, in human disease, especially in immune-suppressed groups. It is also a useful model for other protozoan parasites important in both human and animal medicine. As a prominent disease of the immune-suppressed, the immune response to Toxoplasma is an informative area of research and one of special interest for the Denkers lab.

IL-12 is a proinflammatory cytokine. The cytokine is produced in cells of the innate immune system and requires signaling in the mitogen-activated protein kinase pathway (MAPK) for production. The role of JNK MAPK in IL-12 production is unknown in dendritic cells (DC); consequently, I had the opportunity to look at an unexplored, but very exciting area of research. My results are preliminary, but they, unexpectedly, suggest a role for JNK that is different from that seen in the other cells of the innate immune system; in neutrophils and macrophages, JNK appears to be more central to IL-12 production than it does in DC.

Beyond my research project, which became increasingly interesting as the summer progressed, I learned a lot. I came into the summer with career aims that can best be described as not wanting to be a traditional vet; I now have so many more exciting ideas to consider. I am very grateful for the opportunity to spend a summer thinking about what it is that I want to do and which subjects really excite me. I would like to thank David Fraser and Douglas McGregor for this opportunity and also everyone in my lab, especially Eric Denkers.
Kristin Lewis | University of California at Davis, Molecular Biology

**Syntaxin 1a Interacts with the Calcium Channel β4 Subunit**

My interest in a science career began many years ago as an undergraduate studying microbiology; however, my interest in a career as a veterinary pathologist began recently while working in the biotech industry. In three years time, when I've finished vet school, I plan on completing a residency in anatomic pathology, followed by a Ph.D. I then plan on returning to the biotech/pharmaceutical industry.

This summer I had the pleasure of working in William Horne's lab, where the main research focus is on investigating the protein–protein interactions of voltage-gated calcium channels. Calcium channels regulate a variety of events, including muscle contraction, gene expression, and neurotransmitter release. Understanding how calcium channels function at the molecular level can lead to rational design of drugs for treating chronic pain. My project focused on investigating the interactions of syntaxin 1a, a protein involved in exocytosis/neurotransmitter release, with the calcium channel β4 subunit. My task was to first create and purify the protein and then to study the interactions. Through protein pull-down experiments, which are used to study protein–protein interactions, we showed that syntaxin 1a interacts with the β4 subunit of the calcium channel in the presence of calcium. Ongoing experiments will determine the necessity of calcium in this interaction.

The Leadership Program has been an unforgettable experience that has helped me develop as a person and as a future scientist. I have enjoyed the combination of the workshops, group discussions, and especially the research. I am grateful to everyone whose dedication made this program a success, particularly the members of the Horne lab.

Fiona McNeill | University of Bristol, Virology

**Intranuclear Capsid Movement Studies in Herpesvirus-infected Cells**

I applied to the Leadership Program after completing three years of my veterinary degree and an intercalated B.Sc. in veterinary pathology. I began my veterinary education with the ambition of entering clinical practice, but am becoming increasingly aware of alternative career pathways that exist for veterinary graduates. I aspire to a career combining veterinary knowledge with scientific interest in order to directly influence animal health.

During my summer at Cornell, I worked in Joel Baines's lab studying the intranuclear movement of herpesvirus capsids. Following infection with herpesvirus, focal aggregations of immature capsids known as assemblons can be seen in the nucleus of many cells. A cell line expressing a GFP-tagged herpesvirus capsid protein was infected with herpes simplex virus, allowing the intranuclear virus movement to be tracked using time-lapse confocal microscopy. It was found that as infection progresses fewer fast-moving individual capsids are seen in the nucleus, and more assemblons that are fixed in one position appear.

I also studied the effects of Indomethacin on capsid movement and assemblon formation. Herpesvirus infection induces the production of cyclooxygenase, key enzymes in the prostaglandin synthesis pathway. Indomethacin inhibits cyclooxygenase-2 and was found to cause the disassembly of preformed assemblons. These findings suggest a role for prostaglandins in assemblon maintenance. Since prostaglandins are inducers of the cell stress response, it is hypothesized that they promote actin remodeling in the nucleus, potentially providing an actin scaffold to fix assemblons in one position.

As well as providing me with research experience, the Leadership Program offered a unique combination of workshops, field visits, and career discussions. As a result, I feel better prepared to make informed career decisions in the future. At the same time I have formed close friendships and built up many useful contacts in the field of veterinary science and research.
Ciara Murphy | University College Dublin, Virology

Sialic Acid Binding of the Canine and Feline Parvoviruses

As a second-year veterinary student at University College Dublin, my current professional goal is to combine the skills that I have acquired during my Ph.D. studies with my veterinary degree and future specialist training, to work in the field of translational science.

My research project with Colin Parrish was concerned with the association of the canine and feline parvoviruses (CPV and FPV) with surface molecules known as sialic acids (SA). Although parvoviruses use the transferrin receptor for binding and infection activities, there is also an important relationship between viral binding of SA and the different forms of SA expressed on host cells and tissues. It is known that the viruses have host-specific or selected differences in their SA binding and specificity. For example, CPV and FPV bind the Neu5Gc sialic acid, but not the Neu5Ac form, and they favor a particular α2-6-linked form of the Neu5Gc. Little is known about which SA are expressed by natural hosts, or the genetic basis for any differences that may exist. In order to investigate this further, we focused on a host gene coding for the enzyme cytidine monophosphate-N-acetylneuraminic acid hydroxylase (CMAH), which converts NeuAc to NeuGc. We then asked the question; which form of the CMAH gene is present in the different hosts and host breeds and where is it expressed? An RT-PCR was designed to generate the canine/feline CMAH gene product for sequencing. This assay could then be used to analyze host tissues for the CMAH gene.

I would like to thank all in the Parrish lab as well as Douglas McGregor, David Fraser, and Ariana Blossom for a fantastic summer that has provided me with new insights into the research side of the veterinary profession as well as an opportunity to make many new friends and acquaintances.

