

**Leadership
Program for
Veterinary
Students**

1999 Annual Report

For more information about the Leadership Program contact:

Office of Research and Graduate Education
Douglas D. McGregor, Director
College of Veterinary Medicine
Cornell University
S3 016 Schurman Hall
Ithaca, NY 14853-6401

Telephone: (607) 253-3755
Fax: (607) 253-3756
E-mail: ddm7@cornell.edu

Or visit our web site at:

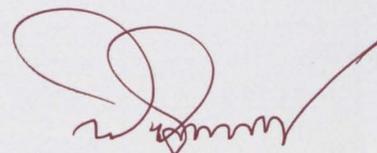
<http://web.vet.cornell.edu/public/research/leadership/index.htm>

A Commitment to Excellence 1990 ~ 1999

The College of Veterinary Medicine at Cornell University celebrated the tenth anniversary of its Leadership Program for Veterinary Students during the program's 1999 session. The program's tradition of excellence has drawn thousands of applicants, but only 224 of the most promising students representing fifty veterinary colleges throughout the world have thus far been selected to participate in this intensive summer initiative. Although the life experiences and the cultural and academic backgrounds of program fellows are diverse, all have completed at least one year of study toward the Doctor of Veterinary Medicine degree and all are recognized as possessing both the motivation and ability to become future leaders in veterinary medicine or animal agriculture.

Research is the foundation of the Leadership Program. Fellows are assigned an independent research project and a faculty mentor at the beginning of each session. In addition to conducting research in Cornell's state-of-the-art facilities under the tutelage of world-renowned scientists, fellows participate in carefully designed modules, workshops, and discussions facilitated by distinguished consultants on topics ranging from biomedical ethics and career exploration to leadership and its associated responsibilities. Field trips to federal research facilities are also important events in the program agenda.

We mark this milestone year with confidence in having fulfilled the program's principal objective – to provide these future leaders of veterinary medicine with a unique learning experience that both clarifies and strengthens their interest in and commitment to a research career, and one that substantially adds to the base of knowledge upon which they will draw in the coming years.



Douglas D. McGregor
Program Director

1999 Leadership Program Fellows



1999 Roster

Participant	College	Mentor	Cornell Dept. Affiliation	Sponsor
Ahrens, Elmer	Hannover	Lust/Burton-Wurster	Baker Institute	Pfizer/Mellon
Andrulis, Sandra	Cornell	Brown	Biomedical Sciences	NIH/Simpson
Behling-Kelly, Erica	Georgia	Sharp	Molecular Medicine	NIH/Pfizer
Bowden, Nadine	Michigan	Parrish	Baker Institute	NIH/Pfizer
Broster, Christine	Liverpool	Warnick	Clinical Sciences	Wellcome
Cazabon, Sarah	Cornell	Clark	Microbiology and Immunology	NIH/Mellon
Costello, Kimberly	VA-MD Regional	Antczak	Baker Institute	NIH/Havemeyer
Dickens, Robert	North Carolina	Carmichael/Shin	Diagnostic Science	NIH/Pfizer
Ealey, Katie	Oklahoma	Schat	Microbiology and Immunology	NIH/Merck
Fine, Joshua	VA-MD Regional	Antczak	Baker Institute	NIH/Havemeyer
Florian, Peter	Leipzig	Straubinger/Jacobson	Baker Institute	Merck
Geraghty, Francette	Sydney	Grohn	Clinical Sciences	Pfizer
Gill, Sarah	Sydney	Denkers	Microbiology and Immunology	Mellon
Harper, Bronwen	Queensland	Robertshaw	Biomedical Sciences	Merck
Holmgren, Carl	Royal Veterinary	Aguirre/Sidjanin	Baker Institute	Wellcome
Meseck, Emily	Cornell	Baines	Microbiology and Immunology	NIH/Mellon
Mo, Rachel	Cornell	Appleton	Baker Institute	NIH/Merck
Nabity, Mary	Cornell	Cerione	Molecular Medicine	NIH/Pfizer
Premanandan, Christopher	Ohio	Noden	Biomedical Sciences	NIH/Merck
Stewart, Paula	North Carolina	Brooks	Diagnostic Science	NIH/Simpson
Tarlinton, Rachael	Sydney	K. Houpt	Biomedical Sciences	Simpson/Pfizer
Volk, Holger	Hannover	Simpson	Clinical Sciences	Mellon

1999 Leadership Program Agenda

Date	Activity
May 31	1999 Leadership Program Session Opens
June 1	Chemical Safety Training
2-3	Radiation Safety Training
7	Leadership Discussion Career Discussion Program Dinner
10	National Institutes of Health, Washington, D.C.
11	U.S. Department of Agriculture, Washington, D.C.
14	Distance Learning Workshop
25	Emerging Diseases Workshop/ Videoconference
July 6	Ethics Discussion
9	Drug Discovery and Development Workshop - Pfizer Inc
12	Reconciling Professional and Personal Responsibilities
19	Residency Workshop
20	Research Workshop
23	Careers in Industry Workshop - Merck
Aug. 4-5	Research Presentations
6	Close of 1999 Leadership Program Session



The Leadership Program curriculum combines independent research experience with on-campus learning modules, workshops, and discussions, and field trips to federal research facilities. Most learning activities are student-directed, and all are carefully designed to foster responsible leadership, analytical and critical thinking skills, and awareness of leadership principles and ethical issues associated with biomedical research.



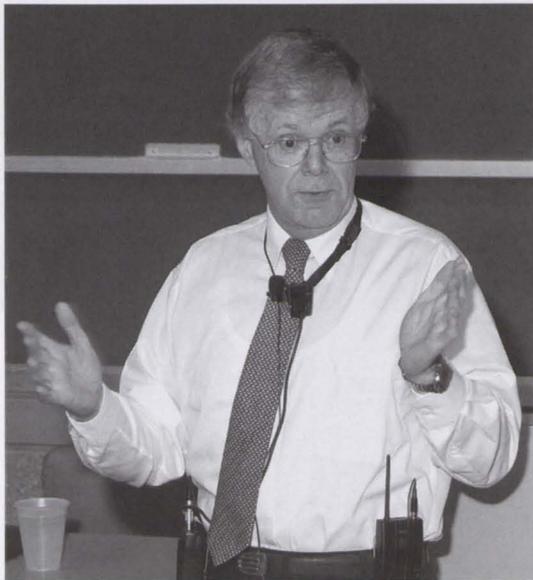
Research

Research is the foundation of the Leadership Program and the underlying theme of all program activities. At each session's beginning, fellows are assigned an independent research project in an area of expressed interest as well as a faculty mentor to guide their research efforts. The opportunity to conduct independent research enables students to gain practical experience in using investigative methods to explore a specific problem, and it allows them to directly observe the ways in which a world-class research laboratory utilizes its professional and material resources. Fellows also gain public speaking experience as they present their research findings to peers and guests at the session's conclusion.

Program Activities

Ethics

Although professional ethics is a prevalent theme of the Leadership Program, a formal group discussion is held each year on issues associated with the proper conduct of research. This year's fellows were provided with videotapes that raised confidentiality issues and addressed the responsibility of scientists to share their findings both with colleagues and with the public. Module facilitator Dr. Ari van Tienhoven encouraged participants to analyze the issues presented and to seek a group consensus on their resolution.



Leadership Development

Leadership and its associated responsibilities are core concepts of the program, and discussions and exercises in leadership are important program features every year. This year's leadership activities featured a role-playing module designed and moderated by Dr. David Fraser. A hypothetical problem in animal agriculture was presented, and roles were assigned to each of the panelists as the module's scenario unfolded. Within their assigned roles, the panelists were obliged to state, defend, and sometimes alter their positions as details of the hypothetical were revealed. The panel was composed of the twenty-two program fellows and the following four consultants: Dr. Nigel Evans, Ms. Suzanne McGregor, Dr. Malden Nesheim, and Mr. Andrew Sage, Jr. At the module's conclusion, the consultants commented on the exercise and discussed leadership principles that have guided their own professional lives.

Career Exploration

Informal career counseling occurs frequently during the ten-week program session, and several meetings are convened each year to explore career options in a more structured setting. During one such discussion, Doctors David Fraser, Michelle Haven, and Ton Schat commented on their own careers and answered questions about various career options for veterinary graduates.

