Baker Institute For Animal Health

 $\begin{array}{c} Annual \; Report \\ 2009-2010 \end{array}$ 

To Improve
Animal Health
Through Basic and
Applied Research







Dear Friends of the Baker Institute for Animal Health,

I am delighted to present the 2010 Annual Report of the Baker Institute for Animal Health. Our theme was "60 Years and Two Careers" as we celebrated 60 Years of leadership in the field of animal health research as well as the careers of two distinguished faculty members, Professor George Lust and former Director Douglas McGregor.

Our 60-year history has been punctuated by discoveries that have improved the lives of animals. When we attended the American Kennel Club/Eukanuba and Westminster Kennel Club Dog Shows, I was able to say with confidence that every one of the healthy and happy dogs present had been touched by research performed at the Baker Institute. In the early years, this work produced vaccines that saved dogs' lives. More recently, identification of genetic causes of disease has helped to limit the perpetuation of these diseases in affected breeds. At this juncture, the genome sequencing efforts for the dog and horse are bearing fruit in many ways that show us the benefit of conducting fundamental research in order to solve problems that challenge animal health. In 2010, the formula was executed beautifully when the equine genome sequence enabled the identification of the genetic defect responsible for Lavender Foal Syndrome. That discovery was translated immediately into the development of a diagnostic test for the affected gene. This is the type of application of basic research findings upon which the reputation of the Baker Institute has been built and that will serve as the basis for advances in the future.

George Lust has been a key researcher during 42 of the 60 years of Baker history. The evolution of his research program parallels that of the Institute. George began his research on canine hip dysplasia by studying the chemical changes in affected joints. He continued his work by studying the impact of growth on the disease and in recent years has directed the research toward understanding the genetic causes of hip dysplasia. George leaves a legacy of students and collaborators who will continue his efforts to solve the problem of hip dysplasia in dogs.

Doug McGregor has had a distinguished career as a researcher, administrator, and leader of research training programs. He enjoyed a highly successful career as a cellular immunologist and, when recruited to the Baker Institute as director, he set about creating the paradigm in place today in which the expectation is that all research programs be federally funded. This was a fairly radical idea when Doug introduced it in 1975, and it has served us very well. Later, when Doug was appointed associate dean for research for the College, he developed NIH-funded training programs for veterinarians. His success in this regard is both impressive and inspiring and many college investigators have benefitted from the programs. Doug's scientific legacy will include his research findings as well as the large number of veterinarians who today are conducting research and, in their turn, training the next generation of veterinary investigators.

The year has been marked by additional milestones. We have joined with the Feline Health Center in our mission to improve the lives of animals. The Center moved to the Baker Institute in November of 2009, and we are working together to optimize our administrative and programmatic activities. Other significant

events and accomplishments are described in the report. I am very pleased that Colin Parrish, the John M. Olin Professor of Virology, has been appointed to serve as the next director of the Baker Institute for Animal Health and the Feline Health Center. Colin is an extraordinary scientist who has contributed in many important ways to the Institute since his arrival as a graduate student in 1980. His commitment to our mission is strong and our future is secure in his hands.

It has been my privilege to serve the Institute as interim director during the past year. Thank you for your support and commitment to our mission. The generosity of our friends enables us to continue to lead and grow our research efforts. To put it simply, we could not do it without you!

When he founded the laboratory that would become the Institute, James Baker's vision was that the challenges of animal health research could be attacked using scientific tools at the cutting edge. In the first 60 years, we have seen James Baker's vision realized in ways that he might not have imagined. We look to the future with excitement and commitment.

With best wishes,

July

Judy Appleton

Interim Director
Baker Institute for Animal Health
and Feline Health Center,
Alfred H. Caspary
Professor of Immunology

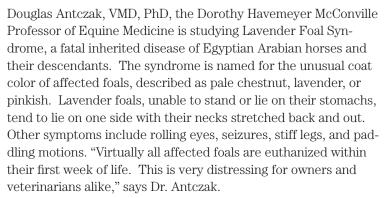


# Lavender Foal Syndrome



Douglas F. Antczak, VMD, PhD

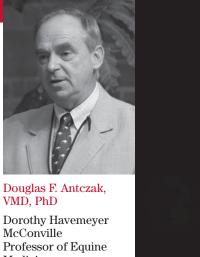
**McConville** Professor of Equine Medicine

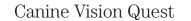


Despite the rarity of Lavender Foal Syndrome—10.3 per cent of Egyptian Arabians and 1.8 per cent of non-Egyptian Arabians are carriers—the cost to owners is significant. "The loss of that year's foal, the mare's lost breeding year, plus veterinary care, can total thousands of dollars," estimates Dr. Antczak.

Drs. Antczak and Samantha Brooks, assistant professor in Cornell's Department of Animal Science, collaborated successfully on a project to identify the mutated gene that causes this disease. It took nearly a decade, along with essential cooperation from Arabian horse breeders, to collect the necessary hair samples from affected foals and their relatives. The researchers then developed a simple molecular assay to test for carriers or to confirm the diagnosis in afflicted foals.

Because Lavender Foal Syndrome is a recessive condition, horses with only one copy of the mutated gene appear normal, but are carriers. Afflicted foals, however, carry two copies of the mutant gene—one from each parent. The new test will enable breeders to avoid carrier-to-carrier matings that can produce affected foals. Test results showing a "clean bill of health" will enhance a horse's breeding value. "The Lavender Foal Project is an excellent example of the practical progress in equine genetic medicine that was made possible by the recent sequencing of the horse genome," notes Dr. Antczak. "Using genetic testing in this powerful way may eventually eliminate this disease."







Gregory M. Acland, BVSc

Professor of **Medical Genetics** 

Gregory Acland, BVSC, Professor of Medical Genetics, researches inherited eye diseases in dogs. Sometimes, he conquers them. One such disease, progressive retinal atrophy (PRA), renders affected Glen of Imaal terriers completely blind by age seven. "It first manifests around age three—too late to avoid breeding carriers together," notes Dr. Acland. Using DNA derived from blood samples, he compared thousands of short gene sequence variations, called "SNPs," from affected and unaffected terriers, exploiting newly available genomics tools ("SNP chips") to locate the mutated gene. "The elimination of PRA in this breed is now probable," says Dr. Acland.

Another breed, the briard, is susceptible to congenital stationary night blindness, an early-onset disease that causes a range of vision problems. "We now have a test that detects the gene responsible for the disease," says Dr. Acland. "Breeders can avoid carrier-to-carrier matings, and the incidence of congenital stationary night blindness in briards has decreased rapidly."

Other diseases that have been similarly eliminated are PRA in collies and Irish setters, and progressive rod cone degeneration in Australian cattle dogs. "There are now over 15 genetic tests associated with 30 different dog breeds," notes Dr. Acland. "Funding from the NIH, Morris Animal Foundation, and various breeder groups has been vital to our work."

In another line of collaborative research, a briard named Lancelot had his sight restored via gene replacement therapy. "Dr. Bill Hauswirth at the University of Florida developed a 'viral vector'—a non-toxic virus containing the missing gene," explains Dr. Acland. "When Lancelot was injected with this virus, the gene was restored to his retina, and his vision returned to normal." This technique has since proven successful on humans with similar disorders.

Dr. Acland is currently studying PRA in Italian greyhounds and American Staffordshire terriers, and a complex retinal disease called collie eye anomaly. "Formerly, we needed 100 dogs plus their parents and grandparents to obtain a sample database for each disease," recalls Dr. Acland. "Now, with SNP chips, samples from only about 30 dogs are needed. That's good news for dog lovers everywhere!"



Judith A. Appleton PhD Alfred H. Caspary Professor of Immunology

Alpaca Parasites

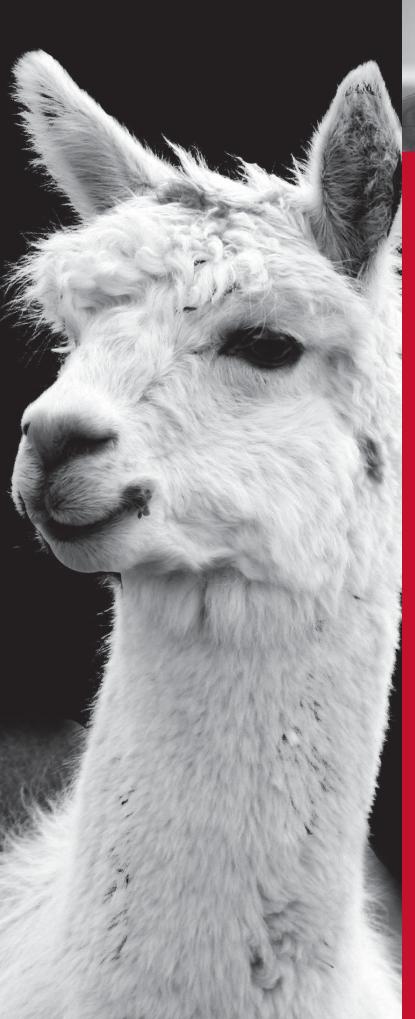
Judith Appleton, PhD, the Alfred H. Caspary Professor of Immunology, is researching the impacts of the parasitic worm *Parelaphostrongylus tenuis* upon alpacas. "Virtually all white-tailed deer in the northeastern U.S. carry this common parasite," says Dr. Appleton. Although the deer are unaffected, the larvae are passed in their feces and then picked up by snails. Llamas, alpacas, sheep, and goats acquire the parasite by eating either the infected snails or the grass they have touched.

"The larvae can enter the animal's spinal cord, where they grow and wreak havoc with the nervous system," says Dr. Appleton. Symptoms include weakness in the hindquarters, difficulty walking, and inability to stand. Left untreated, the disease can lead to paralysis and death for animals unable to feed themselves. "It's not in the best interests of a parasite to kill its host," explains Dr. Appleton, continuing, "but alpacas are not native here, so the parasite is not adapted to them."

"We collaborated with camelid veterinarian Steve Purdy from the University of Massachusetts, in studying the alpaca's immune response to this parasite," says Dr. Appleton. "We found that infected animals improve significantly following treatment with anti-inflammatory and anti-parasitic drugs." They also found that, when mounting immune responses, camelids produce unusual "heavy-chain" antibodies in response to induced infection. These small antibodies may be able to go where conventional antibodies cannot, making them particularly effective in countering *Parela-phostrongylus tenuis*.

Another study revealed that these heavy-chain antibodies are passed into baby camelids' bodies via their mother's first milk. "There is only a short window of opportunity after birth to do this," explains Dr. Appleton. "Crias that cannot nurse miss out and are at high risk for developing a variety of infections."

"This parasite is a huge concern for alpaca owners," notes Dr. Appleton. Most treat their animals preventatively with anti-parasitic drugs; however, other intestinal worms then develop resistance to these medications. Developing a vaccine—Dr. Appleton's long-term goal—could eliminate the need for such medications.





Scott A. Coonrod, MS, PhD, Associate Professor of Epigenetics and Reproductive Biology, is researching canine breast cancer. "Dogs get breast cancer naturally, just as humans do, and they have mammary gland structure, hormone levels, and breast cancer pathways that are similar as well," explains Dr. Coonrod. "Without surgical intervention, most dogs with breast cancer die from it. Fortunately, most owned dogs are spayed before reaching sexual maturity, which helps prevent breast cancer."

Scott A. Coonrod.

Associate Professor

of Epigenetics and Reproductive Biology

MS. PhD

Working in collaboration with Drs. Joe Wakshlag, assistant professor in the Department of Clinical Sciences, and postdoctoral fellow Dr. Brian Cherrington, Dr. Coonrod found that amounts of a specific enzyme, called PAD2 "are increased in the lining of the canine mammary gland as the female enters estrus. We also found that levels of this enzyme are regulated by the epidermal growth factor receptor family, which is currently the target of a number of breast cancer drugs for women."

Besides investigating the function of this enzyme in normal tissue, the researchers are now testing whether PAD2 levels are increased in canine mammary tumors, and whether this increase is linked to one growth factor receptor in particular, HER2. "This is important because women with HER2 positive tumors can be effectively treated with drugs that specifically target this receptor," says Dr. Coonrod. "We've also recently developed a new drug that inactivates PAD2, and this drug also appears to block tumor growth of breast cancer cells. We hope that soon we will be able to begin testing the efficacy of our new drugs on dogs with breast cancer. A combination of HER2 and PAD2-blockers might be particularly effective at blocking tumor growth." Related research also involves testing for PADs as markers for early stage breast cancer.

Regarding future cancer research at the Baker Institute, "Our long-term goal is to develop a strong, well-funded companion animal cancer program that helps both animals and people," says Dr. Coonrod. "We want Baker to be the place to go to study canine and feline cancer."









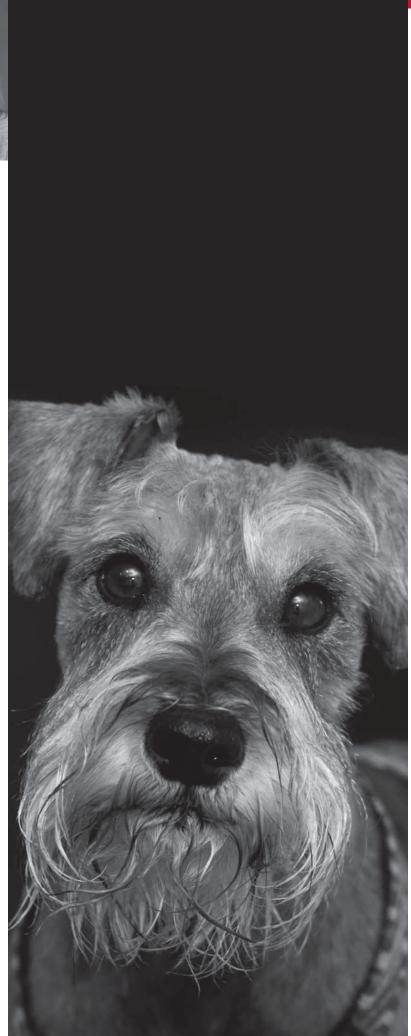
Susan K. Bliss, DVM, PhD Senior Research Associate

Senior Research Associate Susan K. Bliss, DVM, PhD, studies *Cryptosporidium parvum*, a protozoan parasite that causes enteric disease in mammals, including humans, worldwide. The parasite is transmitted by ingestion of oocysts that are shed in the feces of infected animals. "Importantly, recent studies indicate that infected dairy calves are the major reservoir of *Cryptosporidium parvum* for human infection, which can be fatal in people with compromised immune systems," notes Dr. Bliss. "Since medications against cryptosporidiosis have limited benefit in either humans or calves, the development of an effective vaccine is important."

In collaboration with Daryl Nydam, DVM, PhD, an assistant professor in Cornell's Department of Population Medicine and Diagnostic Sciences, Dr. Bliss has been researching such a vaccine. "We are evaluating a protein from the parasite called CP15. When combined with aluminum hydroxide, such a vaccine may decrease both the transmission and severity of disease in calves."