Alison Neef | University of Sydney, Bacteriology

The effects of Short-chain Fatty Acids on Invasion Gene Expression in Salmonella

I have always had a strong interest in large animal veterinary medicine, microbiology, pathology, and infectious diseases, and I had the opportunity to combine these interests last year by undertaking an additional research year. I applied to the Leadership Program so that I could further explore the career opportunities available to me following graduation at the end of this year. My aim is to continue to develop my interests in research and science.

As a Leadership Program scholar, I investigated the effects of short-chain fatty acids on invasion gene expression in Salmonella spp. In particular, butyrate and propionate are known to reduce invasion gene expression, but the molecular mechanism by which this occurs is unknown. The aim of my research was to better characterize these pathways. A population of bacterial mutants was produced, and with the use of a β-galactosidase selection procedure I was able to screen these mutant bacteria for their ability to express invasion genes in the presence of butyrate. If such a mutant colony was identified, further investigation could then be carried out to locate the genes involved in butyrate metabolism. Several mutant bacteria were identified from the screening procedure; but further investigation using quantitative β-galactosidase assays revealed that these did not have significantly higher invasion gene expression in the presence of butyrate when compared with wild type strains.

The program has been a fantastic and enjoyable experience, and I now have a much better understanding of the many career possibilities that are available to me. I would like to thank my research mentor, Craig Altier, and also Douglas McGregor and David Fraser for their work in making this such an excellent program.
**Emily Newman | University of Cambridge, Hematology**

**Stewie's Story: Elucidating the Molecular Basis of Hereditary Thrombopathia in Basset Hounds**

Hereditary thrombopathia is a disorder of fibrinogen-dependent platelet aggregation defect associated with abnormal primary hemostasis and bleeding. Until recently little was understood about the genetic or mechanistic basis of the bleeding phenotype. Recent studies have identified a deletion mutation at F170 in CaIDAG GEF-1, a Ras guanine nucleotide exchange factor that activates Rap1b by catalyzing the replacement of GDP with GTP. Active Rap1b-GTP then interacts with the platelet surface integrin, glycoprotein IIb/IIa, and increases its affinity for fibrinogen. To establish if the deletion of F170 was of functional significance in the disorder, we assayed the amount of Rap1b transformed to its active GTP-bound state. This enabled us to indirectly assess CaIDAG GEF1 function. In contrast to normal dog platelets, platelets from an affected dog generated six- to 2,000-fold less Rap1-GTP when stimulated with various agonists including thrombin and convulxin. This strongly supports our hypothesis that CALDAG-GEF1 function is abnormal in thrombopathic Basset Hounds. Future studies will model the tertiary structure of the normal and mutant CaIDAG-GEF1.

Working on a project where the direct application to canine health was so evident provided a great deal of motivation for me. Prior to this program I had no laboratory research experience and it was a steep learning curve! It has been enjoyable and beneficial in numerous ways; however, I am certain many of the skills I have gained will enable me to tackle future challenges with confidence. I would like to thank my mentors, James Catalfamo and Marjory Brooks, for all their help and patience and everybody else at the Comparative Coagulation laboratory for assisting me with my work.

**Kay Russo | Cornell University, Epidemiology**

**The Effect of Ceftiofur Treatment on the Antimicrobial Susceptibility of Escherichia coli Isolated from Dairy Cows**

This summer I investigated resistance to extended spectrum cephalosporins in enteric bacteria isolated from dairy cows. This is a concern because of potential human health effects. *Salmonella* isolates resistant to ceftiofur, a drug widely used in cattle, typically are also resistant to ceftriaxone, the drug generally used for treating invasive *Salmonella* infections in children. It is important to understand the selection of resistance in commensal enteric bacteria and the potential transfer of resistance determinants to foodborne pathogens. The objective of this study was to investigate the effect of treating dairy cows with ceftiofur on the prevalence of antimicrobial resistance of *Escherichia coli* to extended spectrum cephalosporin antibiotics. Fecal samples were collected from three study herds. Individual animals were chosen based on farm records indicating treatment with ceftiofur within the previous fourteen days. Susceptibility to the National Antimicrobial Resistance Monitoring System (NARMS) panel of antibiotics was assessed. The relationship between treatment status and resistance to ceftiofur was not significant. Therefore, treatment status was not a reliable predictor of resistance patterns in this study. There was evidence of diversity in resistance patterns in *E. coli* isolated from the same animal. Subsequent studies currently underway are investigating this diversity among multiple isolates from the same sample.

I applied for the Leadership Program because I was interested in a summer of unique scientific research. Through the various modules that the program provides, I found that there are multiple roads to follow in order to practice good biomedical research as a veterinarian. My goal is to pursue a Ph.D., and I am now considering applying for a residency prior to my Ph.D. training. This program has been an excellent way for me to gain exposure to the different aspects of veterinary research as well as to meet professionals who are willing to assist me with my endeavors.
Mihaiela Swift | University of Cambridge, Infectious Diseases

Elucidating Molecular Mechanisms for Chlamydial Recruitment of Host GTPases to the Bacterial Inclusion

During my intercalated degree in pathology at Cambridge, I developed a passion for the dynamics and control of infectious diseases, discovering that there was an active and exciting epidemiological interface between the traditional paths of laboratory research and practical fieldwork that included branching into politics and other related fields. The Leadership Program reinforced the message that all these fields can be bridged in one career. It has also whetted my appetite to gain more unusual further educational experiences, and not to limit myself to my home country during my future studies and career.

The goal of my project in Marci Scidmore’s lab was to investigate the interactions between Chlamydia and certain proteins within the host cell that it infects, as a potential therapeutic target. Chlamydia trachomatis is the most prevalent sexually-transmitted bacteria worldwide, and has been shown to recruit host-cell Rab GTPase proteins to its intracellular inclusion membrane. This may be linked to the intracellular survival of the bacteria, by diverting it away from the cell’s degradative pathway.