Two workshops were held this year to explore research careers specific to industry. During the first – the Drug Discovery and Development Workshop presented by Pfizer Inc – four corporate representatives engaged students in an exercise that cleverly illustrated the processes and challenges of drug discovery and development. During the Careers in Industry Workshop presented by Merck & Company, Dr. Gerard Hickey compared academic research with that conducted at a research-intensive pharmaceutical company. This workshop explored the role of veterinarians in research, and it both outlined and discussed the training required for an individual to become involved at the forefront of the scientific discovery process.

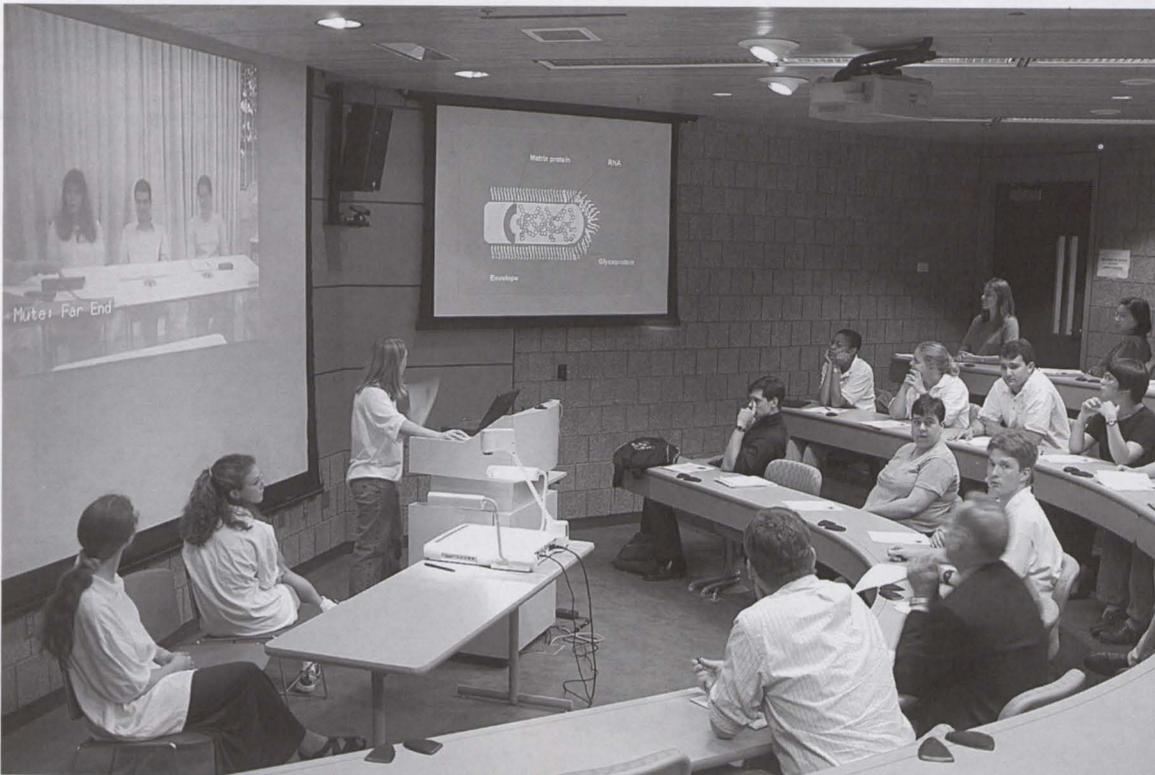
Other career discussions focused on international experiences, residency, graduate research training, and the reconciliation of personal and professional responsibilities during a protracted period of postgraduate training. These discussions were facilitated by present or former members of Cornell's Veterinary College faculty and staff, including Doctors Judith Appleton, Stuart Bliss, Susan Bliss, Alex Brown, Brian Farrow, Robert Gilbert, Richard Jacobson, Douglas McGregor, Noa Noy, David Robertshaw, Donald Schlafer, and Kenneth Simpson.



Emerging Diseases

During the 1999 Leadership Program session, Dr. Colin Parrish and Dr. Robert Shope organized and presented a workshop on emerging diseases. Fellows were required to select four diseases from a prepared list and to divide themselves into groups to discuss and conduct library research on the selected topics. The groups reported their findings on the selected diseases to colleagues and the two workshop facilitators.

Study groups composed of students at Cornell and the University of Sydney were formed to discuss two of the diseases via the Internet using state-of-the-art software developed by program consultant Dr. Sarkis Zartarian. The study groups' findings were then presented during a videoconference held in conjunction with the workshop.



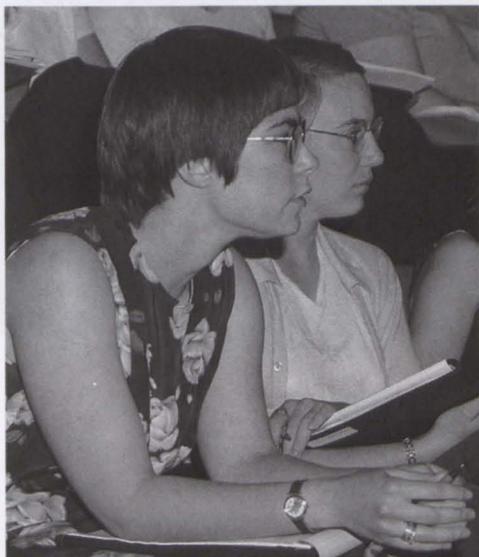


Speakers and Topics

- **Dr. David Bodine**
Genetics and Molecular Biology Branch, National Human Genome Research Institute
Gene Transfer into Hematopoietic Stem Cells
- **Dr. Robert Donahue**
Hematology Branch, National Heart, Lung, and Blood Institute
Gene Transfer in NHP Hemopoietic Cells
- **Dr. Clarence Gibbs**
Laboratory of Infectious Diseases, National Institute of Neurological Disorders and Stroke
Human and Animal Transmissible Spongiform Encephalopathies – Related or Not
- **Dr. Brenda Hanning**
Acting Director, NIH Office of Education
Potential Training Opportunities at NIH
- **Dr. Vanessa Hirsch**
Laboratory of Infectious Diseases, National Institute of Allergy and Infectious Diseases
AIDS Pathogenesis and Vaccine Studies: Simian Immunodeficiency Virus Model
- **Dr. Lance Pohl**
Laboratory of Molecular Immunology, National Heart, Lung, and Blood Institute
Mechanisms of Drug-Induced Toxicities
- **Dr. Silvia Fojo Santamarina**
Molecular Disease Branch, National Heart, Lung, and Blood Institute
Use of Recombinant Adenovirus and Transgenic Animal Models to Study Genes Involved in Lipid Metabolism
- **Dr. Richard Wyatt**
Executive Director, NIH Office of Intramural Research
Linking Veterinary Medicine with Biomedical Research

the National Institutes of Health

The National Institutes of Health and the College of Veterinary Medicine at Cornell University forged a partnership in 1992 that offers Leadership Program fellows an opportunity to learn about governmental research at the highest level. Every summer, the Cornell fellows gather at NIH for a full day of scientific discussions and presentations by distinguished speakers and to find out about intramural research programs and training opportunities within the agency.





Speakers and Topics

- **Dr. Theodore Elsasser**
Growth Biology Lab
Impact of Disease Stress on Metabolism
- **Dr. H. Ray Gamble**
Parasite Biology and Epidemiology Laboratory
*Certification Program for *Trichinella spiralis* and *Toxoplasma gondii* in Swine*
- **Dr. Louis Gasbarre**
Immunology and Disease Resistance Laboratory
Strategic Control of Nematodes in Dairy Cattle on Intensive Rotational Grazing
- **Dr. Morse Solomon**
Meat Science Research Laboratory
Use of Hydrodynamic Pressure Waves to Improve Food Safety of Meat Products

Animal Agriculture

The United States Department of Agriculture has been both a sponsor of and a participant in the Leadership Program for several years. The Leadership Program fellows visited the USDA's Livestock and Poultry Science Institute in Beltsville, Maryland, where they learned about research activities and opportunities for advanced training at the institute and took part in a series of presentations and discussions.