In recent experiments, vaccinated two-year-old pregnant heifers had significantly higher levels of CP15-specific antibodies in both their serum and colostrum (first milk) compared to unvaccinated control heifers. Subsequently, 40 female and male Holstein calves were randomly fed either colostrum from the vaccinated heifers or control colostrum produced by unrelated heifers.

"Vaccination appears to induce a specific immune response in heifers as antibodies are secreted into their colostrum, and calves absorb these antibodies," summarizes Dr. Bliss. "We anticipate that the vaccine will be a practical method for conferring protection to calves against cryptosporidiosis. In addition, colostrum containing CP15-specific antibodies may prove valuable for protecting and treating humans with cryptosporidiosis."



Researching Canine Reproductive Diseases



Reproduction

Vicki Meyers-Wallen, VMD, PhD, Dipl. ACT, Associate Professor of Genetics and Reproduction, investigates two inherited canine reproductive diseases, each with a parallel form in humans. One such disease, which occurs in 22 different dog breeds, is SRY-negative XX Sex Reversal. Here, dogs with female sex chromosomes develop testicular tissue and other male organs in utero. As the name suggests, affected individuals have two X chromosomes and lack a Y chromosome. However, their physical characteristics vary. Severely affected dogs develop testicles and externally, a penis. Less affected dogs are hermaphrodites; they develop ovotestes (gonads with both testicular and ovarian aspects) and externally, female genitalia. The recommended treatment—removing the entire reproductive tract—is similar to spaying.

To identify the cause, says Dr. Meyers-Wallen, "We are examining the region of the genome that most likely contains the mutation, using next-generation sequencing and re-sequencing techniques. Having narrowed this region from billions of base pairs to two million in affected dogs, we plan to pinpoint the abnormal DNA sequence and then develop a diagnostic test for it."

A second disorder is Persistent Mullerian Duct Syndrome in which externally normal males develop oviducts and a uterus. This disorder occurs in miniature schnauzers worldwide. Approximately 50 per cent of affected dogs have undescended testicles, which are susceptible to testicular tumors. Affected dogs may also develop urinary tract infections and life-threatening uterine infections. Again, removal of the reproductive tract eliminates such problems. "In 2009, we identified the mutation that is responsible for this syndrome in miniature schnauzers, using blood samples from affected dogs, and developed a diagnostic test that detects the mutation in the DNA," notes Dr. Meyers-Wallen. "By detecting unaffected carriers, this commercially available test can prevent carrier-to-carrier matings, which produce affected males."

Because the disorders Dr. Meyers-Wallen studies are not always obvious, she is also interested in raising awareness about them among breeders and veterinarians. "If breeders are conscientious, both disorders can eventually be eliminated," she says. "Used in this way, genetic testing can ultimately lead to the improvement of canine breeds."



Susana Mendez. DVM. PhD Assistant Professor of Immunology and Infectious Diseases

Leashing Leishmaniasis

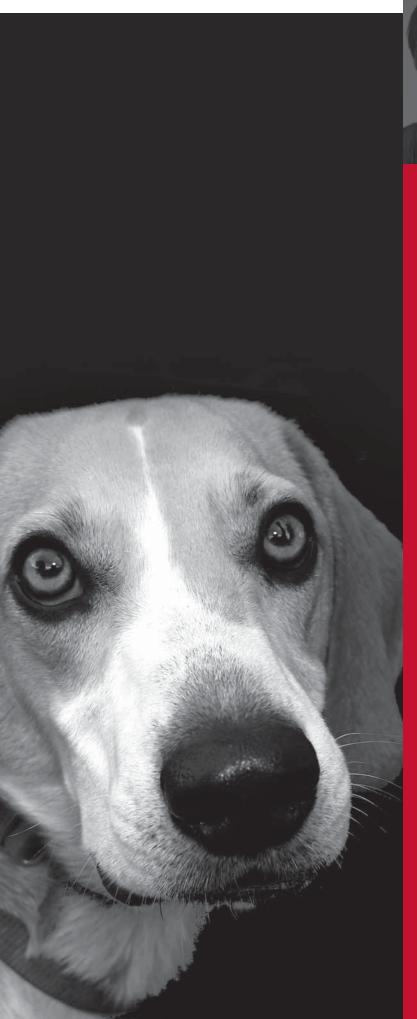
Susana Mendez, DVM, PhD, Assistant Professor of Immunology and infectious diseases, is researching canine leishmaniasis, a serious disease of dogs and people that is caused by a parasite that is transmitted via the bite of a sandfly. Sandflies themselves may become infected from biting infected dogs.

Over the last decade, leishmaniasis has become established in North America and is on the rise worldwide. "However, we receive few canine leishmaniasis patients at Cornell; the sandflies may not survive northeastern winters," notes Dr. Mendez. "Dogs from warmer areas are more likely to contract the disease."

Foxhounds seem particularly susceptible to leishmaniasis. Signs include dry skin, dandruff, hair loss around the eyes and muzzle, open skin sores, and severe weight loss. Diagnosis is confirmed by blood tests. "The disease is generally fatal, since internal organs, especially the kidneys, are irreversibly damaged," says Dr. Mendez. "While 90 per cent of dogs with leishmaniasis die, a small minority—perhaps those with greater genetic resistance overcome it."

Dr. Mendez is studying the antibiotic pyrazinamide—used to treat tuberculosis in humans—for use against leishmaniasis. "This drug is already licensed and is safe, inexpensive, and available in a pill form that is easy to administer," she reports. "We are now researching chemical analogs that would make pyrazinamide more effective."

Research on a leishmaniasis vaccine is also underway. "Live vaccines seem to be required to produce a significant level of immunity," observes Dr. Mendez. "In collaboration with NIH scientists, we have identified salivary proteins of the sandfly that induce a strong immune response. We are now creating a non-pathogenic form of the *Listeria monocytogenes* bacteria that has been genetically manipulated to produce those saliva molecules." When injected into the skin, this vaccine could prime the skin against the bite of the infected sandfly so that the response to infection yields a stronger level of immunity. Says Dr. Mendez, "This vaccine has potential to protect both dogs and humans against leishmaniasis."



Genetics of Anna V. Kukekova. Domesticated Behavior Research Associate in Foxes

PhD

Research Associate Anna V. Kukekova, PhD, literally goes the extra mile for her research. Traveling regularly to Russia, she works in collaboration with the Institute of Cytology and Genetics of the Russian Academy of Sciences to better understand animal domestication. Starting in 1959, the institute selected farm-bred foxes for tameness. Now 50 generations later, the resultant population is represented by 400 animals. In 1970, the institute began selecting aggressive foxes; there are now 200 of these foxes.

There are differences between genetically inherited tameness and non-genetic, learned tameness, says Dr. Kukekova. "If you took infant wild foxes home and hand-raised them, they might act tame, but their offspring would exhibit wild behavior," she explains. "By contrast, our genetically tame foxes consistently produce tame pups. They behave much like pet dogs." Even genetically tame pups reared by aggressive mothers remain tame, notes Dr. Kukekova, adding, "When tame foxes are bred with aggressive foxes, most of the offspring exhibit intermediate behavior."

Tameness is measured by evaluating the way the foxes respond to people, describes Dr. Kukekova. "The foxes may exhibit behaviors ranging from approaching the human with wagging tails, seeking to be petted, to huddling at a distance, or exhibiting aggression."

"Our goal is to identify the genes responsible for these behaviors. By analyzing DNA samples from the foxes, we've found several regions within the fox genome that are associated with tame behavior," says Dr. Kukekova. "The most significant loci are located on fox chromosome number 12. However, this region is very large, and now we're working on narrowing it down to individual genes."

Tame foxes are not only sociable toward humans, but also toward each other, notes Dr. Kukekova. "Our research may identify genes that have parallel functions in domestic dogs and in people. For example, a disease such as autism may be associated with the lack of certain genes that promote sociability. Understanding the genetic basis of behavior is the ultimate goal of our research."





# Virulent Virus Affects Felines

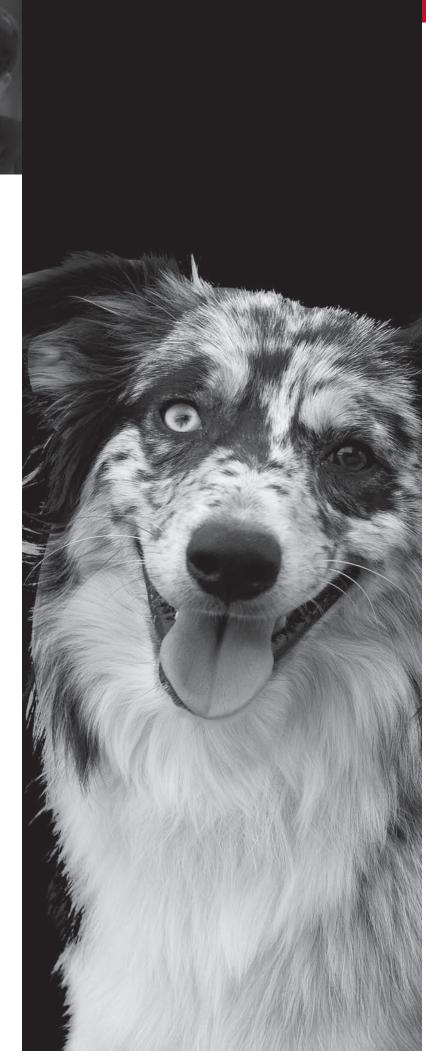


John S. L. Parker, BVMS, PhD, assistant professor of virology, is researching feline calicivirus, a disease with two faces. "Non-virulent forms of feline calicivirus are common," says Dr. Parker. "The virulent form is much rarer, yet much more dramatic. Like wildfire, it can spread quickly between cats, then die down just as fast, leaving behind high mortality and devastated cat owners."

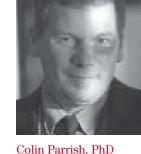
Infection begins when the virus attaches to a specific receptor on a susceptible cell's surface. "Virulent strains may then undergo rapid changes in shape, enabling them to enter cells faster than non-virulent strains," explains Dr. Parker. "Receptors are the key to developing our understanding of this disease. Further research will be devoted to linking specific responses to corresponding genetic conditions."

Dr. Parker is also investigating the genetic basis of calicivirus virulence. "We'd like to combine different parts of virulent strains with non-virulent strains and see what happens," he says. Toward that end, Dr. Parker is working collaboratively with Leadership Program alumna Dr. Patty Pesavento, a faculty member involved in the shelter medicine program at U.C. Davis. "We found that infected cats often have low blood platelet levels," he says. "Platelets are rich in receptors, so the virus causes platelets to aggregate, which can lead to internal bleeding. Given our lab observations and Patty's shelter observations, a clearer picture is emerging."

The original feline calicivirus vaccine neither protects against the virulent form nor prevents infection. A newer vaccine, developed from one virulent strain, may not always protect cats against other virulent strains, says Dr. Parker. "In addition, such vaccines may prevent disease symptoms, but do not prevent infection," he explains. "Vaccines that do both are the gold standard; they carry the hope of eliminating the disease. We'd like to see the day when this happens for feline calicivirus."



Controlling Canine Influenza



John M. Olin Professor of Virology

Colin Parrish, PhD, the John M. Olin professor of virology, is researching canine influenza, commonly known as dog flu. "The H3N8 influenza virus strain that causes this disease in dogs was found originally in horses. First isolated in 2004 by Dr. Edward Dubovi of the College's Animal Health Diagnostic Center, the virus was recovered from samples submitted by Dr. Cynda Crawford at the University of Florida. She sought to determine why racing greyhounds were exhibiting high fevers and coughs," says Dr. Parrish.

By 2004, 100 per cent of Florida's greyhounds tested positive for canine influenza. "The widespread shipment of greyhounds likely helped in the nationwide dispersal of this virus," explains Dr. Parrish. Outbreaks were subsequently observed at greyhound race tracks, as well as shelters and kennels in many areas.

Disease commonly lasts about two weeks, followed by recovery in most dogs. Occasionally, a dog may die from complications. The virus is shed soon after infection, before the dog develops signs of illness, and then for several days after signs begin. Dr. Parrish is currently collaborating on further research with Drs. Jan Scarlett, in Cornell's Department of Population Medicine and Diagnostic Sciences, and Ed Dubovi. "Initially, we looked at the RNA sequences of the virus to see how it emerged, whether it is evolving to become more specific to dogs, and how we might best control it," explains Dr. Parrish. "We obtained viruses from shelters and examined their sequences over time, and found that there have indeed been several changes in the virus since 2003, when they were first collected."

A recently licensed vaccine prevents signs of disease and some infections, but only if administered before dogs are exposed to the virus. "Unfortunately, this vaccine may not work well in shelter situations, where new dogs are constantly arriving," notes Dr. Parrish. "We currently recommend it for high-risk dogs, such as frequently-boarded or show dogs."

Now the researchers are investigating how the host range of the virus varies and how the virus determines which animal it will infect, says Dr. Parrish, adding, "Answers to these questions, along with our studies of the canine parvovirus—another recently emerged virus that was transferred to dogs from cats—will provide the information required to prevent future viral emergences and pandemics."

# January 2009 – June 2010 Publications

### Faculty represented:

G. Acland, D. Antczak, J. Appleton, S. Bliss, L. Carmichael (Emeritus), S. Coonrod, G. Lust, S. Mendez,

V. Meyers-Wallen, J. Parker, C. Parrish, A. Travis.

**2009 Journal Publications:** (PMC numbers indicate NIH grant support and free

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Zhu, L., Zhang, Z., Friedenberg, S., Jung, S.W., Phavaphutanon, J., Vernier-Singer, M., Corey, E., Mateescu, R., Dykes, N., Sandler, J., **Acland, G., Lust, G.**, and Todhunter, R. (2009). The long (and winding) road to gene discovery for canine hip dysplasia. Vet J. 181:97-110.

### 2009 Book Chapters:

Meyers-Wallen, V.N. (2009). CVT Update: Inherited disorders of the reproductive tract in dogs and cats. In: Kirk's Current Veterinary Therapy XIV. Bonagura, J.D. and Twedt, D.C. (eds), W.B. Saunders, Philadelphia, pp. 1034-1040.

### January – June 2010 Journal Publications: (PMC numbers indicate NIH grant support and free public access)

Brooks, S.A., Gabreski, N., Miller, D., Brisbin, A., Brown, H.E., Streeter, C., Mezey,

J., Cook, D., and Antczak, D.F. (2010). Whole-genome SNP association in the horse: identification of a deletion in myosin Va responsible for Lavender Foal Syndrome. PLoS Genet. 6(4):e1000909. PMCID: PMC2855325.