It isn’t currently possible to genetically manipulate Chlamydia, so I mutated various Rab GTPase proteins in mammalian cells to prevent them recycling between the cell cytosol and the bacterial inclusion membrane. Using confocal microscopy, I observed that this did not affect recruitment of Rab GTPases to the bacterial inclusion. I then investigated the uninfected, mutated cells, to elucidate whether the mutated Rab GTPases were found in a cytosolic or membrane-bound pool within the cell, in order to shed some light on what mechanism might be allowing continued recruitment despite the mutations.

My thanks to everybody in my lab and to all the organizers and participants of the program for an absolutely brilliant summer!

Ryan Traslavina | Cornell University, Parasitology

Cytotoxicity Assays of Leishmania spp. to 5-chloro-pyrazinamide (5-CI-PZA)

As a second-year veterinary student at Cornell University, I have become interested in the pathogenesis and pathophysiology of disease. I applied to the Leadership Program to explore the opportunities available for veterinarians interested in research.

My research explored the sensitivity of four strains of the protozoan parasite Leishmania spp. to treatment with 5-chloro-pyrazinamide (5-CI-PZA). As controls, I used the parent compound, pyrazinamide (PZA) and the anti-Leishmania drug amphotericin B. I tested the efficacy of the three compounds on both stages of the life cycle of the parasite; the free form or promastigote (initial infective form) and the intracellular form or amastigote (that perpetuates the infection in the vertebrate host). The four strains in question included infantum and chagasi, responsible for human and canine visceral leishmaniasis in the Old World and New World, respectively, and two strains of Leishmania major called V1 and 173. V1 and 173 both are causative agents of cutaneous leishmaniasis in the Old World. This study found that 5-CI-PZA had an effect on the survival of promastigotes. The greatest inhibition of growth following 48 hours exposure to the drug occurred in the V1 strain with a Lethal Dose 50 (LD50) of 0.8μg/ml. Leishmania chagasi, L. infantum, and L. major both displayed LD50 of 12.0, 68.3, and 12.7μg/ml, respectively, to 5-CI-PZA. Overall 5-CI-PZA was more efficacious than PZA in suppressing promastigote growth. 5-CI-PZA did not appear efficacious when tested on the intracellular form of the parasite (amastigote).

I am grateful for the wonderful people I have met this summer. I would like to thank Douglas McGregor, David Fraser, and Ariana Blossom for making this program possible. I would also like to thank my mentor Susana Mendez, Wenhul Wu, and Julie Jordan for all their help.
**Maria Volkmann** | Freie Universität Berlin, Molecular Biology

**Molecular Characterization of E. coli Strains from Healthy Dogs and Dogs with Granulomatous Colitis (GCB)**

Fascinated by the natural sciences, I have studied veterinary medicine in Berlin since 2003. The most important aspect of the medical professions in my opinion is that the field of knowledge is continuously developing, and because scientific progress demands lifelong learning. I am interested in working with large animals; however, I now realize that I am also interested in basic science. I want to know everything in more detail than being a practical clinician will allow me.

I am interested in gastrointestinal diseases and immunology, so I was fortunate to be assigned to Kenneth Simpson's laboratory during my summer at Cornell. My project involved the identification and characterization of *E. coli* strains in dogs with granulomatous colitis in comparison to healthy dogs and dogs with lymphoplasmacytic colitis. Using molecular detection methods, my goal was to find out if the *E. coli* strains isolated in colonic biopsies of the dogs were commensal or pathogenic. This project is part of wider research on inflammatory bowel diseases, so I also compared the results of my project in GCB with *E. coli* strains of other human inflammatory bowel diseases, e.g. Crohn's Disease.

I believe that the veterinary education in Germany is targeted toward clinical practice, but I am also interested in research and teaching. I applied to the Leadership Program because I saw it as an opportunity to gain more experience in research as well as to meet other students who are also interested in more than clinical practice.

This summer has been a highlight of my education. I would like to say thanks first to Douglas McGregor and David Fraser who brought this program into being. The program modules opened my eyes to the different fields of veterinary profession. I would also like to thank all the members of the lab, the program organizers and the participants.

**Annemarie Voorbij** | Universiteit Utrecht, Genetics

**Quantitative Analysis of Intraspecific Behavior in Tame and Aggressive Silver Fox Strains**

To pursue my dream of becoming a veterinarian, I started, in 2001, to study veterinary medicine at Universiteit Utrecht. Since then, I have become fascinated with the world of science. Therefore, I chose to do a one-year research project, which confirmed my interest. I applied to the Leadership Program, because I knew it would provide me with the perfect tools to further develop my research skills and to explore my career opportunities.

My project was part of a much larger study that began in Russia in 1959. There, silver foxes were bred selectively for more than forty generations for either aggressiveness or tameness. Both the aggressive and tame fox strains were used in ethologic and genetic studies to identify genes that influence tame and aggressive behavioral phenotypes. Up to now, most ethologic research was based on the interaction between foxes and humans. However, social behavior could also be determined by the behavior that foxes exhibit toward each other. Therefore, the aim of my project was to determine what behavior tame and aggressive foxes display toward each other and how this differs between tame and aggressive foxes. By studying videotapes of fox behavior, we were able to conclude that there certainly are significant differences in intraspecific behavior between tame and aggressive silver fox strains. However, selection did not change the behavioral repertoire of either the tame or the aggressive foxes.

The Leadership Program has been an unforgettable experience that has exceeded all my expectations. It has really opened my eyes to exciting possibilities in the world of veterinary medicine. I would like to thank Greg Acland and Anna Kukekova for being such great mentors, both inside and outside the lab and last, but not least, I would like to thank Douglas McGregor and David Fraser for giving me this wonderful opportunity.
Ariana Blossom, Program Coordinator

This is my second year as coordinator and it has proven to be as delightful as the first. It has been a marvelous experience spending time with intelligent, driven, and fun-loving individuals. The cohesiveness of the group living and working together for ten weeks has been a testament to the natural connectivity of the human experience. I wish each of them well and look forward to hearing about their successes.