1999 Leadership Program Fellows



Elmer Jan Ahrens

School of Veterinary Medicine, Hannover

Molecular Genetics

Genetic Marker for Canine Hip Dysplasia (CHD)

While growing up, I spent most of my leisure time outdoors either spotting wildlife or on our friends' farm among cattle, pigs, and poultry. After I helped the twin-calves, Emily and Eliza, into this world I decided to work on the behalf of animals. I was 11 then, and now that I am 22, veterinary medicine is still my goal.

This summer, I conducted research in Dr. George Lust's laboratory, focusing on osteoarthritis and canine hip dysplasia (CHD). I tested decanucleotide primers searching for a genetic marker of CHD as revealed in dorsolateral subluxation (DLS) of the hip joint. After grouping 24 dogs according to high and low subluxation scores, primer specific DNA-fragments were obtained by **R**andom **A**mplified **P**olymorphic **D**N**A** **P**olymerase **C**hain **R**eaction, and separated on agarose gels. The DNA was derived from Labrador Retrievers as models for dysplastic dogs, racing Greyhounds as models for non-dysplastic dogs, and backcrosses from first generation crosses between the two breeds. Lacking previous laboratory-experience, I learned standard techniques of molecular biology while gaining interesting and challenging insight into research.

I would like to thank Dr. Lust for his encouragement and the opportunity to work independently, and Liz Corey who smoothed the beginning of my project by guiding me through the techniques and pondering with me questions related to my research.

Sandra Andrulis

Cornell University

Signal Transduction

Role of Phosphatidic Acid in Mammary Cancer

I am entering my second year of veterinary school at Cornell University. Before entering veterinary school, I worked as a technician in a research laboratory and in several veterinary clinics. Based upon my previous experience, I chose to explore career opportunities that would allow me to combine both of these interests.

To this end, I worked with Dr. H. Alex Brown studying the in vivo effects of non-receptor tyrosine kinases (NRTKs) on phospholipase D (PLD) activity. PLD hydrolyzes phosphatidylcholine (PC) to generate phosphatidic acid (PA) and choline. PLD and its lipid product, PA, have defined roles in secretion, lipid metabolism, and signal transduction cascades. PLD has been implicated, through its enzymatic activity, in the proliferation and metastasis of human breast carcinoma cells. To gain insight into molecular mechanisms that modulate PLD activity, I investigated two NRTKs, **f**ocal **a**dhesion **k**inase (FAK) and **p**roline-rich **t**yrosine **k**inase 2 (Pyk2). This was accomplished by co-transfecting these NRTKs, together with PLD, into mammalian tissue culture cells. Following verification of expression of the transfected proteins by Western blot analysis, PLD activity was measured by quantitative analysis of phospholipid products by thin layer chromatography. Using both in vivo and in vitro approaches to assess PLD activity, I have shown that FAK and Pyk2 can stimulate PLD activity by two- to three-fold. These studies provide evidence for two soluble tyrosine kinases which may affect PLD function in vivo. Further studies will be required to understand the manner through which these factors regulate PLD and the biological significance of this regulation.

These studies have been invaluable in helping me decide what direction to take with my veterinary career. My career goals are to pursue a residency that would allow me to combine research with clinical work.





Erica Behling-Kelly

University of Georgia

Insulin Exocytosis

Mechanisms of Insulin Exocytosis

I received a B.S. in biology from the University of Illinois in Champaign-Urbana. During my undergraduate education, I spent three summers as an intern at Monsanto in Skokie, Illinois. As a Howard Hughes Undergraduate Research Fellow, I worked for a year in a veterinary pathobiology lab at the University of Illinois. After graduation, I returned to Monsanto and spent six months working in the investigative toxicology department. The various experiences I had within industry and academic laboratories kindled my interest in biomedical research. In August of 1998, my husband Chris and I moved to Athens, Georgia, where I began veterinary school. To further develop my abilities within the laboratory, I joined Dr. Donald Evans's laboratory in the medical microbiology department at the veterinary college in Athens. I applied to the Leadership Program because I wanted to not only broaden my research experience, but also to learn about veterinary research and career options for veterinarians outside of private practice. I was particularly interested in some of the planned activities, such as the career planning sessions.

I spent the summer working in Dr. Geoffrey Sharp's laboratory under the supervision of Dr. Tom Schermerhorn, looking at molecular mechanisms of insulin exocytosis. The goal of my project was to attempt to characterize the interactions under both basal and inhibitory conditions between proteins known to be involved in insulin exocytosis, core complex proteins, and heterotrimeric G-proteins. Using immunoprecipitation followed by Western blotting, I was able to demonstrate a number of associations between the core complex proteins and various subunits of G-proteins.

The Leadership Program gave me the opportunity to learn new lab techniques, make contact with various veterinary researchers, learn about veterinary education in other countries, and learn how to combine an interest in veterinary medicine with an interest in research. I aspire to have a career that would allow me to play a role in the development of the veterinary profession as a whole through research.

Nadine Bowden

Michigan State University

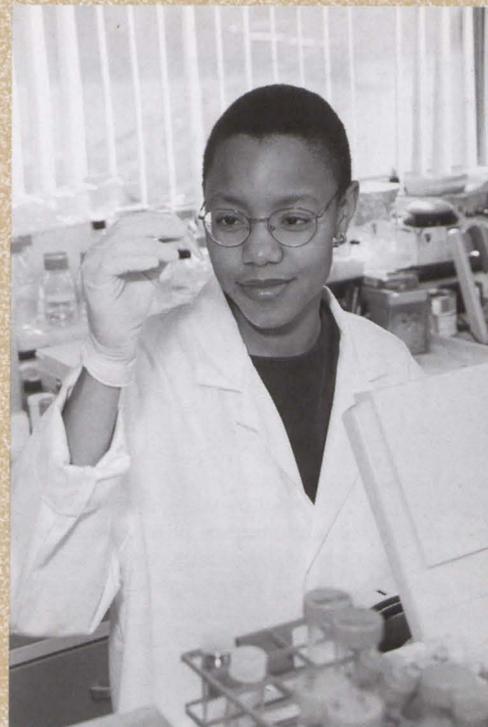
Molecular Virology

Analysis of Canine Parvovirus Variants

This fall I will be a second year veterinary student at Michigan State University. I applied to the Cornell Leadership Program because it offered the opportunity to conduct independent research in a new environment.

At Cornell, I studied Canine Parvovirus (CPV) in the lab of Dr. Colin Parrish. Specifically, I attempted to construct the phylogeny of a mutation located at base site number 3675. This mutation is of interest because it occurs in a region of the genome that codes for host cell range and antigenicity. My approach to the project was to use phylogenetically informative base changes (PIBC) to construct the phylogeny. A PIBC is a change that provides insight into how a group of viruses are related to one another. These changes are always seen in at least two of the viruses being analyzed. I sequenced and examined five nearly complete CPV isolates, looking for PIBCs. I also examined the protein capsid regions of several other isolates for PIBCs. I have gathered a significant number of PIBCs but have not yet completed the phylogenetic analysis.

The Cornell Leadership Program has given me a sample of independent research. It has also made me aware of the many opportunities available to veterinarians both in industry and in government. In the future, I see myself entering the field of public health or pharmaceutical research.





Christine Broster

University of Liverpool

Epidemiology

Antibiotic Resistance in Dairy Cattle

I am entering my fourth year as a veterinary student at The University of Liverpool, England. I applied to Cornell's Leadership Program because I have a keen interest in veterinary research. I had heard excellent reports of the program from past students and I thought it would be an excellent opportunity to experience veterinary research at Cornell University.

During the past two years I have undertaken two research projects: investigating the behavior of sheep on the spread of Sheep Scab within a flock, and the second investigating the hoof balance and conformation of Welsh Mountain Ponies.

While at Cornell I worked with Dr. Lorin Warnick on an epidemiology study of dairy cattle in New York State. I investigated the levels of antibiotic resistance in *Salmonella* and *E. coli*, isolated from fecal and environmental samples. The results of my work will be used to modify the use of antibiotics on farms, and thereby, to reduce the levels of antibiotic resistance in animals and humans.

I have gained invaluable experience from the Leadership Program. I have enhanced my computer skills in statistics, which are essential to epidemiological studies. I have also gained knowledge of the dairy industry in New York State from literary research and farm visits. The program has been a wonderful experience to get to know veterinary researchers and students from universities all over the world.