Daley, L.P., Kutzler, M.A., Bennett, B.W., Smith, M.C., Glaser, A.L., and **Appleton**, **J.A.** (2010). Effector functions of camelid heavy-chain antibodies in immunity to West Nile virus. Clin. Vaccine Immunol. 17(2):239-246. PMCID: PMC2815534.

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Douglas, D.B., Beiting, D.P., Loftus, J.P., Appleton, J.A., and Bliss, S.K. (2010). Combinatorial effects of IL-10 and IL-4 determine the progression of hepatic inflammation following enteric parasitic infection. Hepatology 51(6):2162-2171

Goodman, L.B., Lyi, S.M., Johnson, N.C., Cifuente, J., Hafenstein, S. and Parrish, **C.R.** (2010). Binding site on the transferrin receptor for the parvovirus capsid and effects of altered affinity on cell uptake and infection. J. Virol. 84:4969-4978. Hoelzer, K., Murcia, P.R., Baillie, G.J., Wood, J.L., Metzger, S.M., Osterrieder, N., Dubovi, E.J., Holmes, E.C. and **Parrish, C.R.** (2010). Intrahost evolutionary dynamics of canine influenza virus in naive and partially immune dogs. J. Virol. 84:5329-5335. PMCID: PMC2863817.

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Komáromy, A.M., Alexander, J.J., Rowlan, J.S., Garcia, M.M., Chiodo, V.A., Kaya, A., Tanaka, J.C., **Acland, G.M.**, Hauswirth, W.W., and Aguirre, G.D. (2010). Gene therany rescues cone function in congenital achromatopsia. Hum. Mol. Genet. 19(13):2581-2593. PMCID: PMC2883338.

Lust, G. (2010). Canine hip dysplasia: another perspective. Vet. J. 183:247-248.

Murcia, P.R., Baillie, G.J., Daly, J., Elton, D., Jervis, C., Mumford, J.A., Newton, R. Parrish, C.R., Hoelzer, K., Dougan, G., Parkhill, J., Lennard, N., Ormond, D., Moule, S., Whitwham, A., McCauley, J.W., McKinley, T.J., Holmes, E.C., Grenfell, B.T., and Wood. J.L. (2010). The intra- and inter-host evolutionary dynamics of equine influenza virus. J. Virol. 84:6943-6954. PMCID: PMC2898244

Ossiboff, R.J., Zhou, Y., Lightfoot, P.J., Prasad, B.V.V. and Parker, J.S.L. (2010). Conformational changes in the capsid of a calicivirus upon interaction with its functional receptor. J. Virol. 84:5550-5564.

Parrish, C.R. (2010). Structures and functions of parvovirus capsids and the process of cell infection. Curr. Top. Microbiol. Immunol. 343:149-76.

Tallmadge, R.L., Campbell, J.A., Miller, D.C., and Antczak, D.F. (2010). Analysis of MHC class I genes across horse MHC haplotypes. Immunogenetics 62:159-172. PMCID: PMC2872545.

Yurttas, P., Morency, E., and Coonrod, S.A. (2010). Use of proteomics to identify highly abundant maternal factors that drive the egg to embryo transition. Reproduction 139(5):809-823.



# January 2009 – June 2010: Faculty Accomplishments

# Dr. Greg Acland

Dr. Acland co-authored 13 research papers on the genetic basis of diseases in dogs and secured two major grants to support his research, one from the NIH and another from the Foundation for Fighting Blindness. Together with Dr. Anna Kukekova, he published new findings on mapping of fox and mink genomes and won a third prize grant from Roche for two gigabases of sequencing of fox cDNA.

### Dr. Doug Antczak

A DVM graduate student in Dr. Antczak's laboratory, Dr. Peggy Brosnahan, was the recipient of a five-year NIH K award series grant for her PhD studies on pregnancy immunology in the mare.

Dr. Antczak was honored with the Distinguished Veterinary Immunologist Award, presented by the International Union of Immunological Societies. His acceptance lecture, presented at the conference held in Tokyo, was entitled "Horses for Courses." In addition, Dr. Antczak was inducted into the University of Kentucky Equine Research Hall of Fame in Lexington Kentucky and was named Special Professor by the University of Nottingham. Dr. Antczak's group contributed to the Science publication on the horse genome sequence and, in collaboration with Professor Samantha Brooks in the Department of Animal Science, published a report describing the genetic basis of Lavender Foal Syndrome. The team also developed a diagnostic test for the disease that is being offered through Cornell's Animal Health Diagnostic Center.

# **Dr. Judy Appleton**

Dr. Appleton assumed interim leadership of the Baker Institute and the Feline Health Center and provided oversight for the move of the FHC to the Baker campus. She secured a grant from the NIH for her research on regulation of immunity during nematode infection by eosinophils. The first description of this phenomenon was published by her group and selected for interest by the Faculty of 1000 Biology and described in Nature Immunology. Dr. Appleton was invited to present research findings at the meeting of the International Eosinophil Society in Brugges and the Laboratory of Parasitic Diseases at the NIH. She made presentations on meningeal worm disease in camelids to the Pennsylvania Alpaca Owners and Breeders Association and the Greater Appalachia Llama Association.

# Dr. Susan Bliss

Dr. Bliss secured a grant from the NIH to support her research on liver injury during parasitic infection and published her most recent findings from this project in the journal Hepatology.

# **Dr. Scott Coonrod**

Dr. Coonrod served on review panels for the NIH and Department of Defense. He was invited to speak at the Lake Shirakaba Conference, "From Oocyte to Baby," in Copenhagen and at the Scientific Think Tank sponsored by the Alliance for Contraception in Cats and Dogs, in Roanoke. His post-doctoral fellow, Dr. Xuesen Zhang, won a Susan B. Komen for the Cure Fellowship Award.

# **Dr. George Lust**

Dr. Lust continued his research on hip dysplasia in collaboration with Dr. Rory Todhunter. He retired in 2010 and was elected professor emeritus.

# **Dr. Doug McGregor**

Dr. McGregor continued to lead the highly successful Leadership Program for Veterinary Students and renewed his NIH-supported training grant that provides fellowships to veterinarians seeking PhD degrees.

### Dr. Susana Mendez

Dr. Mendez collaborated with Professor Helene Marquis to secure a grant from the Department of Defense in support of their research on a Listeria-based vaccine against leishmaniasis. The novel approach targets salivary gland proteins from the sandfly vector of the parasite. In addition, Dr. Mendez collaborated with Spanish scientist Dr. Jose Alunda on a project to improve drug treatment of dogs infected with Leishmania infantum. The work is supported by a grant from the Center for Technologic and Scientific Research. Dr. Mendez was invited to present her research findings at the American Society for Microbiology in Philadelphia and at the State University of New York in Albany.

### Dr. Vicki Mevers-Wallen

Dr. Meyers-Wallen secured new grants as principal investigator or co-investigator to study the genetic basis of myopathy in dogs, sex-reversal in dogs, and infertility in horses. She continued work as a co-investigator to study inherited liver disease in dogs, to generate stem cells from dogs, and to generate canine transcriptomes. She published a report on XY sex reversal in cats and lectured on canine reproduction at the AKC Breeders Conference and the Wine Country Regional Dog Show, both held in or near Ithaca.

# Dr. John Parker

Dr. Parker assumed the role of co-director of the Cornell Leadership Program for Veterinary Students. Working in collaboration with Dr. Marcelo Ehrlich at Tel Aviv University, Dr. Parker secured a grant from the Binational Agricultural Research and Development Fund to apply a new, reverse genetics approach to the study of bluetongue and epizootic hemorrhagic disease viruses.

# Dr. Colin Parrish

Dr. Parrish coordinated the Cornell program on the Ecology and Evolution of Infections and Diseases and organized a meeting on Ecology and Evolution of Infectious Disease, held at the Baker Institute. He served on multiple NIH review panels and was invited to speak at a Thought Leaders Workshop on predicting 'species jumps' by viruses, sponsored by the Office of the Secretary of Defense. Dr. Parrish was invited to present his research at the University of Rochester and at the annual meeting of the American College of Veterinary Pathologists in Monterey.

# **Dr. Alex Travis**

Dr. Travis was awarded a prestigious Director's Pioneer Award by the NIH for his work on nanoscale energy production for implantable medical devices. A report on this project was a featured article in the journal *Chemistry and Biology*. He continued in his role as Director of the Cornell Center for Wildlife Conservation and led the initiative to establish the Joint Graduate Training Program with the Smithsonian Conservation Biology Institute. With Professor Christopher Barrett, Dr. Travis served as co-organizer and co-host of an international workshop, "Biodiversity Conservation and Poverty Traps," that was held at the Baker Institute.

# January 2009 – June 2010: Active Faculty Funding

# Gregory M. Acland, BVSc

Professor of Medical Genetics Inherited Eye Disease Studies Unit

# **Team members:**

Anna V. Kukekova, Research Associate
Orly Goldstein, Research Support Specialist
Jennifer L. Johnson, Research Support Specialist
Julie Jordan, Research Technician
Susan E. Pearce-Kelling, part-time Research
Support Specialist
Svetlana V. Temnykh, part-time Research Scientist
Meredith Sherrill, Veterinary Student,
Summer 2009 Leadership Program
Pavee Padte, Veterinary Student,
Summer 2010 Leadership Program

# **Grants:**

2004 – 2009. Principal Investigator. "Models of therapy of hereditary retinal degeneration." National Institutes of Health, Grant # 5 R01 EY06855. Current year direct costs: \$475,844. Total project direct costs: \$2,368,271.

Renewal 2009-2014. Principal Investigator. "Models of therapy of hereditary retinal degeneration." National Institutes of Health, Grant # 2 R01 EY06855. Current year direct costs: \$696,000. Total project direct costs: \$3,695,142.

2004 – 2009. Principal Investigator. "Pre-Clinical Medical Therapy Evaluation Center (Cornell Module)." Foundation Fighting Blindness, Grant # C-NY01-0404-0247. Current year direct costs: \$256,962. Total project direct costs: \$1,345,002. Continued Funding: 2009-2014. Principal Investigator. "Module I Medical Therapy Service Facility." Foundation Fighting Blindness, Grant # C-GT-0409-0475-CORN01. Current year direct costs: \$270,000. Total project direct costs: \$1,350,000.

2007 – 2009. Principal Investigator. "Grants for Growth: Genetic test for hereditary cataract in dogs." (Acland project). Funding awarded to both OptiGen LLC and Dr. G. Acland. NYS Metropolitan Development Assoc./Optigen LLC. Current year direct costs: \$16,028 (Cornell). Total project direct costs: \$43,632 (Cornell).

2007–2011. Co-Principal Investigator. "Molecular mechanisms of social behavior" (with A. Kukekova, PI). National Institutes of Health, Grant # 5 R01 MH077811. Current year direct costs: \$228,600. Total project direct costs: \$914,400.

2007–2011. Principal Investigator. "Pooled association mapping for canine hereditary disorders." Morris Animal Foundation, Grant # D07CA-085. Current year direct costs: \$54,090. Total project direct costs: \$178,530.

2008 – 2011. Co-Principal Investigator. "Candidate gene expression: Validation of directly sequenced canine cDNA library database and in silico screening" (with V. Meyers-Wallen,

PI; S. Center, R. Todhunter, Co-PIs). Cornell Collaborative Research Program. Current year direct costs: \$0, no cost extension. Total project direct costs: \$25,000.

2008 – 2010. Co-Principal Investigator. "Genotyping small breed dogs with portosystemic vascular anomalies and microvascular dysplasia" (with S. Center, PI, V. Meyers-Wallen, R. Todhunter, Co-PIs). American Kennel Club Canine Health Foundation, Grant # 963. Current year direct costs: \$67,549. Total project direct costs: 175,453.

2008 – 2012. Principal Investigator. "Tools for genetic and genomic studies in the dog." National Institutes of Health, Grant # 5 R24GM082910. Current year direct costs: \$221,831. Total project direct costs: \$890,339. Funding support goes to Department of Clinical Sciences.

Supplemental support: 2010. Principal Investigator. "Tools for genetic and genomic studies in the dog." National Institutes of Health, Grant # 3 R24GM082910-02S1. Current year direct costs: \$111,905. Total project direct costs: \$223,739. Funding support goes to Department of Clinical Sciences.

2009 – 2011. Co-Principal Investigator. "Genetics of portosystemic vascular anomalies and microvascular dysplasia in small breed dogs" (with S. Center, PI; V. Meyers-Wallen; R. Todhunter, N. Sutter, Co-PIs). Morris Animal Foundation, Grant # D08CA-001. Current year direct costs: \$78,846. Total project direct costs: \$177,873.

# Douglas F. Antczak, VMD, PhD

Dorothy Havemeyer McConville Professor of Equine Medicine Equine Genetics Center: Equine Immunology

# **Team members:**

Jennifer L. Sones, Postdoctoral Fellow (2009); Post-DVM PhD Candidate (2010)

Margaret M. Brosnahan, Post-DVM PhD Candidate Leela E. Noronha, Post-DVM PhD Candidate Rebecca M. Harman, Research Support Specialist Donald C. Miller, Research Support Specialist Joy T. Tseng, Undergraduate Student (2009); Technician (2010)

Marine deMarcken, Undergraduate Student Mackenzie Adams, Summer 2009 Havemeyer Fellow Kate Huggler, Summer 2009 Havemeyer Fellow Lindsay Goodale, Summer 2010 Havemeyer Fellow Kerrie Winstanley, Summer 2010 Havemeyer Fellow Kate Huggler, Summer 2010, VIP Program

### **Grants:**

2005 – 2011. Principal Investigator. "Split immunological tolerance to trophoblast." National Institutes of Health, Grant # 5 R01 HD049545. Current year direct costs: \$0, no cost extension. Total project direct costs: \$834,055.

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# 2008 – 2011. L. Noronha (Fellow); D. Antczak (Mentor). "Characterization of T lymphocyte modulation in pregnancy." National Institutes of Health, NRSA Grant # 5 F32 HD055794. Current year direct costs: \$72,756. Total project direct costs: \$211.194.

2008 – 2012. Consortium Principal Investigator. "Equine Consortium for Genetic Research. Genes and genetic mechanisms modulating recurrent airway obstruction, allergic diseases and placental development (Cornell subproject)" (with J. Mickelson, Univ. Minnesota, Project PI). Morris Animal Foundation Grant # D06EQ-710, University of Minnesota subcontract Grant # K670647406. Current year direct costs: \$15,278 (Antczak). Total project direct costs: \$30,556 (Antczak).

2009 – 2010. Principal Investigator. "Expression microarrays and equine placental development." Harry M. Zweig Memorial Fund for Equine Research. Current year direct costs: \$35,000. Total project direct costs: \$65,000.