Shen Yang | Shanghai Jiao Tong University, Biochemistry

Detecting the In Vivo Targets of the Ubiquitin Homolog Modification

I graduated in 2007 from Shanghai Jiao Tong University, attaining a degree of B.S., majoring in animal science. Currently, I am standing at the crossroads of my future career path. I participated in the Leadership Program to gain a better understanding of the opportunities in veterinary research. The workshops revealed the diversity of positions available in academia, government, and industry. And it helped me develop the skills required for a leading role in the biomedical sciences, such as public speaking and presentation skills. Most importantly, it has given me the confidence to apply for the Ph.D. program in veterinary medicine at Cornell.

I conducted a biomedical research project in the laboratory of Ruth Collins, investigating Urm1 (Ubiquitin-related modifier-1). Urm1 is a member of an evolutionarily ancient family of proteins that can be covalently linked to the substrate at their COOH-terminus. These types of modifications are reversible and regulate the activity of the target protein. Ubiquitin-like modification plays a role in every physiological process of the animal cell and this field is an emerging area for drug development. In the case of Urm1, little information about signals or consequences of urmylation is known. So I focused on two potential target proteins and developed the reagents and experiments needed to begin to investigate urmylation. I added an epitope tag to the two target genes (SHM2 and TRP5) at their genomic locus. The stably transfected cells were then used in assays where I introduced Urm1 isoforms that are predicted to give a distinct fingerprint that would reflect in vivo urmylation.

As the first participant from China, I would like to thank the organizers, the great members in my lab, and my fellow Leadership Program students for making this summer a truly unique, wonderful, and rewarding experience.
The Leadership Program fellows hosted a dinner for their mentors, module facilitators, and other guests at Willard Straight Hall on the Cornell University campus.
Facilitators for the 2007 Leadership Program

Peter Jahrling
Facilitator
Senior Scientist, NIAID
National Institutes of Health

Robert McCall
Facilitator
Research Fellow, Therapeutic Area and Head of Appetite Regulations/CNS Pfizer, Inc.

Douglas McGregor
Counselor
Director, Leadership and Training Initiatives, College of Veterinary Medicine Cornell University

John Parker
Facilitator
Assistant Professor, Virology Cornell University

Colin Parrish
Facilitator
Professor, Virology, James A. Baker Institute Cornell University

Andrew Sage II
Facilitator
President, Sage Capital Corp.

Kenneth Simpson
Counselor
Associate Professor, Clinical Sciences Cornell University

Alexander Travis
Facilitator
Assistant Professor, Reproductive Biology, James A. Baker Institute Cornell University

Amy Warren
Counselor
Resident, Clinical Pathology Cornell University
Participants in the 2007 Leadership Program were housed in the Zeta Psi fraternity house on the Cornell campus. They had exclusive use of the building for the ten-week period that the program was in session. Several events were scheduled there, typically in the evening in conjunction with a catered meal. The living arrangements enabled the scholars to socialize and relax in a convenient and pleasant campus environment.
Apart from their intensive schedule, program scholars found time for many personal pleasures. They capitalized on local Ithaca amenities and visited Boston, Montreal, New York City, Niagara Falls, Toronto, and Washington, D.C.
The program organizers maintain contact with Leadership Program graduates in order to strengthen the professional network forged at Cornell and to uphold the program’s tradition of excellence for the benefit of future fellows. Listed below are the positions currently occupied by program graduates who have completed their veterinary education and are pursuing careers in science or public health.

### 1990

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<tr>
<th>Name</th>
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<tbody>
<tr>
<td>John Angelos</td>
<td>Assistant Professor, Food Animal Medicine, University of California at Davis, Davis, California</td>
</tr>
<tr>
<td>William Carr</td>
<td>Instructor, MGH Partners for AIDS Research Center, Harvard University, Cambridge, Massachusetts</td>
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<tr>
<td>Laura Gumprecht</td>
<td>Assistant Director, Safety Assessment, Merck Research Laboratory, West Point, Pennsylvania</td>
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<tr>
<td>Elizabeth Lyon Hannah</td>
<td>Research Faculty Member, Boise State University, Boise, Idaho</td>
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<tr>
<td>Richard Haworth</td>
<td>Senior Pathologist, GlaxoSmithKline, Middlesex, United Kingdom</td>
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<tr>
<td>Melissa Mazan</td>
<td>Assistant Professor and Director, Sports Medicine, Tufts University, North Grafton, Massachusetts</td>
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<tr>
<td>Rebecca Papendick</td>
<td>Associate Pathologist, Zoological Society of San Diego, San Diego, California</td>
</tr>
<tr>
<td>Susan Schaefer</td>
<td>Clinical Assistant Professor, Surgery, University of Wisconsin, Madison, Wisconsin</td>
</tr>
<tr>
<td>A. W. (Dan) Tucker</td>
<td>Senior Lecturer, Veterinary Public Health, University of Cambridge, Cambridge, United Kingdom</td>
</tr>
<tr>
<td>Thomas Vahlenkamp</td>
<td>Assistant to the President, Friedrich-Loeffler-Institute, Greifswald, Germany</td>
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### 1991

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<tbody>
<tr>
<td>Prema Arasu</td>
<td>Associate Professor, Parasitology, North Carolina State University, Raleigh, North Carolina</td>
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<tr>
<td>David Bainbridge</td>
<td>Clinical Veterinary Anatomist, University of Cambridge, Cambridge, United Kingdom</td>
</tr>
<tr>
<td>Linda Berent</td>
<td>Clinical Assistant Professor, University of Missouri, Columbia, Missouri</td>
</tr>
<tr>
<td>Ian Davis</td>
<td>Research Assistant Professor, Genomics and Pathobiology, Ohio State University, Columbus, Ohio</td>
</tr>
<tr>
<td>Judy Hickman-Davis</td>
<td>Assistant Professor, Department of Veterinary Preventive Medicine, Ohio State University, Columbus, Ohio</td>
</tr>
<tr>
<td>Dianne Hellwig</td>
<td>Associate Professor, Agriculture and Natural Resources, Berea College, Berea, Kentucky</td>
</tr>
<tr>
<td>Alan Radford</td>
<td>Senior Lecturer, Small Animal Studies, University of Liverpool, Liverpool, United Kingdom</td>
</tr>
<tr>
<td>Jean Reichle</td>
<td>Head, Animal Surgical and Emergency Center, West Los Angeles, California</td>
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1992