After graduating from the University of Liverpool, I hope to return to the U.S.A. and undertake further research in equine science, possibly in the field of epidemiology.

Sarah Cazabon

Cornell University

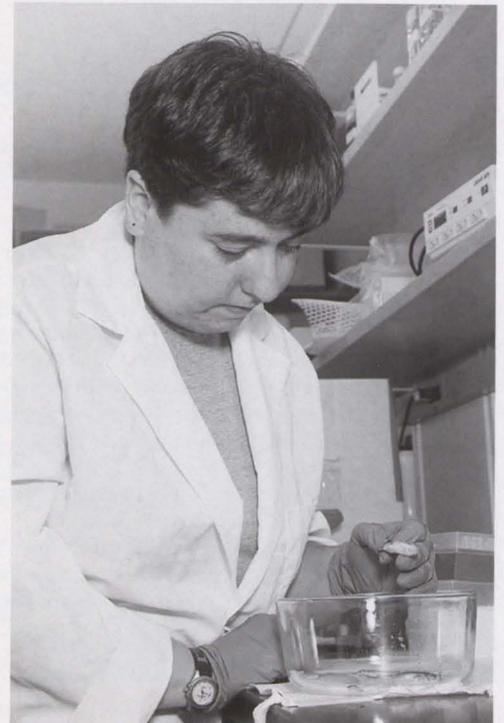
Vaccine Development

Immunity Against Parasitic Protozoa

I am originally from Boston, Massachusetts and graduated from Harvard University with a B.A. in Biology in 1996. I am currently a third year veterinary student at Cornell University College of Veterinary Medicine. Stimulated by a variety of past research projects and non-traditional veterinary clinical experience, I decided to apply to Cornell's 1999 Leadership Program to better understand how my variety of interests can be merged together in my veterinary career.

This summer I have spent my time in the laboratory of Dr. Ted Clark studying *Ichthyophthirius multifiliis* (otherwise known as "Ich"), a freshwater fish parasite that causes large losses in commercial aquaculture worldwide. Specifically, I have characterized a protease that is secreted by the parasite in order to elucidate some of the mechanisms of the pathogenesis and immune host response involved in the parasitic infection. The proteolytic activity of the parasite was visualized using substrate-impregnated SDS-PAGE gels at a variety of conditions and further characterized with the use of specific protease inhibitors. Preliminary data indicates that the Ich protease falls into the category of a metalloprotease and is most probably involved with the breakdown of the extracellular matrix as the parasite migrates throughout the skin of the fish.

After graduating with a DVM from Cornell in 2001, I hope to pursue an internship/residency in small animal internal medicine and spend my time in clinical practice as well as clinical research.





Kimberly Costello

Virginia-Maryland Regional College of Veterinary Medicine
Molecular Genetics

Maternal Immune Responses During Pregnancy

I received my Bachelors of Science degree with honors in Animal Science from Cornell University in May 1998, and then began veterinary school at Virginia-Maryland Regional College of Veterinary Medicine in August of 1998. I've always been interested in veterinary medicine, but my interests have evolved as I've learned more about the opportunities available in the field. I am interested in working in industry while combining my two main interests: pathology and research. I applied to this program because I couldn't resist the temptation of returning to Ithaca, and of doing research.

As a leadership student, I worked in Dr. Antczak's laboratory at the Baker Institute. My research was aimed at determining the imprinting status of the X-chromosome in horses and donkeys. Imprinted genes are those whose activity is determined by the parent of origin, that is, either the paternal or maternal copy only of certain genes may be active, depending upon their inheritance. Only a small number of genes are thought to be imprinted - perhaps 100 of the 70,000 or so genes which make up the mammalian genome. In humans and mice, however, the genes of the X-chromosome represent a special case of imprinting. In females, the paternal copy of the X-chromosome is silenced in the trophoblast, the cells that make up the outer surface of the placenta, and the maternal copy is always active. Thus, the trophoblast tissue is an exception to the random X-chromosome inactivation found in most fetal and adult tissues. Time did not permit completion of the original objectives, but my research laid the groundwork for future studies of X-chromosome regulation in horses, donkeys, and their interspecies hybrids.

Robert Dickens

North Carolina State University
Bacteriology

*PCR vs. Hemoculture for *Brucella canis**

At thirty-one years of age, I am the oldest student attending this year's Leadership Program. Prior to veterinary school, I taught high school and worked in an office as a market researcher. I also hold a Masters degree in Maritime History and Nautical Archaeology. Though I was born and raised in California, I am proud to call North Carolina my home.

I was interested in the Cornell Leadership Program because of its support of non-clinical veterinary careers. My current plan is to work for APHIS, a regulatory branch of the USDA. The many program-sponsored events have furthered my interest in a non-traditional veterinary career and have provided me with valuable contacts and information regarding my intended career. Through this program I have also developed lasting friendships with peers from diverse cultural backgrounds.

This summer under the guidance of Drs. Sung G. Kim, Sang J. Shin and Leland E. Carmichael, I have worked with *Brucella canis*. This bacterium is a leading cause of abortion and infertility in the bitch and sterility in the male dog. Specifically, I have compared PCR and hemoculture as detection methods for *B. canis*. In determining PCR sensitivity, I employed several methods of DNA isolation and compared each method.

My research project has been enriching and enjoyable. Prior to this summer, I had spent very little time in a laboratory. I will leave Cornell with ample laboratory skills and a reasonable comprehension of research protocol. Moreover, I have gained a practical understanding of the molecular biological techniques that form an integral part of veterinary diagnostics. Undoubtedly, this knowledge will play a role in my future career.





Katie Ealey

Oklahoma State University

Molecular Virology

Studies of Chicken Infectious Anemia Virus

I earned a B.S. in Chemistry at Duke University, where I was first exposed to scientific research through an independent study project in biochemistry. My attention to detail and affinity for problem solving initially led me to work in the forensic DNA laboratory of the Oklahoma State Bureau of Investigation. After two years, I was drawn back to my early childhood interests in animal medicine and welfare, and I began my veterinary medical studies at Oklahoma State University. I gained excellent clinical experience in Oklahoma and wanted to balance that experience with excellence in research. I decided to spend my summer at Cornell, one of the top veterinary medical research institutions in the country.

The goal of my research in Dr. Ton Schat's lab was to help elucidate the complex and unpredictable pathogenesis of chicken infectious anemia virus, and specifically its vertical transmission. I determined the distribution of viral DNA in various embryonic tissues. I was not only able to contribute to an ongoing project of significance, but also learned valuable necropsy procedures and aseptic techniques. I also honed my analytical skills through the use of nested PCR, which is very susceptible to cross-contamination.

I have an exciting yet often frustrating desire to "do everything" in veterinary medicine. My strongest interests lie in wildlife conservation and pathology, and my ideal veterinary career is one that combines clinical medicine with clinically relevant research.

Joshua Fine

Virginia-Maryland Regional College of Veterinary Medicine

Molecular Genetics

Placenta Expression of Horse MHC Genes

Since graduating from the Johns Hopkins University in 1994, I've worked doing research in zoonotic diseases such as Hantavirus and Leptospirosis at the Johns Hopkins University School of Hygiene and Public Health. Additionally, I spent weekends assisting an equine clinician in the horse country of Baltimore County. Now that I am a rising sophomore at the Virginia-Maryland Regional College of Veterinary Medicine, I've decided to pursue both my interests—horses and infectious disease.

This past summer, I was honored to receive a Havemeyer Fellowship for Equine Studies, a program to conduct research at the Baker Institute of the Cornell University College of Veterinary Medicine, as a part of the Leadership Program for Veterinary Students. I was fortunate to work in the lab of Douglas F. Antczak, Professor of Immunology and Director of the James A. Baker Institute for Animal Health. My research focused on the fetal-maternal immunological relationship in equines. While others have found that the conceptus produces cytokines associated with a Th2 immune response, these cytokines have never been quantified. I used a Quantitative RT-PCR to measure the number of gene copies of IL-10 (a Th2 cytokine) present in both conceptus and endometrial tissues and found a ten-fold higher level of IL-10 on the maternal side of the fetal-maternal interface. This finding suggests that the source of the vast majority of IL-10 is maternal, not fetal.