2009 – 2011. Co-Investigator. "Leukocyte and neural endothelial cell interactions with the coagulation cascade: Role in the pathogenesis of equine herpes virus myeloencephalopathy" (with T. Stokol, PI). Morris Animal Foundation, Grant # D09EQ-009. Current year direct costs: \$73,814. Total project direct costs: \$148,740.

2009. Principal Investigator. "Transcriptome-wide identification of imprinted genes and quantification of genome-wide differential allelic expression in horse-donkey interspecies hybrids" (with A. Clark, Co-PI), Center for Vertebrate Genomics, Cornell, Seed Grant.

Current year and total direct costs: \$13,000 (funding to Dr. Clark).

# Foundation Support to Dr. Antczak

1995 – 2009. Principal Investigator. "Umbrella support for horse genome project." Dorothy Russell Havemeyer Foundation. Current year direct costs: \$50,000/year. Total project direct costs: \$750,000.

1980 – ongoing. Principal Investigator. "Equine Histocompatibility Antigens." Dorothy Russell Havemeyer Foundation. \$40,000/year.

1986 – ongoing. Principal Investigator. "Summer Fellowship Program for Veterinary Students." Dorothy Russell Havemeyer Foundation. \$11,000/year.

# Judith A. Appleton, PhD

Alfred H. Caspary Professor of Immunology Laboratory of Mucosal Immunity, Nematodes and Immunoparasitology

# **Team members:**

Lisa K. Blum, PhD Candidate
Nebiat Gebreselassie, PhD Candidate
Lucille F. Gagliardo, Research Technician
Emily Bick, Undergraduate Student
Tamara Maehr, 2010 VIP Program
George Theodoropoulos (2009), Sabbatical Visiting Professor,
Agricultural University, Athens, Greece
Na Young Kim, M. Eng. Student
Lucas Dawson, Undergraduate Student
Shirley Cheng, Undergraduate Student

# **Grants:**

2004–2010. Principal Investigator. "Immunity to parasitic infection." National Institutes of Health, Grant # 5 R01-AI014490. Current year direct costs: \$0, no cost extension. Total project direct costs: \$1,092,342.

2008 – 2009. Principal Investigator. "Intrabodies as novel neurological therapeutics." National Institutes of Health, Wadsworth Center, Grant #3546-01. Current year and total project direct costs: \$26,995.

2008 – 2009. Principal Investigator. "Vaccination against infection with Parelaphostrongylus tenuis." University of Massachusetts. Current year and total project direct costs: \$6.390.

2009 – 2011. Co-Principal Investigator. "Biosensor based on electrochemical/gravimetric detection of intrinsic antibody catalysis" (with B. Baird, PI). Cornell Nanobiotechnology Center, Grant # BDF-14. Current year direct costs: \$46,667. Total project direct costs: \$70,000.

2009 – 2011. Principal Investigator. "Eosinophils sustain chronic nematode infection." National Institutes of Health, Grant # 5 R03 AI081043. Current year direct costs: \$50,000. Total project direct costs: \$99,500.

# Susan K. Bliss, DVM, PhD

Senior Research Associate Laboratory of Immunoparasitology

# **Team members:**

Diana Douglas, Research Technician Meleana M. Hinchman, Research Technician John Loftus, Veterinary Student

# **Grants:**

2009 – 2011. Principal Investigator. "Regulatory B cells in the liver." NIH, NIAID, Grant # R03 AI082334. Current year direct costs: \$50,000. Total project direct costs: \$100,000.

2009 – 2010. Principal Investigator. "Modulation of systemic and mucosal immunity in Cryptosporidium parvum infected calves by immune colostrum" (with D. Nydam, Co-PI), Collaborative Research Program, Cornell University. Current year and total project direct costs: \$25,000.

# Scott A. Coonrod, PhD

Associate Professor of Epigenetics and Reproductive Biology Laboratory of Epigenetics and Reproductive Biology

# **Team members:**

Rui Kan, Research Associate Brian D. Cherrington, Postdoctoral Associate Eric P. Morency, Postdoctoral Fellow Xuesen Zhang, Postdoctoral Associate Boram Kim, PhD Candidate John L. McElwee, PhD Candidate Lynne J. Anguish, Research Support Specialist Ashley M. Palmer, Research Technician Mei Jin, Undergraduate Student Emily van den Blink, Undergraduate Student Molly Shook, 2010 Visiting Graduate Student, Boyce Thompson Institute Shuhei Ito, Veterinary Student, Summer 2009 Leadership Program Magdalena Schmidt, Veterinary Student, Summer 2009 Leadership Program Emily Ames, Veterinary Student, Summer 2010 Leadership Program Heike Bruer, Veterinary Student, Summer 2010 Leadership Program Erin Tsi-jia Chu, 2010 VIP Program Adbulwahed Zainel, 2010 Hughes Scholar, from Qatar

# **Grants:**

2007 – 2009. Principal Investigator. "Contraceptive potential of ooctye-restricted cPLA2g." National Institutes of Health, Grant # 5 R03 HD052241. Current year direct costs: \$49,000. Total project direct costs: \$52,602.

2007 – 2012. Principal Investigator. "Role of maternal PADI6 in embryonic development." National Institutes of Health, Grant # 5 R01 HD 38353. Current year direct costs: \$179,002. Total project direct costs: \$808,194.

2007 – 2012. Principal Investigator. "Epigenetic analysis of breast cancer." Department of the Army, Grant # W81X-WH-07-1-0372. Current year direct costs: \$439,168. Total project direct costs: \$2,012,850.

2010 – 2013. X. Zhang (Fellow); S. Coonrod (Mentor). "Role for PADI4 as an estrogen-regulated transcription cofactor during breast cancer." Susan G. Komen for the Cure, Grant # KG101303. Current year direct costs: \$60,000. Total direct costs: \$180,000.

# George Lust, PhD

Professor of Physiological Chemistry The Albert C. Bostwick Foundation Laboratory: Canine Hip Dysplasia and Osteoarthritis

### Grant:

2008 – 2010. Co-Investigator. "Fibrillin 2 and developmental genetics of hip dysplasia in a canine model" (with R. Todhunter, PI). National Institutes of Health, Grant # 5 R21AR055228.

# Douglas D. McGregor, PhD

Director of Leadership Program and Training Initiatives

# **Team members:**

Kathleen Williams, Administrative Assistant Cynthia Kwong, 2009 Leadership Program Assistant Caleb Chan, 2010 Leadership Program Assistant

### Grants:

2005 – 2010. Principal Investigator. "Graduate training program in comparative medicine." National Institutes of Health, Grant # 5 T32 RR07059. Current year direct costs: \$388,908. Total project direct costs: \$1,670,404.

2007 – 2012. Principal Investigator. "Short-term training program for students in health professions." National Institutes of Health, Grant # 2 T35 AI07227. Current year direct costs: \$68,185. Total project direct costs: \$339,821.

# Foundation/Corporate Support to Dr. McGregor

Ongoing. Principal Investigator. "Leadership Program for Veterinary Students." Albert C. Bostwick Foundation. \$45,000/year.

Ongoing. Principal Investigator. "Leadership Program for Veterinary Students." Pfizer Inc. Current Year: \$42,950.

# Susana Mendez, DVM, PhD

Assistant Professor of Immunology and Infectious Diseases Laboratory of Immunology of Infectious Diseases

# **Team members:**

Wenhui Wu, Postdoctoral Associate
Lu Huang, PhD Candidate
Meleana M. Hinchman, Lab Manager/Research Technician
David Byun, Undergraduate Student
Eliese Friedel, Undergraduate Student
Patricia Green, Undergraduate Student/Honors thesis
Byung Joo Nahm, Undergraduate Student
Christian Owusu, Undergraduate Student
Jolanda Verhoef, Veterinary Student, Summer 2009
Leadership Program
Anne Kimmerlein, Veterinary Student, Summer 2010
Leadership Program
Maria Warren, Summer 2010, VIP Program
Laura Manna, Visiting Scholar (2009), Universita di Napoli

# **Grants:**

Federico II, Italy

Patricia Wolkmer, Volunteer

2007 – 2009. Co-Principal Investigator. "Immunomodulatory effect of two Leishmania recombinant antigens encapsulated in nanocapsules of phosphatidylcholine-cholesterol (Quil-ISCOM)" (with A. Osuna, PI, Univ. Grenada, Spain). Center for Technologic and Scientific Research (CICYT), Grant # AGL2007-60123/GAN. Total project direct costs: approx. \$16,422 USD (Mendez).

2009 – 2012. Co-Principal Investigator. "Resistance of Leishmania infantum to chemotherapy. Methods of drug screening and therapy with amphotericin B" (with J. Alunda, PI, University Complutense of Madrid, Spain), Center for Technologic and Scientific Research (CICYT), Grant # AGL2009-13009. Total project direct costs: approx. \$41,664 USD (Mendez)

2010 – 2013. Co-Principal Investigator. "Listeria-based vaccine for cutaneous leishmaniasis" (with H. Marquis, PI). Department of Defense, Grant # 1026861. Current year direct costs: \$172,773. Total project direct costs: \$620,374.

# Vicki N. Meyers-Wallen, VMD, PhD

Associate Professor of Genetics and Reproduction Laboratory for the Study of Inherited Canine Reproductive Diseases

# **Team members:**

Shashikant Pujar, Research Associate Shana Mintz, Undergraduate Student

### **Grants:**

2008 – 2010. Co-Principal Investigator. "Genotyping small breed dogs with portosystemic vascular anomalies and microvascular dysplasia" (with S. Center, PI; G. Acland, R. Todhunter, Co-PIs). American Kennel Club Canine Health Foundation, Grant # 963. Current year direct costs: \$67,549. Total project direct costs: \$175,453.

2008 – 2011. Principal Investigator. "Candidate gene expression: Validation of directly sequenced canine cDNA library database and in silico screening" (with G. Acland, S. Center, R. Todhunter, Co-PIs). Cornell Collaborative Research Program. Current year direct costs: \$0, no cost extension. Total project direct costs: \$25,000.

2009 – 2011. Co-Investigator. "Genetic background and efficient generation of induced pluripotent stem (iPS) cells" (with L. Fortier, J. Schimenti, PIs; A. Travis, Co-Investigator). New York State Dept. of Health – NYSTEM, Grant # C024400, Current year direct costs: \$95,371. Total project direct costs: \$190,700.

2009 – 2011. Co-Principal Investigator. "Genetics of portosystemic vascular anomalies and microvascular dysplasia in small breed dogs" (with S. Center, PI; G. Acland, R. Todhunter, N. Sutter, Co-PIs). Morris Animal Foundation, Grant # D08CA-001. Current year direct costs: \$78,846. Total project direct costs: \$177,873.

2010. Principal Investigator. "Generation of a molecular resource to identify gene mutations causing inherited equine sterility and infertility." Harry M. Zweig Memorial Fund for Equine Research. Current year and total project direct costs: \$48,000.

2010–2011. Principal Investigator. "Canine XX sex reversal: The molecular basis and its effect on key gene expression during sex determination." CU-ADVANCE Research Initiation Award. Current year and total project direct costs: \$50,000.

# John S. L. Parker, BVMS, PhD

Associate Professor of Virology Laboratory of Virology: Feline Caliciviruses and Mammalian Orthoreoviruses

### **Team members:**

Irene (Alex) Amaro, Postdoctoral Associate Jae-Won Kim. Postdoctoral Associate Susanne Kaufer, PhD Candidate Robert J. Ossiboff, DVM/PhD Candidate Brenda G. Werner, Research Support Specialist Brian M. Ingel, Research Technician Jegath Athilingham, Undergraduate Student Amanda Fischer, Undergraduate Student Joseph Graterol, Undergraduate Student Natalie Katchmar, Undergraduate Student Dana Anchassi, 2009 Hughes Scholar, from Qatar Stuart Davenport, Veterinary Student, Summer 2009 Leadership Program Samantha Hodgkins, Veterinary Student, Summer 2010 Leadership Program Andrea Lopez-Cepero, 2010 Leadership Alliance Program

### Grants:

2005 – 2010. Principal Investigator. "Reovirus factories: structure, function, and dynamics." National Institutes of Health, Grant # 5 R01 AI063036. Current year direct costs: \$0, no cost extension. Total project direct costs: \$857,002.

2005 – 2012. Principal Investigator. "Reovirus-induced apoptosis: the role of the viral outer capsid protein mu1." Burroughs Wellcome Fund, Grant # 1005528. Current year direct costs: \$100,000. Total project direct costs: \$470,000.

2008 – 2010. Principal Investigator. "Are differences in feline calicivirus (FCV) tissue tropism and virulence determined by changes in virus interactions with cell surface glycans?" Winn Feline Foundation-Miller Trust, Grant #MT07-008. Current year direct costs: \$0, no cost extension. Total project direct costs: \$15,750.

2009 – 2010. Principal Investigator. "The role of feline junctional adhesion molecule-A in feline calicivirus infection." Cornell Feline Health Center. Current year direct costs: \$0, no cost extension. Total project direct costs: \$20,000.

2009 – 2011. Principal Investigator (US). "Development of a plasmid based reverse genetics system for the Bluetongue and Epizootic Hemorrhagic Disease viruses to allow a comparative characterization of the function of the NS3 viroporin in viral egress" (with M. Ehrlich, University of Tel Aviv, PI). BARD, Grant # IS-4192-09. Current year direct costs: \$40,830 (Cornell). Total project direct costs: \$125,000 (Cornell).

# Colin R. Parrish, PhD

John M. Olin Professor of Virology Albert C. Bostwick Laboratory of Molecular Biology: Canine and Feline Parvoviruses

### **Team members:**

Sangbom Lyi, Research Associate Laura B. Goodman, Postdoctoral Fellow Jessica J. Hayward, Postdoctoral Associate Carole E. Harbison, DVM/PhD Candidate Karin Hoelzer, Post-DVM PhD Candidate Karla M. Stucker, Post-DVM/PhD Candidate Virginia Scarpino, Research Technician Wendy S. Weichert, Research Support Specialist Shelagh M. Johnston, Administrative Assistant Leigh MacAyeal, Veterinary Student Matthew Hints, Undergraduate Student Natalie Johnson, Undergraduate Student Jason Kaelber, Undergraduate Student Alicia Ortega, Undergraduate Student Ichih Candy Wu. Undergraduate Student Bobby Yu, Undergraduate Student Hans Winkler, Veterinary Student, Summer 2009 Leadership Program Marie Killerby, Veterinary Student, Summer 2010 Leadership Program

### **Grants:**

2003 – 2009. Principal Investigator. "Parvovirus structure, capsid assembly and receptors" (with M. Rossmann, Purdue University). National Institutes of Health, Grant # 5 R01 AI033486. Current year direct costs: \$0, no cost extension. Total project direct costs: \$1,231,170.

2006 – 2011. Principal Investigator. "Training in molecular virology and pathogenesis." National Institutes of Health, Grant # 5 T32 AI007618. Current year direct costs: \$152,837. Total project direct costs: \$742,423.