Tomasz Betkowski  Medical Representative, Eli Lilly Co., Indianapolis, Indiana
Stephen Davies  Assistant Professor, Parasitology, Uniformed Services University, Bethesda, Maryland
Matthew Gerard  Assistant Professor, Surgery, North Carolina State University, Raleigh, North Carolina
Christine Hawke  Lecturer, Small Animal Clinical Practice, University of Sydney, Australia
Julio Montero-Oliver  Command Veterinarian, Headquarters U.S. Army South, Fort Sam Houston, Texas
Jacqueline Phillips  Senior Lecturer, Physiology, Murdoch University, Perth, Australia
Cristina Rodriguez-Sanchez  Senior Research Associate, Universidad Nacional Autónoma de México, Mexico
Louise Southwood  Assistant Professor, Emergency and Critical Care, University of Pennsylvania, Philadelphia, Pennsylvania
Reinhard Straubinger  Lecturer, Institute for Immunology, University of Leipzig, Leipzig, Germany

1993

Virginia Fajt  Clinical Assistant Professor, Texas A&M University, College Station, Texas
Christopher Laing  Scientific Writer, Integral Molecular Inc., Philadelphia, Pennsylvania
Emma O'Neill  Lecturer, Small Animal Medicine, University College Dublin, Dublin, Ireland
Joanne Rainger  Registrar, Anesthesia, University of Sydney, Sydney, Australia
Ashley Reynolds  Associate Research Scholar, Virology, Princeton University, Princeton, New Jersey
Susanna Ryan  Communications Specialist, MediTech Media, London, United Kingdom
Veiko Saluste  Chairman, Interchemie Werken Der Adelaar Eesti, Harju, Estonia
Lynn Wachtman  Clinical Veterinarian, New England Primate Research Center, Southborough, Massachusetts

1994

Melissa Beall  Research Scientist, IDEXX Inc., Westbrook, Minnesota
Larissa Bowman  Director, Mountain Veterinary Pathology, Asheville, North Carolina
Leslie Gabor  Assistant Professor, Pathology, University of Prince Edward Island, Atlantic Veterinary College, Charlottetown, Prince Edward Island, Canada
Paige Langdon  Clinical Instructor, Small Animal Medicine, University of Missouri, Columbia, Missouri
Maria Lara-Tejero  Research Associate, Department of Microbiology, Yale University, New Haven, Connecticut
Christopher Mariani  Associate Professor, Neurology, University of Florida, Gainesville, Florida
Sonia Mumford  Veterinary Medical Officer, Fish Health Center, Olympia, Washington
Jeffrey Phillips  Assistant Professor, Oncology, University of Tennessee, Knoxville, Tennessee
Julie Pomerantz  Associate Research Scientist, Wildlife Trust, Palisades, New York
Stacy Pritt  Director, Regulatory Operations, Covance Research Products, Inc., Denver, Pennsylvania
Oliver Turner  Pathologist, Novartis Inc., East Hanover, New Jersey
Mary Thompson  Academic Clinician, University of Queensland, Brisbane, Australia
1995

Elizabeth Adkins  Clinical Instructor, University of Wisconsin, Madison, Wisconsin
Gertraut Altreuther  Project Manager, Parasitology, Bayer Animal Health, Leverkusen, Germany
Adrienne Bentley  Lecturer, Surgery, University of Pennsylvania, Philadelphia, Pennsylvania
Philippa Beard  Lecturer, Virology, University of Edinburgh, Edinburgh, United Kingdom
Kate Crevey  Resident, Small Animal Medicine, University of Georgia, Athens, Georgia
Rachael Gray  Lecturer, Veterinary Anatomy, University of Sydney, Sydney, Australia
Krista-Britt Halling  Assistant Professor, Surgery, Ontario Veterinary College, University of Guelph, Guelph, Ontario, Canada
Wendy Harrison  Research Scientist, GlaxoSmithKline, Medicines Research Center, Stevenage, United Kingdom
Kelly Lorschy  Technical Service Specialist, Pfizer, Australia
Andrew Moorhead  Ph.D. candidate, Microbiology, Cornell University, Ithaca, New York
Tony Mutsaers  Ph.D. candidate, Biophysics, University of Toronto, Toronto, Ontario, Canada

1996

Michelle Dries-Kellaway  Research Project Manager, Meat and Livestock, Australia
Patricia Gearhart  Adjunct Assistant Professor, Ophthalmology, Michigan State University, East Lansing, Michigan
Tamara Gull  Ph.D. candidate, Pathobiology, Texas A&M University, College Station, Texas
Antonia Jameson-Jordan  Ph.D. candidate, Molecular Medicine, Cornell University, Ithaca, New York
Allison Stewart  Associate Professor, Large Animal Medicine, Auburn University, Alabama
Edwin van Duijnhoven  Research Scientist, NOTOX, 's-Hertogenbosch, Netherlands
Constantin Von der Heyden  Scientist, Pegasys Strategy and Development RSA, South Africa

1997

Dennis Bailey  Lecturer, Oncology, Cornell University, Ithaca, New York
Jonathan Happold  Veterinary Officer, Biosecurity Australia, Canberra, Australia
Esther Kornalijnslijper  Postdoctoral Associate, Department of Farm Animal Health, Universiteit Utrecht, Netherlands
Tanya LeRoith  Assistant Professor, Pathology, Virginia–Maryland College of Veterinary Medicine, Blacksburg, Virginia
Lucy Neave  Lecturer, Creative Writing, Australian National University, Canberra, Australia
Patricia Pesavento  Research Assistant Professor, Pathology, University of California at Davis, Davis, California
Paul Plummer  Ph.D. candidate, Microbiology, Iowa State University, Ames, Iowa
Deborah Prattley  Ph.D. candidate, Epidemiology, Massey University, Auckland, New Zealand
Melinda Story  Assistant Professor, Equine Surgery, Kansas State University, Manhattan, Kansas
Jonathan Werner  Principal, Pathobiology, Amgen Co., Thousand Oaks, California
Rebecca Wilcox  M.S. candidate, Environmental Studies, University of Melbourne, Melbourne, Australia
Esther Wissink  Postdoctoral Fellow, Netherlands Cancer Institute, Amsterdam, Netherlands
Nicolette Zardy  M.P.H. candidate, University of California at Berkeley, Berkeley, California
1998