I thoroughly enjoyed my time in the Leadership Program. I was able to perform research in a world-class lab studying equine immunology, interact with faculty, residents, grad students and other vet students, and further my experience in different aspects of veterinary medicine that I am considering as possible career paths. Though still unsure of my post-graduate plans, I am certain that the Leadership Program has enabled me to make an educated decision about my future role in veterinary medicine.





Peter Florian

University of Leipzig

Immunology

Mechanisms in Lyme Arthritis

I am a final year student at the University of Leipzig, Germany, and I applied to the Leadership Program in order to explore future possibilities for a scientific career.

I spent this summer working in Dr. Reinhard Straubinger's laboratory, where the research focus is Lyme borreliosis in dogs. Dr. Straubinger had previously shown that the chemokine IL-8 was up-regulated in the synovial membranes of *Borrelia burgdorferi*-infected dogs showing clinical signs of acute Lyme arthritis. The goal of my project was to determine whether the cytokine IL-10 is also up-regulated in these tissues since it may modulate the affect of IL-8 and related proinflammatory cytokines. I used the ABI Prism 7700 Sequence Detection System to detect and quantify IL-10 mRNA. After the conditions for the reaction were optimized with RNA from cultured macrophages, I tested the assay with mRNA from synovial explant culture tissues. Finally, IL-10 mRNA was quantified in tissues from dogs with acute Lyme arthritis. Our preliminary data indicate that IL-10 and IL-8 mRNA are up-regulated together in tissues during acute Lyme arthritis. Besides working with a quantitative PCR assay, I also had the opportunity to broaden my knowledge of techniques such as Western blotting and kinetics ELISA in Dr. Jacobson's laboratory within the New York State Diagnostic Laboratory.

The Leadership Program strengthened my desire to pursue a research-oriented career in the pharmaceutical industry. I made friends with veterinary students from all over the world, had time to travel, and enjoyed outside activities. I would like to thank everyone in the laboratory, especially Dr. Reinhard Straubinger, his wife Alix, Dr. Jacobson, and Mary Beth Matychak, for making my research experience so successful and enjoyable.

Francette Geraghty

University of Sydney

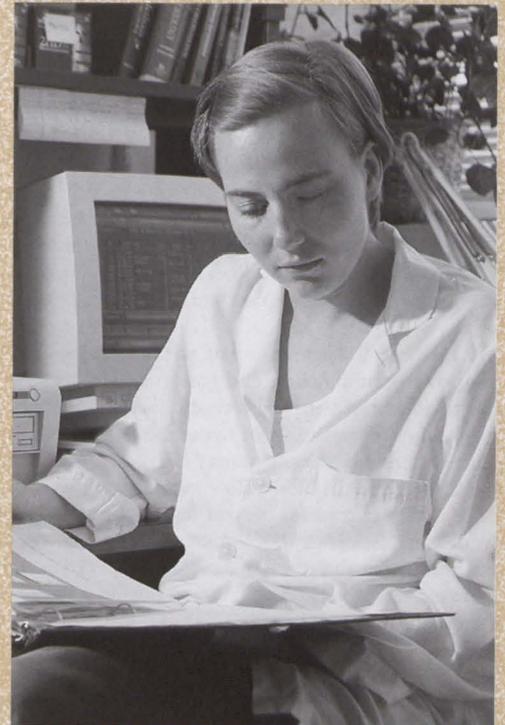
Epidemiology

Economic Considerations of Mastitis

My background is in Agricultural Science (BScAg), and I am completing my fourth year of Veterinary Science at the University of Sydney. The Leadership Program provided me with an introduction to epidemiology research at a world-renowned institution and an opportunity to broaden my personal and professional horizons on an international level.

My summer was spent working with the enjoyable team of Dr. Allore, Dr. Haferkamp-Wise, Ms. Hertl, Dr. Rajala-Schultz, and Mr. Shiu under the direction of Dr. Gröhn in the Department of Population Medicine and Diagnostic Science, Section of Epidemiology. The research project I was involved in revolved around the current development of a stochastic dynamic-programming model for use in making economically optimal decisions for dairy farms. The model describes a cow by various production, age, reproductive, and disease characteristics. Using economic values, a cow's current and future value at a particular point in time is compared to the value of a replacement heifer. For example, if a cow's value is higher when bred in May rather than kept open, then the cow should be bred. If her value is lower than that of a replacement heifer, then the cow should be culled.

The project was especially well-suited to me because of my agricultural background and my desire for epidemiological training. Skills I have acquired while at Cornell include statistics and computer programming. I am now seriously considering further study in this field with the hope that I will apply this knowledge and experience to ecologic systems modeling and to zoonotic diseases in both wild and domestic animals.





Sarah Gill

University of Sydney

Molecular Parasitology

Immunity to Toxoplasma gondii

I am a fourth year Veterinary Science student at Sydney University. In 1998, I spent a year completing a research degree (BScVet) on Vitamin D metabolism and hematology in Diamond Pythons. This stimulated my interest in research as a career. I applied to the Leadership Program because I wanted to learn more about research and to see Cornell University. The discussions and workshops offered, ranging from ethics to residencies, also piqued my interest.

This summer, I examined the immune response to *Toxoplasma gondii* in Dr. Eric Denkers's immunology laboratory. *T. gondii* is a protozoan parasite. It is pathogenic in pregnant or immunocompromised mammals. I used genetically modified mice that had the MIP-1 α gene removed and compared the cellular response of these mice with wild type mice to see how MIP-1 α affects production of other cytokines. MIP-1 α is a chemotoxic cytokine involved in the cellular inflammatory response. This comparison involved studying production of Interleukin-10, Interleukin-12, and Interferon- γ by leukocytes when they were stimulated with antigen. I measured values using ELISA, and also spent some time using PCR to determine magnitude of MIP-1 α gene expression in some samples. I have gathered some interesting and paradoxical results, which suggest that MIP-1 α is important in immunoregulation.

I gained important skills this summer. Mastering the ELISA and learning about PCR were highlights of my lab experience, and living with people from several countries provided insight into other cultures.

When I finish my Vet degree, I want to spend a few years consolidating my skills in private practice, and traveling. I would then like to do post-graduate study overseas, either a residency or a Ph.D., and specialize in wildlife medicine or small animal surgery.

Bronwen Harper

University of Queensland

Exercise Physiology

Cardiac Function and Tissue Oxygen Transfer

Having completed an honors degree in Agricultural Science in 1994, I had to choose between accepting a Ph.D. scholarship and continuing in the field in which I had qualified, or moving from my home in Melbourne to develop my interest in the field of veterinary medicine. After much deliberation, I relinquished the option of Ph.D. and enrolled in the veterinary science program at the University of Queensland.

My research this summer was part of a larger project investigating relationships between cardiovascular function and tissue oxygen transfer, with sheep as our model. We examined the relationship between oxygen consumption and cardiac output to establish whether heart rate is a good indicator of tissue oxygen transfer in the free ranging animal, or whether changes in cardiac output may also reflect a change in the function of blood flow. We hypothesized that blood flow may also serve to transport absorbed nutrients from the gut and have a role in transfer of heat to the skin from metabolically active tissues. Exercise and feeding trials were carried out to investigate these hypotheses. From the experimental data, we found that there was no increase in cardiac output to suggest a measurable flow being diverted to the gut for transfer of nutrients rather than oxygen delivery. We concluded that heart rate is, in most circumstances, a good predictor of oxygen consumption.

Heartfelt thanks go to my mentor Dr. Robertshaw, and also to Dr. Rawson, Dr. Karen Gellman, Kim Harris, and Priscilla Maldonado—all of whom have made my research environment a very warm and rich one this summer. I have learned a great deal about the value of group discussion and teamwork, and I have enjoyed the challenges of investigation. Thanks to the selfless commitment of Dr. McGregor, the Leadership Program has provided an opportunity to confirm my bearings, and it has given me a wider perspective on the paths to follow in the coming months when I graduate.





Carl Holmgren

Royal Veterinary College, London

Molecular Genetics

*Positional Cloning of the *prcd* Locus*

I am a fourth year veterinary student at the Royal Veterinary College, London. In 1996, I pursued an intercalated degree in biochemistry at University College London, where I gained my first experience in research. That summer I was awarded a Wellcome Trust Vacation Scholarship, which allowed me the opportunity to work in the neurophysiology department at Birmingham Medical School studying the morphological properties of scrapie infected CA1 hippocampal and neocortical pyramidal neurones in a hamster model of the disease. These experiences prompted me to investigate the possibility of research as a career option, and the presence of the Leadership Program afforded me the opportunity to investigate this avenue further.