2007–2010. Principal Investigator. "Antigenic structure of adeno-associated virus capsids and antibody escape mutants" (with M. Agbandje-McKenna, University of Florida-Gaines-ville, Co-PI). National Institutes of Health, Grant # 5 R21 AI072341. Current year direct costs: \$0, no cost extension. Total project direct costs: \$325,637.

2007–2011. Principal Investigator. "Mechanisms of parvovirus infection and host range." National Institutes of Health, Grant # 5 R01 AI028385. Current year direct costs: \$242,798. Total project direct costs: \$1,243,779.

2007–2012. Consortium Principal Investigator. "The evolutionary and biological bases of host switching in viruses" (with E. Holmes, Penn State University, PI). National Insti-

tutes of Health, Grant # 5 R01 GM080533/Pennsylvania State University, Subcontract # 3368-CU-DHHS-0533. Current year direct costs: \$180,816 (Cornell). Total subcontract direct costs (years 1-4): \$451,676 (Cornell).

2008–2009. Co-Investigator. "Bioengineering to optimize monoclonal antibodies for passive immunotherapy" (with M. Jin, PI, Biomed. Engr., Cornell; A, Moscona, Weill Cornell Medical College, Cornell). Northeast Biodefense Center; NYS Dept. of Health. Current year and total project direct costs: \$7,500 (Parrish).

# 2008–2010. K. Hoelzer (Fellow); C. Parrish (Mentor). "Mechanisms of canine and feline parvovirus emergence and spread." Morris Animal Foundation, Fellowship Training Grant # D08FE-403. Current year direct costs: \$37,375. Total project direct costs: \$72,970.

2009–2011. L. Goodman (Fellow); C. Parrish (Mentor). "Engineering altered receptors and antibodies to study viral functions." National Institutes of Health, NRSA Grant # 1 F32 AI082922. Current year direct costs: \$50,054. Total project direct costs: \$101,764.

2009–2014. Co-Principal Investigator. "Veterinary student training in biomedical research" (with R. Gilmour, PI). National Institutes of Health, Grant # 2 T32 RR018269. Current year direct costs: \$126,208. Total project direct costs: \$635,884.

# Alexander J. Travis, VMD, PhD

Associate Professor of Reproductive Biology Laboratory of Reproductive Biology

# **Team members:**

Atsushi Asano, Research Associate
Roy Cohen, Research Associate
Lizeng Gao, Postdoctoral Associate
Danielle Buttke, DVM/PhD Candidate
Yeunhee Kim, PhD Candidate
Jacque L. Nelson-Harrington, Research Support Specialist
Lauren Wu, Technician
Kate Backel, Undergraduate Student
Abdelaziz Farhat, 2010 Hughes Scholar, from Qatar
Gertje Petersen, Veterinary Student,
Summer 2010 Leadership Program
Sirima Yaesmsiri, Veterinary Student,
Summer 2010 Leadership Program

# **Grants:**

2004–2009. Principal Investigator. "Organization and function of lipid rafts in spermatozoa." National Institutes of Health, Grant # 5R01 HD045664. Current year direct costs: \$167,260. Total project direct costs: \$873,703.

2006–2009. Project Director. Co-PI. "Developing a Participatory Socio-Economic Model for Food Security, Improved Rural Livelihoods, Watershed Management, and Biodiversity Conservation in Southern Africa." (Travis, Project Director and Co-PI with A. Torres and D. Lewis; approx. 20 investigators from multiple institutions). SANREM CRSP, US AID/Virginia Tech. 19024D-425632. Current year direct costs: \$317,417. Total project direct costs: \$1,119,656.

2007–2010. Principal Investigator. "Analyzing the function of feline sperm produced by testis xenografting." Morris Animal Foundation, Grant # D07ZO-097. Current year direct costs: \$0, no cost extension. Total project direct costs: \$99,000.

2008 – 2010. Co-Investigator. "NYSTEM Grant for institutional development of stem cell research capabilities" (with A. Nikitin, PI). NYS Department of Health, Grant # C023050. Current year direct costs: \$0, no cost extension. Total project direct costs: \$26,730 (Travis).

2009. Principal Investigator. "Modulation of calcium channel function in sperm by gangliosides." Center for Vertebrate Genomics. Current year and total direct costs: \$10,000.

2009 – 2010. Principal Investigator. "Production of metabolic energy for implantable medical NanoDevices." NYSTAR Cat Grant. Current year and total direct costs: \$49,605.

2009 – 2011. Co-Principal Investigator. "Towards a canine model of fanconi anemia" (with Torok-Storb, PI). NIH Recovery Act Challenge Grant # 1RC 1HL100270/Fred Hutchinson Cancer Research Center subcontract #680169. Current year direct costs: \$85,372 (Travis). Total project direct costs: \$173,305 (Travis).

2009–2011. Co-Investigator. "Genetic background and efficient generation of induced pluripotent stem (iPS) cells" (with L. Fortier, J. Schimenti, PIs; V. Meyers-Wallen, Co-Investigator). New York State Dept. of Health – NYSTEM, Grant # C024400. Current year direct costs: \$95,371. Total project direct costs: \$190,700.

2009–2014. Principal Investigator. "Nanoscale energy production for implantable medical devices." NIH Pioneer Award, Grant # 1 DP1 OD006431, Current year direct costs: \$500,000. Total project direct costs: \$2,500,000.

# Baker Institute Trainees: PhD Degrees Awarded 2009 – June 2010

**Christian Nelson** 

Graduate field:

Current position:

Major advisor:	Dr. Colin Parrish
Thesis title:	Studies of conformational changes and
	the effect of antibody and receptor
	binding on canine parvovirus.
Current position:	Postdoctoral Associate, Department
	of Molecular Biology, Cell Biology and
	Biochemistry, Brown University,
	Providence, RI.
Robert Ossiboff	January 2009
Graduate field:	Comparative Biomedical Sciences

January 2009

Major advisor: Dr. John Parker
Thesis title: Studies of virus receptor interactions

and virulence determinants of feline calicivirus.

Comparative Biomedical Sciences

Veterinary Anatomic Pathology Resident, Department of Biomedical Sciences, College of Veterinary Medicine, Cornell University,

Ithaca, NY

Note: Dr. Ossiboff was a dual-degree program graduate student and completed his DVM degree in May 2010.

Meagan Wisniewski	January 2009
Graduate field:	Immunology
Major advisor:	Dr. John Parker

Thesis title: Expression of reovirus structural protein  $\mu 1$  leads to activation of the intrinsic and extrinsic apoptotic

pathways.

Current position: Postdoctoral Research Assistant,

Biotechnology Research and Training Center, University of North Carolina,

Pembroke, NC.

**Karin Hoelzer** May 2009

Graduate field: Comparative Biomedical Sciences

Major advisor: Dr. Colin Parrish
Thesis title: The molecular an

The molecular and evolutionary determinants of host-switching viruses.

Current position: Postdoctoral Associate,

Department of Food Sciences,

Cornell University, Ithaca, NY. **Yeunhee Kim** May 2009

Graduate field: Molecular & Integrative Physiology

Major advisor: Dr. Alexander Travis
Thesis title: Stem cell-based techr

Stem cell-based technologies of assisted reproduction in the cat

and dog.

Current position: Postdoctoral Fellow, Yale School of

Medicine, New Haven, CT.

**Danielle Buttke** May 2010

Graduate field: Comparative Biomedical Sciences
Major advisor: Dr. Alexander Travis

Thesis title: The ganglioside GM1 in mammalian

sperm function: new role for lipid

signaling.
Current position: Postdoctor

Postdoctoral trainee, Epidemic Intelligence Service, Centers for Disease Control and Prevention,

Atlanta, GA

Note: Dr. Buttke was a dual-degree program graduate student and completed her DVM degree in May 2009.



### Westminster 2010

Baker Institute advisory council members, Institute friends, Cornellians and Cornell supporters discussed the strength and beauty of the purebred dog, the prestige of the Westminster Kennel Club Dog Show, and Cornell's commitment to research and service to benefit the canine community at the 2010 Westminster annual attraction. During a reception hosted by the University, more than 100 dog enthusiasts were introduced to the mapping of the canine genome, a tool capable of using canine genetics to better understand inherited diseases, like cancer, diabetes, and arthritis. In addition, a variety of presenters, including Peggy Reed, an accomplished show judge and Baker Advisory Council member; show dog owner and friend of the Baker Institute Renee Idone; and Veterinary College faculty member Dr. Tom Kern also discussed ideas for prepping for the show, being in the show ring, and understanding the road to Westminster.

During the presentation, Idone described how dogs qualified for Westminster and the roles of the owner and handler. Reed shared her experiences as a show judge, including what a judge looks for when selecting winners, how to compare different breeds, what the audience should notice when watching, and why Westminster is so prestigious. Dr. Kern discussed the screening of purebred dogs for genetic diseases at the Cornell University Hospital for Animals and the importance of surveillance for inherited disorders.

"I invite you to think about how these beautiful and diverse breeds are helping us to improve animal and human health," said event co-host Dr. Michael I. Kotlikoff, Austin O. Hooey Dean of Veterinary Medicine. "Genetics may be the area of veterinary medicine that holds the most promise for the future, and we at Cornell are proud to be leading the way in this comparative medicine. So when you watch the Westminster Kennel Club dog show and when you hug your own dogs, realize that they might be helping veterinarians and scientists in Ithaca and at Weill Cornell to find tomorrow's cures and preventions for diseases that affect their fellow canines, and all species."

# **AKC/Eukanuba National Championship**

For the third year, faculty and staff from the Baker Institute for Animal Health and the College of Veterinary Medicine ventured to southern California for the AKC/Eukanuba National Championship. Long Beach welcomed breeders, owners, handlers, and dog aficionados to enjoy three national AKC events: the AKC Agility Invitational, the AKC National

Obedience Invitational, and the main event, a conformation dog show. Agility, one of the fastest-growing dog sports, features dogs with great conditioning, coordination, and concentration as they maneuver through obstacles. Obedience tests the relationship between a dog and its handler. The dogs must respond to commands such as sit, heel, and down, in an environment filled with distractions. During conformation shows, judges are looking at how well a dog matches the ideal size, color, disposition, proportion, structure, and movement described in the breed standard. In 2009, a Scottish terrier named Sadie took home Best in Show.

Not only were guests treated to exciting competitions, but they enjoyed an Institute-hosted hospitality room; a private tour of the AKC/Eukanuba National Championship; entertaining dog demonstrations; and "Meet the Breeds," an up-close and personal look at all 140 AKC registered breeds. Each breed has a booth staffed by breed experts, breeders, and owners. Guests can pet the dogs, chat with experts, and learn more about each of the breeds.

# **Bicknese Prize winner**

Orly Goldstein is the 2009 Bicknese Prize winner. As a member of Dr. Gregory Acland's lab, Goldstein's research focuses on studying retinal degeneration in dogs, a condition that is linked to blindness. She is looking for mutations that cause degeneration, the basis for developing genetic tests with the power to eliminate blindness. She used the Prize to purchase a new computer and three scientific text books.

The Bicknese Family Prize was established in 2005 by Dr. Joanne Bicknese, CALS '76, DVM '78, MS, ELS, as an annual award for research activities of a woman scientist-in-training. The award aims to provide support at a critical point in the trainee's academic development and to help launch her into a successful career. Dr. Bicknese, one of the Institute's most devoted and generous supporters, is a current member of the Institute's Advisory Council and served six years as chairperson during the Institute's fiftieth anniversary and the building of the new wing. The fund honors her parents, Helen and Louis Bicknese, and her aunt and uncle, Grace and Carl Bicknese.

# A trio of awards

Dr. Douglas Antczak, the Dorothy Havemeyer McConville Professor of Equine Medicine at the Baker Institute for Animal Health, was named the Distinguished Veterinary Immunologist of 2010 by the Veterinary Immunology Committee of the International Union of Immunological Societies. Offered once every three years, the award was presented in Tokyo at the International Veterinary Immunology Symposium, where Antczak, who is only the sixth person and the first Cornellian to receive the award, presented a lecture. The award recognizes his work in the area of veterinary immunology, and specifically in horse pregnancy immunology, as well as his dedication to training future scientists and his ability to attract NIH funding by successfully demonstrating the relevance of his work to human medicine.

This recognition follows on the heels of two other awards: Antczak was inducted into the University of Kentucky Equine Research Hall of Fame in October 2009 and was more recently selected for Cornell University's Polo Club Wall of Honor.

A Connecticut native, Antczak joined the faculty at the Baker Institute in 1979. In 1994, he became the director of the Baker Institute for Animal Health, a post he held for 15 years. For the past 30 years, Antczak has conducted research in equine immunology, genetics and reproduction. For more than 15 years, Antczak was also a major participant in the Horse Genome Project. As a Cornell student, Antczak was a member of the Polo team, serving as captain his senior year.

"I have supported the team financially and morally for many decades," said Antczak, who is also the father of two Cornell polo team alumnae. "Polo is the most wonderful game. It combines an interest in horses with athletics. At Cornell, it is even more wonderful as the University removes all financial barriers to the game."



# Mission: Operation Control Research to understand cancer hopes to control chaos

Cancer is a familiar villain to most of us, touching more than half of American men and one-third of American women. Linked to damaged DNA, cancerous cells replicate uncontrollably and invade healthy tissues, according to the American Cancer Society.

Researchers and new hypotheses inspire hope, encouraging those suffering, survivors, and the people who love them to imagine a cancer-free life. The Judy Wilpon Professorship of Cancer Biology at the Baker Institute for Animal Health is yet another reason to hope. Initially funded through the Judy and Fred Wilpon Family Foundation, the endowed position was created in 2009 with a \$2 million gift and a request to all those who also hope to conquer cancer: help us raise \$1 million more to permanently endow the position.

"With almost \$600,000 of the final million raised, we are in the homestretch," said Dr. Judy Appleton, interim director of the Baker Institute of Animal Health. "Endowing this position ensures that we can leverage a better understanding of the biological nature of cancer to gain greater control."



Dr. Scott Coonrod will hold the endowed position. He and his team have produced data that indicates that estrogen and progesterone are important factors in growth of canine mammary tumors. They are currently investigating the clinical correlation between the expression of hormone-associated factors and tumor progression, Coonrod explained, adding that he hopes that the results of their work will be used to develop strategies to block tumor growth.

"Ideally, no one should have to endure the pain and devastation caused by cancer," said Wilpon, who has lost five Golden retrievers to this disease. "Losing a pet to cancer is awful, and it is my hope that by supporting the research of the Baker Institute, fewer people and animals will suffer this fate. The answer may be in genetic research or in prophylactic care, but scientists are getting closer and closer to achieving this goal. It is my hope that this gift will expedite the research and the eventual discovery of a cure."