Max Bastian  Postdoctoral Fellow, Institut für Klinische Mikrobiologie, Immunologie und Hygiene, University of Ulm, Ulm, Germany
Stephen Fleisher  Biologist, U.S. Food and Drug Administration
Karsten Hüffer  Assistant Professor, Virology, University of Alaska, Anchorage, Alaska
Karen Liljebjelke  Postdoctoral Fellow, USDA, Athens, Georgia
Larissa Minicucci  Director, D.V.M./M.P.H. Program, University of Minnesota, Minneapolis, Minnesota
Amanda Murphie [de Mestre]  Lecturer, Royal Veterinary College, London, United Kingdom
Anne-Marije Sparnaay  Senior Policy Advisor, Ministry of Agriculture, Netherlands
Erin Crotty [Phipps]  M.P.H. candidate, University of New Mexico, Albuquerque, New Mexico
Mary Klinck  Resident, Behavioral Medicine, University of Pennsylvania, Philadelphia, Pennsylvania

1999

Erica Behling-Kelly  Ph.D. candidate, University of Wisconsin, Madison, Wisconsin
Robert Dickens  Risk Management Veterinarian, North Carolina Department of Agriculture, North Carolina
Peter Florian  Laboratory Head, Thrombosis, Sanofi-Aventis, Frankfurt, Germany
Francette Geraghty [Dusan]  M.S. candidate, Epidemiology, University of Sydney, Sydney, Australia
Carl Holmgren  Staff Scientist, Neural Sciences, Karolinska Institutet, Stockholm, Sweden
Emily Meseck  Pathologist, Charles River Laboratory, Montreal, Canada
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Mary Nabity  Clinical Assistant Professor, Texas A&M University, College Station, Texas
Kimberly Newkirk  Assistant Professor, Anatomical Pathology, University of Tennessee, Knoxville, Tennessee
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Rachel Tarlinton  Lecturer, Preclinical Veterinary Medicine, The University of Nottingham, Nottingham, United Kingdom
Holger Volk  Lecturer, Neurology, Royal Veterinary College, London, United Kingdom

2000

Tanya Babu  Veterinary Surgeon, Department of Environment, Food and Rural Affairs, United Kingdom
Beatrice Bohme  Resident, Small Animal Surgery, Liege, Belgium
Steven Daley  Postdoctoral Fellow, Immunology, Australian National University, Canberra, Australia
David Detweiler  Resident, Radiology, University of California at Davis, Davis, California
Katharine Evans  Deputy Veterinary Surgeon, Babraham Institute, University of Cambridge, Cambridge, United Kingdom
Rachel Geisel  Resident, Pathology, Ontario Veterinary College, University of Guelph, Guelph, Ontario, Canada
Samuel Hamilton  Ph.D. candidate, Epidemiology, University of Sydney, Sydney, Australia
Birgit Hingerl [Viertlboeck]  Scientific Assistant, Immunology, Ludwig-Maximilians-Universität München, Munich, Germany
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Richard Luce  State EIS Officer, Cheyenne, Wyoming
Fiona Norris  Ph.D. candidate, Microbiology, Monash University, Melbourne, Australia
Knut Stieger  Ph.D. candidate, Genetics, University of Nantes, Nantes, France
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Kevin Woolard  Ph.D. candidate, Pathology, National Cancer Institute, NIH, Bethesda, Maryland
2001

Julie Chevrette  Clinical Veterinarian, Charles River Laboratory, Montreal, Canada
Robert Klopfleisch  Postdoctoral Fellow, Freidrich-Loeffler-Institut, Greifswald, Germany
Katherine Hughes  Resident, Pathology, University of Cambridge, Cambridge, United Kingdom
Karin Holzer  Ph.D. candidate, Virology, Cornell University, Ithaca, New York
Stephanie Janeczko  Resident, Shelter Animal Medicine, Cornell University, Ithaca, New York
Charles Johnson  Resident, Pathology, Iowa State University, Ames, Iowa
Rebecca Lin  Resident, Small Animal Surgery, University of Pennsylvania, Philadelphia, Pennsylvania
David Loch  Postdoctoral Fellow, Genetics, Johns Hopkins Medical Institute, Baltimore, Maryland
Maeva Louis  Postdoctoral Fellow, Cornell University, Ithaca, New York
Timothy Myshrall  Ph.D. candidate, Toxicology, University of Washington, Seattle, Washington
Kis Robertson  M.P.H. candidate, University of Minnesota, Minneapolis, Minnesota
Simon Starkey  Resident, Avian and Exotic Medicine, Cornell University, Ithaca, New York
Amy Warren-Yates  Resident, Clinical Pathology, Cornell University, Ithaca, New York
Robin Yates  Fulbright Scholar, Ph.D. candidate, Microbiology, Cornell University, Ithaca, New York
Bevin Zimmerman  Ph.D. candidate, Pathobiology, Ohio State University, Columbus, Ohio