The projects I have been involved in during my time at Cornell include an investigation of the haplotype variation in the *prcd* region of *prcd* (progressive rod-cone degeneration) affected papillons, and an assessment of the possibility of rearrangement of the canine genome in *prcd* region using Southern blot hybridization. Results from these studies indicate that the papillon differs from previously characterized breeds, as it is highly heterozygous in the gene that is linked to *prcd*. This contrasts with poodles, which are homozygous for a haplotype in the gene which is linked to *prcd*. The initial results from the hybridization studies indicate that there are no large insertions or deletions in the gene that is linked to *prcd*.

I was fortunate to work in Dr. Aguirre's laboratory this summer, where I was supervised by Dr. Sidjanin and assisted by the other members of the laboratory. I am grateful for their support and enthusiasm, as well as for their practical assistance. The Leadership Program provided me with valuable research experience, contact with veterinary students from around the world, and an opportunity to discuss career options.

Emily Meseck

Cornell University

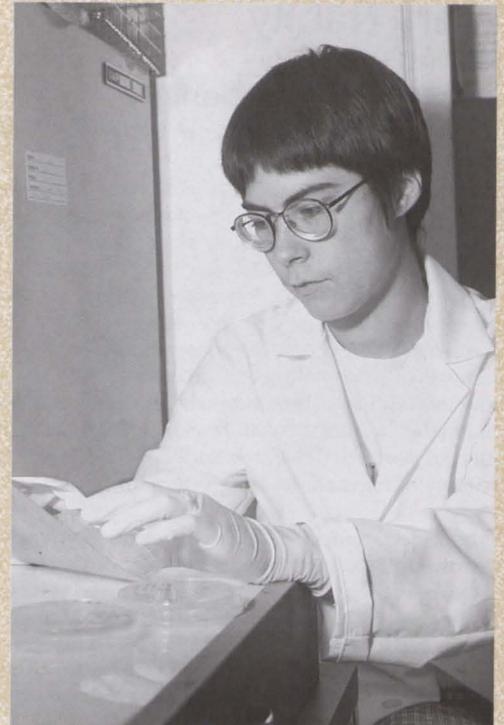
Molecular Virology

Herpes Simplex Virus Capsid-Protein Trafficking

I am entering my second year at Cornell's College of Veterinary Medicine. I was attracted to the Leadership Program by its strong focus on research and by the opportunity to explore career alternatives to private practice.

My project was in the department of Microbiology and Immunology, with Dr. Joel Baines. His lab studies DNA packaging and cleaving in Herpes Simplex Virus I (HSV I), a human virus. I worked with a former Leadership participant ('93), Dr. Ashley Reynolds and used a novel Bacterial Artificial Chromosome (BAC) system to create a recombinant HSV I virus containing the Green Fluorescent Protein (GFP) gene inserted into a nonessential viral gene U_L35 . The product of U_L35 is a small protein on the tips of the major capsid protein VP5 in the hexons of the virus capsid. Incorporation of GFP-tagged U_L35 protein into viral capsid structures will allow the recombinant virus to be tracked by live-time video fluorescent microscopy inside living cells. The creation of different mutant viruses will help define the role of certain packaging and cleavage genes in virus assembly.

The Leadership Program was a wonderful opportunity to meet future veterinarians from around the world and establish professional relationships with them. The program improved my networking skills and perception of the academic research environment and its rigors. In the future, I hope to find opportunities in the pharmaceutical industry in molecular toxicology or pathology, or in the federal government in infectious disease research.





Rachel Mo

Cornell University

Parasitology

Targets of Protective Immunity against Parelaphostrongylus tenuis

This summer, Merck and the NIH generously sponsored my research in the lab of Dr. Judith Appleton. My project involved looking at antigens of a deer meningeal worm, *Parelaphostrongylus tenuis* (family *Metastrongylidae*) which causes severe neurological disease when it infects domestic sheep, goats and llamas. The definitive host for this parasite is the white tailed deer; however, the deer do not suffer disease from being infected by the parasite. The parasite matures to adulthood and reproduces only in the deer. These immature parasites are then shed in the deer feces. The immature parasites subsequently infect snails on the ground. Both the deer and domestic small ruminants become infected when they graze and ingest these infected snails. Given the high numbers of deer in upstate New York, with the estimation that about half are infected, this parasite is a serious health problem. Diagnostic aids for the detection of *P. tenuis* infestation have not yet been devised, and effective anthelmintic protocols have not been devised. Once clinical signs progress, the prognosis is generally poor.

We have produced this summer monoclonal antibodies to an adult worm extract so we could better study the antigens that would be 1) useful as a diagnostic tool of early infection, and 2) possible candidates for a vaccine target. What was most rewarding for me in this project was that I was involved in applying basic science and veterinary knowledge to a local veterinary problem as which befits a land grant university. I hope to pursue both clinical veterinary medicine and basic science research in the future by completing residency and Ph.D programs.

I am indebted to Dr. Appleton and all in the Appleton Lab and the Baker Institute for Animal Health for having me this summer and for the assistance that they have provided. Much thanks also go out to Drs. Mary Smith, Susan Stehman, Amy Glaser, and Alexander deLahunta and Gail Fulkerson for specimens, slides, and clinical expertise.

Mary Nability

Cornell University

Signal Transduction

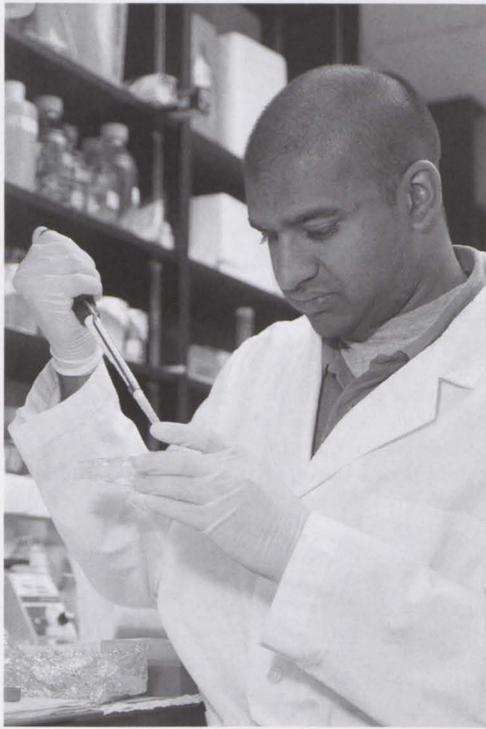
G-Protein Signaling and Growth Factor Control

I am currently entering my second year as a student in the College of Veterinary Medicine at Cornell. Although veterinary medicine has been of interest to me since I was a child, I did not see myself as a veterinary clinician. I wanted to obtain the broad-based medical background of a veterinary education and apply it to research. Therefore, in high school and as an undergraduate, I conducted research in the Veterinary Science Department at the University of Nebraska-Lincoln, an opportunity that provided wonderful basic research experience. After one year of veterinary school, I have also found the clinical aspects of veterinary medicine enjoyable. This clinical interest sparked a desire to further my interest in an institution where clinical medicine bears a strong presence and is intimately associated with research. The Leadership Program promised a unique combination of veterinary research and leadership experiences that could be shared with a wide variety of talented, aspiring veterinarians.

My project, under Dr. Richard Cerione in the Department of Molecular Medicine, involved identifying binding partners of proteins involved in gene expression and/or cytoskeletal organization, namely Pak and IQGAP associated with the Rho family small G protein, CDC42. CDC42 causes the formation of filopodia in cells through growth factor receptors, and has been implicated in tumorigenesis and metastasis. By identifying novel protein interactions with CDC42-associated proteins Pak and IQGAP, we are able to further the understanding of the mechanism of cell growth and tumorigenesis as well as to hopefully design new strategies for therapeutic intervention against cancer.

The Leadership Program provided the opportunity to work in the area of oncology, a long-term interest of mine, and to gain a wider variety of laboratory skills. This experience has helped focus my research interest in clinical oncology, where I hope to relate basic research to clinical aspects of cancer.