The Wilpons' gift also provided the Sprecher Institute with funds for programmatic support for the Institute and will match dollar for dollar (up to \$1 million) other gifts to the Sprecher Institute for endowment of two oncology residencies

To join the Wilpon family and the Baker Institute in fighting cancer, please contact Kevin Mahaney at km70@ cornell.edu.

Judy Wilpon, who has been a member of the advisory council at the Baker Institute since 1994, is a firm believer in education. The Judy Wilpon Professorship of Cancer Biology will encourage life-saving research and raise awareness of canine cancers. "The Baker Institute's facilities, commitment to conquering cancer, dedication to first-class research, and educational mission were all instrumental in my decision to establish the professorship."

# Pioneer Award Recognizes Plan to Target Tumors



Dr. Alexander J. Travis, associate professor of reproductive biology at the College of Veterinary Medicine, was presented with the National Institutes of Health (NIH) Director's Pioneer Award at the Fifth Annual NIH Director's Pioneer Award Symposium on September 24, 2009. The award supports individual scientists of exceptional creativity who propose pioneering and possibly transforming

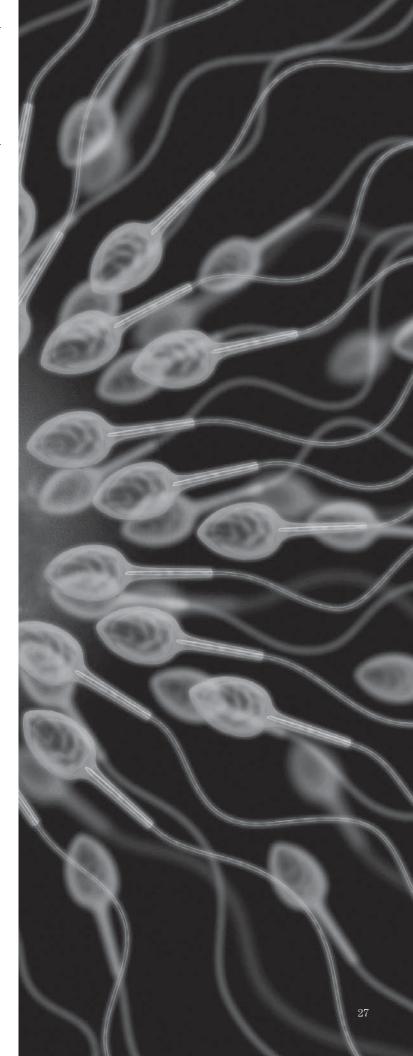
Alexander Travis

approaches to major challenges in biomedical and behavioral research, according to the NIH's web site.

Dr. Travis was recognized for his work developing an energy-producing platform that could be used to power a variety of implantable medical devices. Based on the design of a sperm's tail, this technology involves attaching metabolic enzymes to a solid support. If the entire pathway can be completed on the device, it could use freely-circulating glucose as fuel. These hypothetical devices could be used to deliver drugs precisely where they are needed in a patient's body, for example, the site of a tumor.

"We're borrowing the sperm's strategy for locomotion," said Dr. Travis, who conceived the idea after noting that many proteins on the sperm's tail are tied down to solid structures within the cell, but still function. By modifying the targeting domains responsible for this binding, he manipulated the first two proteins of the pathway to stick to a single man-made surface and demonstrated that they functioned in series. "We believe it is one of the first, if not the first, example of building sequential steps of any biological pathway on a man-made surface."

Chemistry and Biology published this information in the issue released on September 25, 2009.



# Doug McGregor: Training Veterinary Researchers for the Future

Doug McGregor

The impact made by Douglas McGregor, MD, D. Phil. upon the Baker Institute will be felt for decades to come. As director of the institute from 1976 through 1991, Dr. McGregor was not only a lead researcher in cellular immunity; he also transformed the Institute's funding paradigm, insuring a more secure future. As current director of the Leadership Program for Veterinary Students, he has

seeded both the veterinary and human medical communities with top-notch researchers, enhancing both the quality and direction of today's research.

Following Dr. James Baker's sudden death in 1975, Dr. McGregor became the Institute's second director. A medical doctor by training, he had been studying human and animal diseases. "I felt like a kid in a candy store when I arrived here in 1976; there were so many fascinating diseases I hadn't known about," recalls Dr. McGregor. "At that time, nearly every animal vaccine in use was either developed or produced by researchers who had come through Baker. Many of those vaccines are still in use today."

But, although the Institute's research was solid, its funding model was tenuous. As the first director of the Institute, Dr. Baker was also the sole fundraiser. "He was an entrepreneur and a virologist, whose Southern charm helped convince drug companies, feed companies, and wealthy individuals to fund veterinary research, which was not well supported at the time," says Dr. McGregor. "Dr. Baker then parceled out the money to the Institute's scientists."

By the late 1970s, biomedical research was becoming more expensive and more complex. "Dr. Baker's model was no longer sufficient. It became clear that in order to thrive, we needed federal funding," says Dr. McGregor. "Institute scientists were asked to seek research grants from sponsors such as the National Institutes of Health (NIH) to support their own work. This was a new experience for many. But one after another, they received sizable grants and derived satisfaction from their efforts. The people working here were so capable; I wanted to see them succeed. And succeed they did!" recalls Dr. McGregor. As a consequence, the Institute's research arena became more broad and deep. In addition to infectious diseases it now includes genetic and reproductive aspects of

biology, and cancer research. "However, our legacy of private sector support is still vital in fulfilling our infrastructure needs," notes Dr. McGregor. "As a result of both grants and gifts, the Baker Institute's influence on animal health over the years has been enormous."

As director, Dr. McGregor also made significant progress in training veterinary researchers. "We received our first NIH grant to train biomedical researchers in the early 80s, and we've never looked back," he says. Dr. McGregor is especially proud of the Leadership Program he helped establish 22 years ago, in an effort to recruit veterinary students and provide them with the hands-on experience and encouragement to succeed as research scientists. Nearly 500 students from 59 colleges have since taken part in the program. More than half of the program's alumni pursued careers in biomedical research or veterinary public health, some as scientists in industry and government. PhDs have been awarded to 138 alumni, and 62 are faculty of veterinary schools or research institutes worldwide. "While there are now similar programs at 17 other veterinary colleges nationwide, ours is the oldest and perhaps the most comprehensive," says Dr. McGregor.

"We look for applicants with an excellent academic record, the ability to apply themselves, and a passion for discovery, and offer scholarships to approximately 25 per year. There is pressure to accept more but we believe the small numbers encourage close bonding," explains Dr. McGregor, adding, "The students live, work, and play together during their 10 weeks at Cornell, and we don't want to see the program become fragmented."

Over the years, the program has built strong partnerships with the NIH and various industrial sponsors. "Rather than just asking them for money, we involve them directly in the program," notes Dr. McGregor. "We bring in the highest level people in education, government, and industry to work closely with the students. They seem to enjoy this experience as much as students enjoy interacting with them."

# George Lust: Canine Hip Dysplasia – A Cornerstone of Research at the Baker Institute



George Lust

George Lust, PhD, professor of physiological chemistry emeritus, first applied for a job at Cornell in 1968. He had graduated from Cornell four years earlier with a major in biochemistry and intended to work on infectious diseases. "But someone was needed to work on canine hip dysplasia, and I accepted," recalls Dr. Lust. "It turned out to be a good fit: I've now been here for 42 years! Over that time the

Institute has nearly doubled in size, from six professors to 11. My project began in 1968 and ended in 2010, making it one of the longest running at Baker."

Dr. Lust's research has addressed the genetics, diagnosis, pathogenesis, and treatment of hip dysplasia and osteoarthritis in dogs. "We've found that this disease has a complex inheritance with contributions from several genes, along with environmental factors—such as food consumption—that affect the rate of growth," he notes. "We also found that the signs of disease occur not only in hip joints, but also in shoulder, knee, and lumbar vertebral joints."

Initially, the only diagnosis available for canine hip dysplasia was via X-ray. "Hip dysplastic dogs were often misdiagnosed as normal," recalls Dr. Lust. "When the disease did show up, it wasn't until age two-far too late to make responsible breeding decisions." Since the abnormal dorsolateral subluxation of femoral heads is indicative of canine hip dysplasia, Dr. Lust's research team came up with the dorsolateral subluxation (DLS) test. Unlike an ordinary radiograph procedure, in which the anesthetized dog lies on its back, the DLS test utilizes the same X-ray machines, but places the dog's knees into plastic holders in a supported kneeling position, which is more similar to a normal walking or running posture. "The DLS test is not only much more accurate than a regular X-ray, but it can also detect hip dysplasia in a six- to eight-month-old dog—while there is still time to avoid breeding carriers to other carriers," notes Dr. Lust.

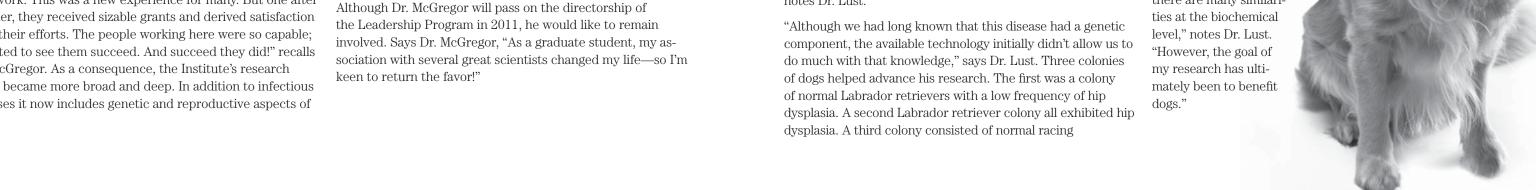
greyhounds. "When we bred the hip dysplastic labs with the normal greyhounds, the first filial generation (F1) all appeared normal—however, they were all carriers of the genes for hip dysplasia," explains Dr. Lust. "Back breeding them to the normal greyhounds resulted in normal offspring, but when the F1 dogs were back-bred to the hip dysplastic labradors, their F2 offspring had a very predictable 75 percent chance of manifesting hip dysplasia."

For the past decade, Dr. Lust has been involved in collaborative research to identify the specific genes responsible for canine hip dysplasia. "We've found that there are many genes involved, and as a result, many genetic markers some of which we've discovered," he notes. "We want to identify nucleotide sequences of DNA that can be the basis of a blood test for either normal or hip dysplastic dogs, in an attempt to identify the genes related to trait expression. We would like to identify the pertinent genes, and ultimately, the biochemical mechanisms responsible for the development of hip dysplasia and osteoarthritis."

Prior to retiring in July 2010, Dr. Lust taught osteoarthritis to veterinary students for two decades. "The students seemed to get smarter every year!" observes Dr. Lust.

"Many of my graduate students went on to have exemplary careers of their own And, while I miss the contact with these outstanding students, I've welcomed the opportunity to do more writing." Dr. Lust is currently working on his autobiography, as well as several collaborative publications on DNA testing for hip dysplasia, geared for various genetics and veterinary journals.

"Hip dysplasia in dogs has turned out to be a model for human hip dysplasia, and there are many similari-





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George and Jan Collins (in memory of Duke)

Joyce Connolly (in memory of Grizzly) Ann Corcoran (in memory of Pepper, Turbo, Lottie, Ajeax, Corky, and Penney)

John Corselli (in memory of Rex)

Judy Crichlow (in memory of Jasmine)

John Crowe (in memory of Dr. DuBois L. Jenkins)

Nancy Cummings (in memory of Dr. DuBois L. Jenkins)

Paula Cutcomb:

Sitting Pretty Pet Sitting

Antoinette Daab

(in memory of Bud and Taz)

Joyce M. Dalton (in memory of Bally)

Marion Daniel

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Sally Davidson

Mr. and Mrs. Norm Davis (in honor of Brad Davis, DVM)

Mr. and Mrs. Michael Delverne (in memory of Buster Brown and Blaze)

Ione Denny (in memory of Hansli)

Angela Dethloff (in memory of Ceaser)

Mr. and Mrs. Owen F. Devereux (in memory of all their dogs and cats)

Rosemarie DiBuono (in memory of Harley)

Dr. and Mrs. Scott Dillingham (in memory of Amalgan)

Sheila Dineen

(in memory of Munchkin and Puffin)

Houng Do (in memory of Syrah)

M. Evelynn Dolan (in memory of Misiu)

Mr. and Mrs. John Drega (in memory of Gracie)

Donald Dreher

Mr. and Mrs. Joseph Dudo (in memory of Lavinia M. Dudo)

Elizabeth Dugan

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Mr. and Mrs. William Duggan (in memory of Vex, Guinness, and Mabel)

Margaret Duque

(in memory of Stuart Phillips)

Sarah Sparkowski (in memory of Tasha)

Dr. and Mrs. Cleon Easton

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(in memory of Teddy and Pia)

Joseph Emsley

(in memory of Mr. Bogart and Bogart)

Susan Engel

(in memory of Zoe; in honor of

Dr. Cheryl Harris)

Sandra Enser

(in memory of Sasha and Belle)

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(in memory of Major and Dan DeLion)

Mitchell Field

Mary Fine

(in memory of Bug; in memory of Georgianna Marshall and June Perkins; in honor of Dr. Coley's care of Riley)

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(in memory of Ela, Itty Bitty, Mito, George, Jessie, Mac, and Fred)

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(Shadow, Daisy, and Beauvoir dog)

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(in memory of Cinder and Ocho)

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Florence Gaylord (in memory of Rosie)

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Joyce Haines (in memory of Pheonit)

Ruth Hallinan (in memory of Katrinka)

Richard Halstead (in memory of Shandy)

Carvl Handelman

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Corinne Harrison

(in memory of Bailey's English Dream)

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Chessie, Tyler)

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William and Joan Hildreth (in memory of Lynette Smith)

Lois Hilgeman (in memory of Taffy)

Klaus Hirnschal (in memory of Aly and Peppy)

George Hize (in memory of Ruth Black)

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Walter Hoffman (in memory of Shelby)

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Mr. and Mrs. David Houser (in memory of Emmitt)

Alan and Sharon Howell (in memory of Caleb)

June Hoye (in memory of Petey and Pauly)

John Hughes (in memory of Foxy and Nipper)

Kaye Hughes

LeeAnn Hughes-Martin (in memory of Ninja and Cinder) Patricia Ireton

(in memory of Spot and Corndog)

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(in memory of Marley and Kirby)

Ronald Jacobs

(in memory of Butch; in honor of the Hinman, Ragi, Greenberg, Diktas, and Eiseman families

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Beth Keister (in memory of Tilly)

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(in memory of Sandi Skryniarz)

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(in memory of Jewell and Dylan)

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Adrienne and Dan Kozma (in memory of Dr. Dennis Thome; in memory of Otis)

Diane Kranz (in memory of Sam and Luca)

Patricia Kreinheder

Mark and Stephanie Krolicki (in memory of Sasha)