2002

Janet Beagley  M.S. candidate, Epidemiology, Michigan State University
Nicholas Berryessa  Resident, University of California at Davis, Davis, California
Karin Darpel  Ph.D. candidate, Parasitology, Pirbright, United Kingdom
Karyn Havas  U.S. Army Veterinary Corps, Minot Air Force Base, Grand Forks, North Dakota
Patrick Kenny  Resident, Neurology, University of California, Davis
Susannah Lillis  Resident, Diagnostic Imaging, University of Pennsylvania, Philadelphia, Pennsylvania
Anna Lo  M. Phil. candidate, Virology, University of Cambridge, Cambridge, United Kingdom
Michael Mienaltowski  Ph.D. candidate, Cell Biology, University of Kentucky, Lexington, Kentucky
Andrew Miller  Resident, Pathology, Cornell University, Ithaca, New York
Simon Priestnall  Ph.D. candidate, Pathology, Royal Veterinary College, London, United Kingdom
Scott Rizzo  Resident, Small Animal Medicine, University of Tennessee, Knoxville, Tennessee
Kelly Still  U.S. Army Veterinarian, Enterprise, Alabama
Ryan Taggart  U.S. Army Veterinarian, Havelock, North Carolina
Barbara Taennler  Marketing Manager, Veterinaria, Zurich, Switzerland
Christine Trezise  Resident, Pathology, Gribbles Co., Melbourne, Australia
Ainke Werner  Ph.D. candidate, Pharmacology, Leibniz Universität Hannover, Hannover, Germany
Justin Wimpole  Resident, Ryde Veterinary Hospital, Sydney, Australia
Vivian Yau  Resident, Internal Medicine, Los Angeles, California
### 2003

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Institution/Location</th>
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</thead>
<tbody>
<tr>
<td>Rosie Allister</td>
<td>Ph.D. candidate, Parasitology</td>
<td>University of Edinburgh, Edinburgh, United Kingdom</td>
</tr>
<tr>
<td>Mieke Baan</td>
<td>Resident, Small Animal Medicine</td>
<td>Ohio State University, Columbus, Ohio</td>
</tr>
<tr>
<td>Sandra Barnard</td>
<td>Resident, Oncology</td>
<td>Cornell University, Ithaca, New York</td>
</tr>
<tr>
<td>Belinda Black</td>
<td>Intern, Small Animal Medicine</td>
<td>Murdoch University, Perth, Australia</td>
</tr>
<tr>
<td>Amy Cordner</td>
<td>Resident, Small Animal Medicine and Surgery</td>
<td>University of Minnesota, Minneapolis, Minnesota</td>
</tr>
<tr>
<td>Jennifer Fernandez</td>
<td>Intern, Garden State Veterinary Specialists</td>
<td>Tinton Falls, New Jersey</td>
</tr>
<tr>
<td>Erica Gruber</td>
<td>Intern, Small Animal Medicine and Surgery</td>
<td>Colorado State University, Fort Collins, Colorado</td>
</tr>
<tr>
<td>Carol Haak</td>
<td>Intern, University of Missouri</td>
<td>Columbia, Missouri</td>
</tr>
<tr>
<td>Lindsay Hamilton</td>
<td>Ph.D. candidate, Neurophysiology</td>
<td>University of Cambridge, Cambridge, United Kingdom</td>
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<tr>
<td>Jutta Klewitz</td>
<td>Dr.Med.Vet. candidate, Leibniz Universität Hannover</td>
<td>Hannover, Germany</td>
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<tr>
<td>Michael Krahm</td>
<td>Postdoctoral Fellow, Stem Cell Biology</td>
<td>Georg-August-Universität Göttingen, Göttingen, Germany</td>
</tr>
<tr>
<td>Heather Martin</td>
<td>Postdoctoral Associate, Lab Animal Medicine</td>
<td>MIT, Cambridge, Massachusetts</td>
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<tr>
<td>Siobhan Mor</td>
<td>Ph.D. candidate, Parasitology</td>
<td>Tufts University, North Grafton, Massachusetts</td>
</tr>
<tr>
<td>Kate Paterson</td>
<td>Ph.D. candidate, Oncology</td>
<td>Garvin Institute, University of New South Wales, Sydney, Australia</td>
</tr>
<tr>
<td>Lyn Wancket</td>
<td>Resident, Pathology</td>
<td>Ohio State University, Columbus, Ohio</td>
</tr>
<tr>
<td>Christiane Wrann</td>
<td>Ph.D. candidate, Immunology</td>
<td>Leibniz Universität Hannover, Hannover, Germany</td>
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</tbody>
</table>

### 2004

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
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</tr>
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<tbody>
<tr>
<td>Anton Asare</td>
<td>Public Health Veterinarian</td>
<td>USDA, Amarillo, Texas</td>
</tr>
<tr>
<td>Carolyn Block</td>
<td>Dr.Med.Vet. candidate, Ludwig-Maximilians-Universität München</td>
<td>Munich, Germany</td>
</tr>
<tr>
<td>Mathew Breed</td>
<td>Resident, Ambulatory Medicine</td>
<td>Cornell University, Ithaca, New York</td>
</tr>
<tr>
<td>Andrew Broadbent</td>
<td>Ph.D. candidate, Dermatology</td>
<td>Imperial College, London, United Kingdom</td>
</tr>
<tr>
<td>Karla Dreckmann</td>
<td>Ph.D. candidate, Microbiology</td>
<td>Leibniz Universität Hannover, Hannover, Germany</td>
</tr>
<tr>
<td>Jessica Frankel</td>
<td>Intern, Small Animal Medicine</td>
<td>Oradel Animal Hospital, Hasbrouck Heights, New Jersey</td>
</tr>
<tr>
<td>Annika Krengel</td>
<td>Dr.Med.Vet. candidate, Institute for Zoo and Wildlife Research</td>
<td>Berlin, Germany</td>
</tr>
<tr>
<td>Duncan Russell</td>
<td>Resident, Pathology</td>
<td>Cornell University, Ithaca, New York</td>
</tr>
<tr>
<td>Katherine Scollan</td>
<td>Intern, California Animal Hospital Specialty Group</td>
<td>California</td>
</tr>
<tr>
<td>Baukje Schotanus</td>
<td>Intern, Small Animal Medicine</td>
<td>Universiteit Utrecht, Utrecht, Netherlands</td>
</tr>
<tr>
<td>Ivana Sekis</td>
<td>Dr.Med.Vet. candidate, University of Vienna</td>
<td>Vienna, Austria</td>
</tr>
<tr>
<td>Katy Townsend</td>
<td>Postdoctoral Fellow, Orthopedics</td>
<td>State University of New York at Syracuse, Syracuse, New York</td>
</tr>
<tr>
<td>Claire Underwood</td>
<td>Intern, Large Animal Medicine</td>
<td>University of Pennsylvania, New Bolton Center, Pennsylvania</td>
</tr>
</tbody>
</table>
2005