Christopher Premanandan

Ohio State University

Cell Biology

Analyses of Muscle Development

I will be entering my third year at the Ohio State University College of Veterinary Medicine and will begin clinical rotations in two semesters. I applied to the Leadership Program because it promoted extracurricular research training and career development specifically for veterinary students, which is currently lacking in the medical and scientific communities in general.

Dr. Drew Noden's laboratory studies the development of craniofacial structures using chick and quail embryos as experimental models. My goals were to learn the methods of in situ hybridization and apply these to define expression patterns of novel genes in craniofacial muscles. *MyoD* and *myf5* are well-characterized genes that are essential for initiation of differentiation in all skeletal muscle cells. I examined the sequence and locations in which these genes are expressed in the branchial arch and extraocular muscles. Next, I examined expression patterns of two other genes that have been reported to be active in subsets of embryonic skeletal muscle, *barx2* and *mCaps*. Both are expressed in the embryonic head tissues, but I did not detect any transcripts in skeletal muscle.

I would like to thank my sponsors, the Merck Foundation and the NIH for funding the past ten weeks. My thanks also to Dr. McGregor for the wonderful opportunity, Dr. Marcucio for his invaluable advice and assistance, Monica Han for her help with the everyday work, and Dr. Noden for his patience with the numerous questions and occasional roadblocks. Finally, best wishes to my program colleagues, with whom it has been a privilege to live and work.

Paula Stewart

North Carolina State University

Gene Therapy

Canine Hemophilia – A Model for Gene Therapy

I am entering my third year in veterinary school, and my motivation to participate in the Leadership Program was to broaden my research experience and to explore the career opportunities available to veterinarians. During the program, I was fortunate to work under the guidance of Dr. Marjory Brooks performing research using hemophilia B dogs as a model for gene therapy.

My project was to evaluate the sensitivity and specificity of functional and quantitative in vitro assays capable of detecting low level expression of canine factor IX in order to monitor the efficacy of in vivo gene transfer. Using known standard dilutions, determination of the lower limits of sensitivity and reproducibility of highly specific factor IX coagulant activity assays were performed. Also, a highly sensitive polyclonal enzyme-linked immunosorbant assay was developed and validated for quantification of low level canine factor IX. These assays were then used to characterize the phenotype of thirty-five dogs affected with naturally occurring hemophilia B. In a series of infusion trials, three hemophilia B dogs were transfused with canine cryosupernatant plasma. Blood samples were collected at various time points for comparison of sensitivity and specificity of the Whole Blood Clotting Time assay, Activated Partial Thromboplastin Time, and Clot Signature Analyzer for detection of low level factor IX in canine plasma.

The program was very positive, and my research was interesting and afforded me the opportunity to see the clinical application of laboratory research. A definite highlight of the program was the opportunity to work and interact with other veterinary students from around the world.





Rachael Tarlinton

University of Sydney

Animal Behavior

Welfare of Tail-Docked Dairy Cattle

After developing an interest in veterinary medicine through my family's beef cattle property, I began studying veterinary science at Sydney University and will graduate at the end of this year. I applied for admission to the Leadership Program hoping to discover what research entails and to learn about opportunities for alternative career paths.

My project was conducted under the supervision of Dr. Katherine Houpt. I sought for differences in behavior and cleanliness of tail docked and non-tail docked dairy cows maintained in tie stalls. The major welfare concern with this practice is the inability of cows to use their tails to avoid flies. I used the Cornell University College of Veterinary Medicine dairy herd, which has about half of its cows docked. The first part of the study involved photographing cows and scoring them for cleanliness. Some cows were also washed and then scored. The second part of my research involved recording the behavior of all cows in the barn four times each day over a one-month period and the behavior of individual cows during their exercise period. The third part compared specific fly avoidance behaviors from videotape recordings. The results have shown that tail docked cows are cleaner, though cows with tails groom more and are more active.

I found the research interesting and challenging, and I have learned much about methods for measuring and recording behavior as well as statistical analysis of data. I have enjoyed the opportunity to live and work with other veterinary students from around the world, and I found the career guidance sessions very worthwhile.

I would like to thank Dr. Houpt for her help and guidance, and all those who cheerfully helped me wash cows.

Holger Volk

School of Veterinary Medicine, Hannover

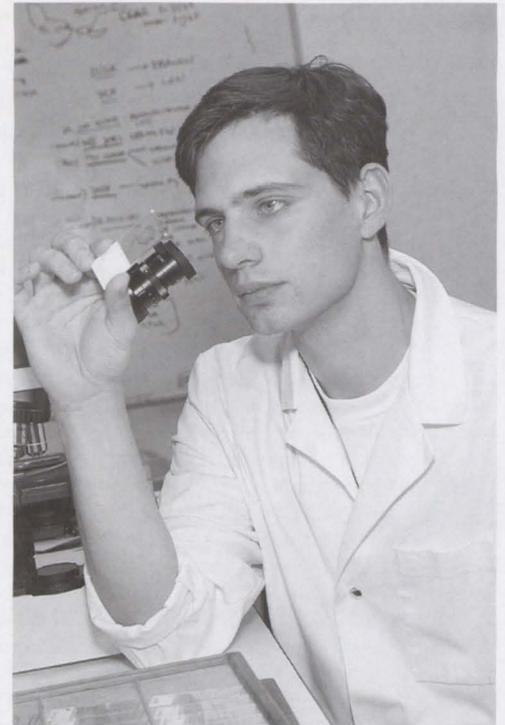
Autoimmunity

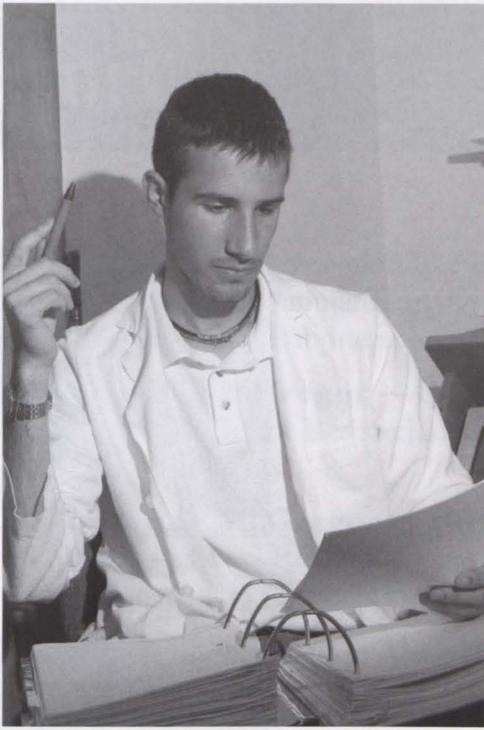
Disease Mechanisms in Helicobacter pylori Infection

Growing up on a farm made me curious about animal disease and catalyzed my decision to study veterinary medicine. As I began my studies, I realized that there were not always answers to my questions. The Leadership Program allowed me to look for some answers.

This summer, I had the pleasure of working in Dr. Kenneth Simpson's laboratory. The lab works on *Helicobacter* infection in dogs and cats. The aim of my project was to determine if *H. pylori* infection induces anti-gastric autoantibodies in cats. In humans, anti-gastric antibodies are thought to arise as a consequence of antigenic homology between antigens such as Lewis x and y which are present in gastric mucosa, blood cells, and *Helicobacter*, and may play a role in the pathogenesis of *H. pylori* associated gastritis and gastric atrophy. For my study, I used sera from uninfected cats, *H. pylori* infected cats, and cats vaccinated with *H. pylori* and *H. felis*. I assayed the sera on gastric tissue from uninfected cats and evaluated the localization on cells by immunostaining. I attempted to identify the immunoreactive cells using antibodies against Lewis x and y, gastrin, and somatostatin. Preabsorption of sera with *H. pylori*, *H. felis* and Lewis x and y antigen was performed to confirm antigenic mimicry.

The Leadership Program's career discussions, workshops, and daily discussions gave me an overall picture of what research is and can be. I had a lot of fun working, both because of my project and because of the people in the lab. I want to thank the Mellon Foundation, Dr. Kenneth Simpson and his team, Christina Smith, the staff of the Diagnostic Lab, and the histopathology service.