LaGrange Fire Company (in memory of Brian Odendahl's mother)

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American Border Collie Association
Australian Cattle Dog Club of America
The Back Mountain Kennel Club
Finger Lakes Kennel Club
Glen of Imaal Terrier Association
Glen of Imaal Terrier Club of America
Greater Lowell Kennel Club
Greenwich Kennel Club
Olympic Kennel Club

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Dr. Pamela Nersesian Dumont
Godspeed Mobile Veterinary
Animal Hospitable Veterinary
South Wilton Veterinary Group
Dr. Darryl S. Praul
Windsor Veterinary Clinic
Dr. W. Bradley Davis
Davis Companion Animal Hospita
Woodbury Animal Hospital, P.C.
Animal General of East Norwich



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(in memory of Samantha, Sandy, Doc, Mitchell, and Pudge Boy)

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Paula Lindner (in memory of Katie)

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(in memory of Cecil, Willie, and Simon)

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(in memory of Michael) Cara and John Macchiaroli

(in honor of Sophie)

Dorothea Maibaum

Taaron and George Makrauer (in memory of Hobbie, Truffles, Muffin, and Mocha)

Alma Maler

(in memory of dogs and cats)

Gloria Manente

(in memory of Thomas C. Manente; in memory of Tedie, Gretchen, Heidi A., and Krista)

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William and Emmanuel Marchak (in memory of Shadow, Bullet, Maggie, Penny, Olivia, Emmanuel, Chewy, Roxie, and Jake)

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Susan Marsicano

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Gerry Burstein and Jim Harris

(in memory of Bill Begell)

Pamela Burton (in memory of China) Emily Buteau (in memory of Mitzy) Mr. and Mrs. Gary Butterfield (in memory of Gunther) Ethel Butterfield (in memory of Dr. DuBois L. Jenkins) Mr. and Mrs. John Buvis (in memory of Brutus) Robert Byles (in memory of Jake) April Cady (in honor of Hamilton Animal Hospital) Christine Calamia (in memory of John Tavano) Mr. and Mrs. Ralph Calkin (in memory of all their dogs) Carol Camelo (in memory of Jenny) Mr. and Mrs. Robert Canning Margaret Capobianco (in memory of Beau) Mr. and Mrs. Mark Caporale (in memory of Gigi) Christine Cappabiance Carter (in memory of Mookie) Carl Cappadona Mr. and Mrs. Donald Capra (in honor of Patsy and Peter Hollister) Megan M. Carey (in memory of Mac) Mr. and Mrs. Michael Carfagna (in memory of Moe) Mr. and Mrs. Anthony Caria (in memory of Sir George, Dillan, and Bailey) Carlone Family (in memory of Oreo) Marie Carmardella Dr. and Mrs. Leland Carmichael (in memory of Shadow) Sherilee Carpenter (in memory of Gretzky and Romey) Sheila Carroll (in memory of Marley) Dorothy Carson (in memory of Shady) Troy and Sherie Carson (in memory of Logger) Jayne and Patrick Caruso (in memory of Khushi)

Mr. and Mrs. James Cascardi

(in memory of Jasper, Lupe, and Betsy)

(in memory of Sasha)

Diane and Ralph Casillo

(in memory of Hershey)

Christine Castagna

Edward J. Canelli (in memory of Missu)

Kathleen Catalano (in memory of Foxie) James Catanzaro (in memory of Maximilian) Catskill Glee Club (in memory of Dr. DuBois L. Jenkins) Claudia Cauchard (in memory of Tiger and Bear) Eleanr Cauwels (in memory of Samantha and Hannah) Denise Ceravolo (in memory of Arkahn) Maryalice Chaifetz Florence Chammings (in memory of Molly) May Chan (in memory of Maxamillion) Chebaco Kennels (in memory of Hank) Bobby Checchi (in memory of Bommer) Anna Cheek (in memory of Milo) Mr. and Mrs. William Cheeseman (in memory of DJ, Roxy, Sonny, Lucky, Jax, Fritz, and Tucker) Jean Chenault (in memory of Penny) Betty and Stephen Cherico (in memory of Nook and Lexie) Marisa Chieffo (in memory of Cyrus) Sue Christiansen (in memory of Sophie) Natalie Churak (in memory of Rocky and Shadow) Jo Ann Ciarocco (in memory of Gizmo) Roy Cinq-Mars (in memory of Riley) Joanne Cisek (in memory of Bacchus) Jane Clark Amy Clark (in memory of Summer) Christina Clark Franklin and Winifred Clark (in memory of Dr. DuBois L. Jenkins) Rae Clark (in memory of Beau; in honor of Smudge) Mr. and Mrs. Donald Clarke (in memory of Leslie) Gordon Clarke (in memory of Cooper and Daisy) Kathryn Clarke (in memory of Lucky Dog Clarke; in honor of Dr. James Glendening) Valerie Clayman Pye (in memory of Duncan) Shari Clayman-Kerr (in honor of Miss Molly)

Mr. and Mrs. William Clift Mr. and Mrs. Scott Clippinger Mr. and Mrs. James Closs (in memory of Lexi) Deborah and Michael Coad (in memory of Quincy) Carola Coburn Angela and David Cochran (in memory of Mocha) Mr. and Mrs. Martin Cohen and Nathan) Mr. and Mrs. Michael Cohen (in memory of Jake and Simmone) H. Rodgin Cohen (in memory of Mingus and Orion) Howard Cohen (in honor of Dr. Alan Baum) Daniel Colaprete (in honor of Dr. Jess Buttery) Mr. and Mrs. Mark Cole (in memory of Buddy, Misty, and Samuel) Mr. and Mrs. David Colgan (in memory of Brandy) Grace Colton (in memory of Shadow, Chewie, Misty, Cocoa, and Penny) Mr. and Mrs. Robert Condon Linda Conger Mr. and Mrs. Gene Conklin (in memory of Clyde) Scott A. Coonrod (in memory of Shadow) Patricia Cooper (in memory of Coco and Aggie) Joseph Corio **Edith Cornelius** Margaret Coroneos (in memory of Holly)

Dr. and Mrs. Neil Corselius Terri Clingerman (in memory of Moe) Lesley Cowenhoven (in memory of Gatsby) (in honor of Hamilton Animal Hospital) Steven M. Craig Kevin Clowe (in memory of Bubba) Candice Croissant (in memory of Gizmo) Douglas Cromarty (in memory of Fran Maier and Cassie) and Domino) Synde Cohen (in memory of Midnight (in memory of Buddy) Estelle Cohen (in honor of Doctors and (in memory of Maggie) Staff of Goosepond Animal Hospital) Kenneth Crossman (in memory of Theo) Barbara Curtis Odette Czapliki dog, Bogart) Anthony Dalesandro Linda Dalton Walker (in memory of Jackson and Chapin) (in memory of Duke) (in memory of Bubba and Chester) James Connell (in memory of Lucky) Mary Damico Peggy Connors (in memory of Coco) Matthew Conway (in memory of Skyler) (in memory of Tashia) Kathy Cook (in memory of Morgan) Darlene Daniels

Lisa Cowie (in memory of Abby) Mr. and Mrs. Robert Crain Catherine Cranor (in memory of Alpine) Mr. and Mrs. James Crocicchia (in memory of Chloe and Pumpkin) (in memory of Rommel, Harley, Mr. and Mrs. Frank Crommelin Mr. and Mrs. Neil Cronin Mr. and Mrs. Thomas Crooks Kathleen Crossan (in memory of Lexie) Margot Cullen (in memory of Bo) (in memory of Brandi and Molly) Mr. and Mrs. Roger Cusano (in memory of Tommy and Nikki) Olga Cutler (in memory of Chip) Cindy Czekalski (in memory of my dear husband Ronald and his beloved Jude Dainton (in memory of Molly) Patricia Daly (in memory of Mulder) Annie Damiano (in memory of Krypto, Bubba, Brando, and Sasha) (in memory of Teddi Bear) Mr. and Mrs. Thomas D'Andrea Mr. and Mrs. Nestor D'Angelo (in memory of Mr. Jefferson) Sharon Dattilo (in memory of Bubba) Lori Davico (in memory of Vixen) Robert and Sandra Davis (in memory of Kathy LeDuc Brand)

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Priscilla Davis
Kathy Davis (in memory of Roxy)
Robyn Davis (in memory of Babe)
Roxanna Davis (in memory of Urbie)

Barbara De George (in memory of Maximillion) Calvin De Golver

(in memory of Dr. DuBois L. Jenkins)

Helene Deaguilar

Mr. and Mrs. James Dearborn (in memory of Roadster) Marguerite DeBenedictis (in memory of Baci Boy)

Lois DeConca Janice Dee

(in memory of Cub an Hershey)

Dee and Dennis Deery

Mr. and Mrs. Edward DeFilippo (in memory of Molly)

Melissa Deines (in memory of Abby)

Lindsay Del Borgo (in memory of Lady)

John Del Grosso

(in memory of Niles, Char, and Jasmine)

Mr. and Mrs. Raymond Del Savio (in memory of Otis)

Kim DeLong (in memory of Maddie)

Marie DeLuca

(in memory of Chris and T.J.)

Tiffany DeMartin and Thunderhead Farms (in memory of Deacon)

Kathleen Demme

(in memory of Nina and Mush)

Michele Denezza

(in memory of Marilyn and Suki)

Maryann Dennehy (in memory of Harry)

Mr. and Mrs. William Dennis (in memory of Sam)

Karen Deperro Susan DeRienzo

(in memory of Gem and Bear)

Christi Deshaies (in memory of Sabre)

Rosanna DeVergiles (in memory of Bocephous) Mr. and Mrs. Robert DeWaine (in memory of Emmanuel) Mr. and Mrs. Jerry DiCanio (in memory of Woody)

(in memory of Woody)

Starr and Tom DiCiurcio (in memory of Liberty Bell and Noel)

Jane Dickerson (in memory of Rocky)

Mr. and Mrs. James Digilio (in memory of Maverick) Mr. and Mrs. Everett Dillon (in memory of Copper)

Donna DiPaolo (in memory of Shilo)

Mr. and Mrs. James Dirie (in memory of Gretchen and Lucy)

Arline Disanze (in memory of Al)

Jo Disoteo (in memory of Yogi)

Christine Dively

(in memory of John Iorio; in memory

of Thomas)
Marian Dixon (in memory of Boo)

Marian Dixon (in memory of Boo)
Susan Dobransky (in memory of Leia)

Rebecca Doderer

(in memory of Richard A. Doderer;

in memory of Jetta) Rodolfo Domingo

(in memory of Sampson)

Mr. and Mrs. Edward Donley (in memory of Reed)

Anne Donnelly (in memory of Gorka)

Mr. and Mrs. Paul Donovan (in memory of Gabby)

Janice Douglass (in memory of Kona)

Robert Dowd

Doris Downes-Hughes (in memory of Boo)

Mr. and Mrs. Bryan Drago (in memory of Mary Jane)

Helene Dreskin (in memory of Liam)

Mr. and Mrs. Duane Dressen (in memory of Kirby and Pajero)

Stacy Dressen (in memory of Zelda) Joseph Driskill (in memory of Toby)

Mr. and Mrs. William Dubray (in memory of Chelsea, Bandit, and Bear)

Donna Duby (in memory of Little Ponds Promise, Sanford, Homer, and Mackie)

Wynne Dudley (in memory of Tino)

Mr. and Mrs. David Duffner (in memory of Milkshake)

Beverly Dul (in memory of Lady Luck) Barbara Dunne (in memory of Rocky)

Lorraine Dusinberre (in memory of Indy)

Mr. and Mrs. Russell Duvernoy (in memory of Chelsey) Nancy Earle (in memory of Babe)

Rose and Don Eastman (in memory of Nibbles, Garth,

Ms. Whiskers, Whoopie, and Gus) Mr. and Mrs. Richard Eckert

(in memory of Pepper and Jennie) Mr. and Mrs. Ken Eckstein (in memory of Bailey)

June Edinger

Mr. and Mrs. John Eggener (in memory of Porky)

Deborah Ego (in honor of Terry Smith)

Margie Ehmann

(in memory of Bandit and Tucker)

Mr. and Mrs. Steve Eichin (in memory of Philip Tully and Harold Eichin)

Mr. and Mrs. Elliot Eisman (in honor of Dr. Francie Rubin and Rockledge Veterinary Clinic)

Mr. and Mrs. Myron Eisner

Kathy Elks (in memory of Rolly)

Mr. and Mrs. Paul Engeldrum (in memory of Kokomo)

Elizabeth Engeldrum (in memory of Misty)

Mr. and Mrs. George England (in memory of Minnie)

Mr. and Mrs. Mark Epley (in memory of Duke)

Leona Epstein

Monica Erdely (in memory of Missy, Sandy, Goldie, and Grizzly)

Timothy Eskeli

(in memory of Doc and Diddle)

Carol Esposito (in memory of Simba) Mr. and Mrs. Larry Essick

(in memory of Chico)

Audrey Eulner (in memory of Wibbles) Dorene Evans (in memory of Tyler)

Susan Everitt (in memory of Sarazan)

Mr. and Mrs. Ronald Evershed (in memory of Bailey)

Shanon Excel (in memory of Schultz)

(in memory of Charity and Jenny)

John and Caterinine Ezzard (in memory of Chili)

Marilyn and Ed Fabian

Dr. and Mrs. Jim Fagin (in memory of Minerva)

Mr. and Mrs. Edward Farley (in memory of Shana)

Michael and Stephanie Farmer (in memory of Dr. DuBois L. Jenkins)

Amanda Farnsworth

(in memory of Jazz)

(in memory of Mocha Delight) Mr. and Mrs. Gary Farrell

Duane and Theresa Faulkner (in memory of Dr. DuBois L. Jenkins)

Karen and Joel Fazekas (in honor of Dr. Alan Baum)

Jean Feckanicz

(in memory of Shaina, Abby, and Riley)

Renie Federighi

(in memory of Hattie Louise)

Diana Feil (in memory of Mr. Miz)

Margot Feldman

(in honor of Dr. Alan Baum)

Theresa Felix (in memory of Caesar)

Mr. and Mrs. Craig Fellers

Kathleen Felty (in memory of Lucy)

Mr. and Mrs. Richard Fenton (in memory of Sunshine)

Marianne Feraca

(in memory of Hans I, II, III, and IV)

Dr. and Mrs. Jonathan Ferencz (in memory of Gabby and Bear)

Mr. and Mrs. Steve Ferentzy (in memory of Owen) Teri and Jamie Ferguson

(in memory of Mandy)
Shannon Ferrara (in memory of Ali)

Mr. and Mrs. Andrew Ferraro (in memory of Slapshot)

Jean Ferri

(in memory of Cocoa and Black)

Patty Ferris

(in memory of Cici and Visa Gold)