Melanie Ammersbach  Intern, Small Animal Medicine, Ontario Veterinary College, Guelph, Ontario, Canada
Hille Fieten  Ph.D. candidate, Genetics, Universiteit Utrecht, Utrecht, Netherlands
Louise Le Fluffy  Intern, Large Animal Medicine, Colorado State University, Fort Collins, Colorado
Marieke Opsteegh  Ph.D. candidate, Parasitology, Universiteit Utrecht, Utrecht, Netherlands
Klara Saville  Intern, Large Animal Medicine, Western College of Veterinary Medicine, University of Saskatchewan, Saskatoon, Saskatchewan, Canada
Kai-Biu Shiu  Resident, Oncology, Ohio State University, Columbus, Ohio
Catherine Trickett  Ph.D. candidate, Animal Behavior, University of Bristol, Bristol, United Kingdom
Collin Wolff  Intern, Animal Medical Center, New York City, New York

2006

Jane Leadbeater  Intern, Equine Medicine, Virginia-Maryland Regional College of Veterinary Medicine, Blacksburg, Virginia
Richard Meeson  Intern, Small Animal Medicine, Royal Veterinary College, London, United Kingdom
Gelja Maiwald  Ph.D. candidate, Biotechnology, Leibniz Universität Hannover, Hannover, Germany
John Porter  Junior Clinical Training Scholar, University of Cambridge, Cambridge, United Kingdom
What Did They Say?

"Meeting like-minded colleagues provided reassurance that a career in veterinary science could be both stimulating and rewarding"
Richard Haworth, 1990

"The Leadership Program remains one of the best experiences of my life"
Mathew Gerard, 1992

"The best ten weeks I have ever had"
Mark Doherty, 1996

"The Leadership Program allowed me to find the ideal career path through a maze of opportunities"
Michelle Dries, 1996

"I have used the Leadership Program as a stepping stone and also as a feather in my cap"
Bronwen Harper, 1999

"I feel the real value of the program was reflecting on the experience afterwards and interpreting the knowledge and perspectives I received"
Zoe Leonard, 1999
"The Leadership Program was one of the best experiences of my life"
Jutta Klewitz, 2003

"I had an awesome summer at Cornell"
Hannah Bender, 2005

"I continue to realize what a strong influence the program is still having on me"
Anna-Linda Golob, 2006
In the Limelight

Philippa Beard

The Cornell Leadership Program was one of the most formative experiences of my veterinary training and I welcome any opportunity to emphasize the importance of the program. As I write this article, the U.K. is again struggling under an outbreak of foot and mouth disease, bluetongue has again been found in sheep in western Europe, and an outbreak of Rift Valley fever in Kenya, Tanzania, and Somalia is causing severe disease in both livestock and people. Greater research efforts are required to understand the causes of these and other diseases and improve control and eradication measures. To this end, the Cornell Leadership Program has been demonstrably successful at encouraging veterinarians to enter a research career.

In 1995, I was merrily forging my way through the five-year veterinary degree course at the University of Sydney when I noticed a poster advertising the Cornell Leadership Program, with applications closing the next day. A friend had cancelled a lunch date with me just five minutes earlier, so I spent the following spare hour composing an application to the program instead. Much to my surprise and delight, I was accepted; I often think about how different my career might have been had my friend made lunch that day! During my ten-week summer at Cornell, I worked with Dr. Joel Baines on Herpes Simplex Virus 1, and discovered that research was exciting and that I enjoyed it.

After completing my veterinary degree at Sydney in 1996, I worked in a mixed animal practice for a year before being offered a Ph.D. position at the Moredun Research Institute in Edinburgh. Remembering the positive experiences I had had in the lab at Cornell, I accepted and spent the following three years investigating potential wildlife reservoirs of paratuberculosis. The Ph.D. was a very stimulating and fulfilling experience and encouraged me to follow a research career, so I returned to Cornell to work with Dr. Baines again as a postdoctoral associate. After three years, I was awarded a Wellcome Trust Intermediate Clinical Fellowship to move back to the U.K. and work on poxviruses at Imperial College, London. I have recently moved to Edinburgh to take up a position as a senior academic fellow at the Royal (Dick) School of Veterinary Studies, heading a virus research laboratory.

As I look around the Edinburgh veterinary school, I am reminded of the myriad of different career options open to veterinarians. Teachers, clinicians, researchers, managers—I had no concept of this breadth of opportunity when I chose a veterinary career at the age of 17. Consequently I found one of the most important parts of the Cornell Leadership Program was the clear explanation of many of these career paths. The explanations were reinforced with the opportunity to speak with veterinarians who had chosen different career paths and, of course, the chance to road-test a research career for ten weeks. I will be taking full advantage of the flexibility of veterinary training as I take a sabbatical next year in Mongolia. I have been offered the chance to spend a year as a veterinary advisor to the Mongolian government, helping them tackle the transboundary animal diseases, such as foot and mouth disease and sheeppox, that affect their livestock. I expect quite a change of pace, many challenges, and a lot of fun!
For more information about the Leadership Program, contact:

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Leadership Program for Veterinary Students
James A. Baker Institute for Animal Health
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Cornell University
Ithaca, NY 14853
Telephone: 607 256-5638
Fax: 607 256-5608
E-mail: ddm7@cornell.edu

Interested parties are also invited to visit the program web site at:

www.vet.cornell.edu/OGE/Leadership

Photos by Alexis Wensi-Roberts unless otherwise noted.