Mike Fietz

Cornell University

Leadership Program for Veterinary Students Coordinator

I grew up in the suburbs of Long Island, New York, and decided at an early age that I wanted to become a veterinarian. For the past three years, I have studied Animal Science as a Cornell University undergraduate, and I will enter Cornell's vet school in the fall of 1999.

In my position as coordinator of the Leadership Program, I was responsible for the administration of all program activities, and I served as liaison between participating students and program organizers. I had the opportunity to attend all of the program modules, discussions, and functions.

1999 Prizes

Students present their research activities and findings at the conclusion of each program session. A book prize is awarded to the student with the best overall project as judged by the criteria of underlying hypothesis, project design, research results, and presentation. Additional prizes are awarded for exceptional projects in molecular, cellular, and integrated biology. We extend our congratulations to the following 1999 Leadership Program for Veterinary Students prize winners:

Program Prize:

Nadine Bowden

Analyses of Canine Parvovirus Variants

Integrative Cell Biology Prize:

Sarah Cazabon

Immunity against Parasitic Protozoa

Cell Biology Prize:

Rachel Mo

*Targets of Protective Immunity against
*Parelaphostrongylus Tenuis**

Molecular Biology Prize:

Erica Behling-Kelly

Mechanisms of Insulin Exocytosis

Dr. Judith Appleton – Career Counselor
Associate Professor, James A. Baker Institute for
Animal Health
Cornell University

Dr. David Blackwell – Module Facilitator
Principle Research Investigator, Drug Safety Evaluation
Pfizer Inc

Dr. Stuart Bliss – Career Counselor
Resident, Clinical Sciences
Cornell University

Dr. Susan Bliss – Career Counselor
Ph.D. Graduate Student, Field of Immunology
Cornell University

Dr. Mary Boy – Module Facilitator
Manager, Animal Health Clinical Affairs
Pfizer Inc

Dr. H. Alex Brown – Career Counselor
Assistant Professor, Molecular Medicine
Cornell University

Dr. Nigel Evans – Module Facilitator
Executive Director, Animal Health
Discovery Pharmaceuticals
Pfizer Inc

Dr. Brian Farrow – Career Counselor
Professor, Clinical Sciences
University of Sydney

Dr. George Foley – Module Facilitator
Senior Pathologist, Toxicology
Pfizer Inc

Dr. David Fraser – Career Counselor, Module Facilitator
Professor, Animal Science
University of Sydney

Dr. Robert Gilbert – Career Counselor
Associate Dean for Clinical Programs and Professional Service
Cornell University

Dr. Michelle Haven – Career Counselor, Module Facilitator
Assistant Director, Animal Health Drug Discovery
Pharmaceuticals
Pfizer Inc



Dr. Nigel Evans



Dr. Michelle Haven



Dr. Gerard Hickey



Dr. Douglas McGregor

Facilitators

Dr. Gerard Hickey — Module Facilitator
Senior Director, Animal Drug Evaluation
Merck Research Laboratories

Dr. Douglas McGregor — Career Counselor
Associate Dean for Research and Graduate Education
Cornell University

Ms. Suzanne McGregor — Module Facilitator
Special Assistant Regional Council
US Department of Justice

Dr. Malden Nesheim — Module Facilitator
Provost Emeritus
Cornell University

Dr. Noa Noy — Career Counselor
Associate Professor, Nutritional Sciences
Cornell University

Dr. Colin Parrish — Module Facilitator
Associate Professor, James A. Baker Institute for
Animal Health
Cornell University

Mr. Andrew Sage, Jr. — Module Facilitator
Managing Partner Retired
Lehman Brothers

Dr. Karel Schat — Career Counselor
Professor, Microbiology & Immunology
Cornell University

Dr. Donald Schlafer — Career Counselor
Professor, Biomedical Sciences
Cornell University

Dr. Robert Shope — Module Facilitator
Professor, Pathology
University of Texas Medical Branch at Galveston

Dr. Kenneth Simpson — Career Counselor
Assistant Professor, Clinical Sciences
Cornell University

Dr. Ari van Tienhoven — Module Facilitator
Professor Emeritus, Animal Science
Cornell University



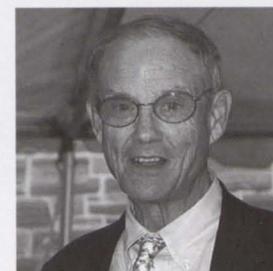
Ms. Suzanne McGregor



Dr. Malden Nesheim



Dr. Colin Parrish



Mr. Andrew Sage, Jr.



Dr. Robert Shope

Program Dinner

The Leadership Program fellows hosted a dinner for mentors, facilitators, and other guests in Willard Straight Hall on the Cornell campus.



Although the Leadership Program for Veterinary Students is an intensive ten-week learning experience, the fellows found time to visit New York City, Montreal, Washington, D.C., and the Bostwick Great Camp in New York State's Adirondack Mountains.



Where Are They Now?

We strive to maintain contact with program alumni to help us determine how they may have benefited from participation in the program, and to ensure that the Leadership Program for Veterinary Students' tradition of excellence is upheld for the benefit of future program fellows. Listed below are some recent alumni reports.

1990 Graduates

Allan Berger – Postdoctoral Fellow, Molecular Pharmacology, University of Iowa
Laura Gumprecht – Veterinary Pathologist, Merck Research Laboratories
Richard Haworth – Molecular Pathologist, Glaxo Wellcome
Susan Schaefer – Assistant Professor, Small Animal Surgery, Washington State University
Alexander Tucker – Head, Veterinary Services Unit, Imutran-Novartis Ltd.

1991 Graduates

Prema Arasu – Assistant Professor, Microbiology, Pathology and Parasitology,
North Carolina State University
Judy Hickman-Davis – Research Assistant Professor, Anesthesiology, University of Alabama
Jean Reichle – Assistant Professor, Radiology, Ohio State University

1992 Graduates

Matthew Gerard – Ph.D. Student, Experimental Surgery, University of Sydney
Christine Hawke – Ph.D. Student, Immunobiology, University of Sydney
Jackie Phillips – Postdoctoral Fellow, Neuroscience, University of Auckland
Reinhard Straubinger – Research Associate II, James A. Baker Institute for Animal Health,
Cornell University

1993 Graduates

Melinda Gabor (Stewart) – Ph.D. Student, Immunology, University of Sydney
Claire Micklethwaite – Veterinary Surgeon, Brisbane, Australia
Ashley Reynolds – Ph.D. Student, Microbiology, Cornell University

1994 Graduates

Melissa Beall – Ph.D. Student, Microbiology, Cornell University
Leslie Gabor – Territory Manager, Merial Limited

1995 Graduates

Philippa Beard – Ph.D. Student, Microbiology, Moredon Institute, University of Edinburgh
Adrienne Bentley – Resident, Large Animal Medicine, University of Georgia

1996 Graduates

Antonia Jameson – Ph.D. Student, Molecular Medicine, Cornell University
Amy Schein – Staff Veterinarian, ASPCA Manhattan

1997 Graduates

Jennifer Fryer – Veterinary Student, North Carolina State University
Monica Mason – Veterinary Student, Cornell University

1998 Graduates

Karsten Hüffer – Ph.D. Student, Immunology, James A. Baker Institute for Animal Health,
Cornell University
Larissa Minicucci – Veterinary Student, Cornell University

Acknowledgments

The Leadership Program for Veterinary Students was made possible through awards from federal agencies, corporations, foundations, and other private sector sponsors. For their generous support of this initiative, we wish to thank:

- The National Institutes of Health
- The United States Department of Agriculture
- The Merck Company Foundation
- Pfizer Inc
- The Marilyn M. Simpson Charitable Trust
- The Wellcome Trust
- The Albert C. Bostwick Foundation
- The Dorothy Russell Havemeyer Foundation
- The R. K. Mellon Family Foundation
- The Auxiliary to the New York State Veterinary Medical Society

We would also like to thank all of the facilitators and mentors for their dedication to and involvement with this program, and for the expertise they lend. But most of all, we wish to thank the Leadership Program fellows themselves. The academic excellence they display coupled with their dedication to biomedical research render these extraordinary individuals worthy of being distinguished as future leaders in veterinary medicine and animal agriculture.