Mr. and Mrs. Richard Filipski (in memory of Porsche and Ava)

Mr. and Mrs. R.J. Findlay (in memory of Jack and Alfie)

Phyllis Fiordalice (in memory of Bridgette)

Debbie Firestone (in memory of Jeeter)

Janet Fischer

(in memory of Fudge; in honor of Dr. Karen Mateyak)

Suzanne Fischman (in memory of Trixie) Vern Fish

Jirina Fishman

(in honor of Dr. Alan Baum)

Mr. and Mrs. Blaine Fitch (in memory of Boots)

Mr. and Mrs. Thomas Flanagan

(in memory of Cody)

Mr. and Mrs. Michael Flanigan (in memory of Aggie; in honor of

Dr. Michael Murphy)

Mary Ann Fligiel and Elaine Jacobs (in memory of Ben and Hollyn)

David Flitner (in memory of Breadie)

Eileen Flynn (in memory of Sage)

Barbara Fogarty

(in memory of all her beloved pets)

The Foisset Family (in memory of Petey)

Maryanne Forish (in memory of Sofi)

Mr. and Mrs. Melvin Foster (in memory of Sarah)

Louis Foudos (in memory of Happy)

Ann Fowler

Bernice and Jerry Fowler (in memory of Casey)

Jennifer Fox

Colonial Boarding Kennels:

Paula Fraczek (in memory of Pepper, Elliott, Chocolate, Sally, Lucy, Calvin,

Elvis, Trixie, and Sweetie) Erin Franco

(in memory of Cody Beach) Mr. and Mrs. Richard Frank

(in memory of their past cats) Mr. and Mrs. Samuel Frank

Richard Frazier (in memory of Tao)

Mr. and Mrs. Michael Frazzetta

(in memory of Sassy, Abby, and Cricket) Elsie Frei (in honor of Sam)

Karen Freilich (in memory of Tootsie)

Paul Fremder (in memory of Princess)
Doug and Denise French
(in memory of Maggie)

Lawrence Frey

(in memory of Sadie and Sara)

Jan Frieary (in memory of Sydney)

Eleanor Friedauer Ann Paula Friedland (in memory of Suzy Q)

Dr. and Mrs. Daniel Friedman (in memory of Boots)

Mr. and Mrs. William Friel (in memory of Cinnamon)

Lauren Frieman (in memory of Edward)

Mr. and Mrs. Gerald Fritsch

(in memory of Bear, Bandit, and Shelby)

Peggy Fritz

Thomas Froehlich (in memory of Molly)

Mr. and Mrs. Walter Frueh (in memory of Harley) Mr. and Mrs. David Furash

Carlene Furch

(in memory of Jack L. Hyde, DVM)

Regina Furphy

(in memory of MIssy and Red)

Patricia Fusaro (in memory of Korbel)
Betty Ann Fusco
(in memory of Johnny)

Jeannette Gabosch
(in memory of Belle and Sophie)

Mary J. Gaetano (in memory of Lulu)
Mr. and Mrs. Robert Gagner (in memory

of Babe)

Vicki Gaily (in memory of Jada) Gallagher Family (in memory of Cassie)

Tory Gallante (in memory of Ringo and Meggie)

Debra and Brooke Galliard (in memory of Carrie)

Elizabeth Galloway (in memory of Killian)

Kathleen Galvani

(in memory of Tilly and Garp) Kathleen Gardner (in memory of Cocoa)

Florence Gardner (in memory of Schneider)

Mr. and Mrs. Thomas Garrett

Joyce Garrison (in memory of Wrecks)

Ann Garza (in memory of Izzy)
Mr. and Mrs. William Gates
(in memory of Hunter)

Arlene Gaudette (in memory of Sera)

Elizabeth Gaughran (in memory of Kitty)

Russell Gawrys (in memory of Lila Lou)

Mr. and Mrs. Vincent Cordo (in memory of Bandit)

Dan Gebbia

(in memory of Dante and Woody)

Margot Gellman and Laurel McBride (in memory of Angel)

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i memory of Anger)

(in memory of Sunshine)
Mr. and Mrs. Marshall Genger
(in memory of Rusty, Fluffy, and Daisy)
Charles Gennarelli
(in memory of Moses)

Joyce and Bob Gentile (in memory of Spike) Mr. and Mrs. Wesley Gerechka (in memory of Angel and Nigel; in honor

Janos John Gertler and Eva Ann Vas (in memory of Mossy)

Michele Giardini

Kendra Gemmett

(in memory of Julius, Rocky, and Roxanne)

of Kenneth Adam Estes)

Lowrie Gibb Christine Gibbons

(in memory of Fozzey)

Thomas Gibbons and Linda Siple (in memory of Wheatie)

Carol Gillispie

(in memory of Buck and Tippy)
Mr. and Mrs. Martin Gilmartin
(in memory of Snickers and Bridget)

Lorraine Giordano

(in memory of Charlotte Louise)

Mr. and Mrs. H. Peter Giordano (in memory of Dr. DuBois L. Jenkins)

Giordano Family (in memory of Emmitt)

Brenda Giovanneillo (in memory of Hyway and Friday)

Mr. and Mrs. Joseph Giovannoli

(in memory of Lilly)

Steven Gippetti (in memory of Budie) Mary Gleason (in memory of Nikko)

Dianne Godar (in memory of Buddy)

Stacey and Andrew Goddard (in memory of Molly)

Richard Goldberg (in memory of Muggsy)

David Goldberg

(in memory of Mary Jane)
Janis Goldberg Warren
(in memory of Booker)

Rita Golden

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(in memory of Sasha and Blackie Johnson Golden)

Sheldon Goldfarb

(in memory of Darrow, Bailey, and Brody)

Elisabeth Goldman

Mr. and Mrs. Harold Goldman (in honor of Suzie-Q)

Alan Goldstein (in memory of Ginger)

Mr. and Mrs. Eugene Goldwasser (in honor of Finnegan and Holden)

Luis Gonzalez (in memory of Happy) Mr. and Mrs. Robert Goran

(in memory of Tommy)

Roberta Gordon

(in memory of Dr. Bernard W. Rosen)

Alice and Gary Gordon (in memory of Lucky)

Lynette Gosch (in memory of Pepper)

Mr. and Mrs. Dennis Gottilla (in memory of Oliver) Dr. and Mrs. Paul Gould (in memory of Honey)

Lilian Gourley (in memory of Josh)
Scott Graber (in memory of Amber)

Mr. and Mrs. Walter Grambow Mr. and Mrs. Robert Graves

(in memory of Cody) John Gray (in memory of Jacob)

Sue Green (in memory of Nora) Ellen R. Greenberg (in memory of Sandy)

Greene County Farm Bureau, Inc. (in memory of Dr. DuBois L. Jenkins)

Martha Greenlee

(in memory of Thor and Butch)

Elaine Greenstone

(in memory of Otis and Milo)

Susan Gregory

(in memory of Beavis, Mistletoe, Enya, and Maggie)

Eleni Grekos-Retsinas (in memory of Roki)

Ann Griffin (in memory of Frankie)

Mary Lou Griffith (in memory of Tessie)
Mr. and Mrs. Philip Grippe
(in memory of Fozzie and Max)
Mr. and Mrs. William Grob

(in memory of Muffin)
Jay Groff (in memory of JJ)

Tricia Gronachan (in memory of Lexie) Robert Groskin (in memory of Jasper)

Leslie Gross (in memory of Casey)

Kathy Grosz-Zaltas (in memory of Sedona)

Dr. and Mrs. Martin Gruber Jennifer Gruenheid

(in memory of Morgan, Minx, Devon, and Ali)

Dr. and Mrs. Gordon Grundy

Barbara and Jerry Grunt (in memory of Rizzo)

Anthony Guarino (in memory of Rex)

Mr. and Mrs. Richard Guida (in memory of Kuma)

Kathy Guissi (in memory of Cameron)

Mr. and Mrs. Eric Gunther
(in memory of dogs)
Mr. and Mrs. Bob Gurka
(in memory of Sarah Daigle)
Janet and Jerry Gutterman
(in memory of Willoughby)
Doris Haa (in memory of Wizard)

Noreen Halbach (in memory of Zeus)

Robert and Lindy Hall (in memory of Chelsea)

James Halpin (in memory of Molly)

Mr. and Mrs. Jim Halter (in memory of Bailey) Marion Hamblett

(in memory of John Piantedosi; in memory of Snuggles)

Ann Hamnes

(in memory of Jesse, Annie, and

Tristan)

Charlotte Handsman (in memory of Rocky)

Earl Hannibal

(in memory of Tom Guzinski)

Bob and Barbara Hansen (in memory of Monty)

Lynette Cardisty-Capitanio (in memory of Luke)

Mr. and Mrs. Robert Hardy (in memory of Hawkeye)

Sharon Harker (in memory of Martha) Mary Harmon (in memory of Mikey) Trish Harms and Christine Simes

(in memory of Izzie)

Claire Harouni

(in memory of Molly and Lucy)
Mr. and Mrs. Gerald Harper
(in memory of Max)

Alyce Harper (in memory of McBear)

Mr. and Mrs. Burton Harris (in honor of Bob and Marie Proctor)

Lynn Harris (in memory of Sandy)

Harry Harrison

Debra Harrison-Atlas

(in memory of Savannah and Acacia) Bette Harrold (in memory of Nugget)

Jill Harsin

Reinaldah Hartmann

(in memory of Dr. DuBois L. Jenkins)

Mr. and Mrs. Thomas Hartzheim (in memor of Maggie Rose)

Jacquelyn Harvey (in memory of Bailey)

Bonnie Sue Harvey (in memory of Angus)

Doris Hattin (in memory of Bandi)

Susan Hauser Donna Hayden

(in memory of Pebbles and Tate)

David and Sara Hayden (in memory of Buddy)

Laura Louise Haynes (in memory of Lucy, Scout, and Oliver)

Sally Head and Eileen Reedy (in memory of Abby, Brindle, Molly, and Brady)

Mr. and Mrs. David Head (in memory of Zeke and Jake) Joanne Healey and Catherine Vitale

(in memory of Hudson, Sabrina, and Danny)

Diane Heckert (in memory of Sasha)

Madeline Hedelhofer (in memory of Schatzi) Chris and Barbara Heiser (in memory of Scooby) Ellen and Richard Heissler (in memory of Cody)

Constance Held (in memory of Jake)

David Helfant

Matthew Heller and All About PetCare (in memory of Mallory)

Emily Helwig

(in memory of Shanna and Sam)

Scott Hemenway

Mr. and Mrs. Michael Henderson (in memory of Taylor)

James Henderson

Dr. and Mrs. Michael Henes (in memory of Jack)

Roxanne Hennemuth (in memory of Lilly) Elizabeth Henry

(in memory of Spooks and

Sylvester Sinclair)

Mr. and Mrs. James Herbert (in memory of Hershey and Dooper)

Mr. and Mrs. Malcolm Hermele (in memory of Kahli)

Susan and Malcolm Hermely (in memory of Petey)

Jennifer Hesse (in memory of Max)

Francine Hicks and Chris Manfredo (in memory of Birdbrain)

Janet Higgins

(in memory of Max and Cookie)

Mr. and Mrs. Michael Higgins (in memory of Maurice)

Jan Hilgeman (in memory of Mica)

Mr. and Mrs. Stetson Hill (in memory of Chelsea)

Howard and Joan Hill (in memory of Dr. DuBois L. Jenkins)

Dolores Hils (in memory of Max)

Helen Hinchcliffe

Brad Hirschhorn (in memory of Ralph)

James Hodges (in memory of Homer)

(in memory of Cash) Robert Hogan

(in memory of Maggie and Tabby)

John Hogan (in memory of Gigi)

Mr. and Mrs. Jeffrey Hogan

Dr. and Mrs. Herbert R. Holden (in memory of Dr. DuBois L. Jenkins)

Penelope Holloway (in memory of Charlie) Mr. and Mrs. Ross Holmes (in memory of Riley)

Susan Holmes (in memory of Miles) Linda Holmes (in memory of Tasha)

Sandra Holsinger

Mr. and Mrs. Robert Hommel (in memory of Tyler, Max, Lady, and Nicki)

Lynn Horn

(in honor of Lucy and Bristol)

Mr. and Mrs. Jan Horowitz (in honor of Harley)

Amy Houbre (in memory of Mugsy)

Donald and Ginny Howe (in memor of Duffy)

Robert Hughes

(in memory of Fuzzy Bear)

Robert Hull

(in memory of Butch and Daisy)

Linda Hulse

Mr. and Mrs. Merritt Humphrey (in honor of Goosepond

Animal Hospital)

Donna Hunt

(in honor of Dr. Marc Wallach)

Ann Hyden

Ian Passman Inlender (in memory of Holly)

Ewa Irani

(in memory of Snoia, Niko, and Brita)

Diane Izzo (in memory of Kye)

Roberta Jackson

(in honor of Moko, Scrappy,

and Minalouche)

Charles and Mildred Jackson (in memory of Maggie Mae)

P. Jacobs (in memory of Heather)

Mr. and Mrs. David Jaffe (in memory of Phineas)
Mr. and Mrs. James Jaffe

(in memory of Gus)
Donna Janelle (in memory of Buddy)

Lois Janson

Richard Janson (in memory of Spanky)

Robert Jantosciak (in memory of Tippy)

Gary and Gail Jay (in memory of Bacci) Mr. and Mrs. Donald Jayson

(in memory of Lacey)
Francis Johnson (in memory of Lacey)

Mr. and Mrs. Robert Johnson (in memory of Jester and Sally)

Kelley Johnson (in memory of Bentley) Beverly Johnson

(in memory of Chelsey and Abbey)

Marsha Johnson (in memory of Sam Brown)

Yvonne Johnson (in memory of Anna Segotta)

Edna Johnson (in memory of Dillon) Moira Jones (in memory of Toby)

Randall Kach

Mr. and Mrs. John Kadlecik (in memory of Buddy)

Marie Kafka (in memory of Erica)

Roberta Kahan

(in memory of Robbie and Lexy)

Lucille Kaiser (in memory of dogs) Barbara Kalmes (in memory of Truman) Debra Kannry (in memory of Mandi) Jack and Amy Kantorski (in memory of Beanie Baby) Norman Kantrowitz

(in memory of Uno, Indy, and Avery)

Ann Kanze (in memory of Shiloh Autumn Gold)

Robert Kaplan (in memory of Sally)

Aram Kaprielian (in memory of Apollo)

Ann Karmin (in memory of Timothy Slattery; in memory of Rascal)

Rita Kasky

(in memory of Missy and Mr. Truffles) Kathleen Kato (in memory of Buddy)

Phyllis Katz (in memory of Bearly)

Myrna Katz (in memory of Lakota)

Heidi and Michael Katz (in memory of Lucille)

Adam Kaufman (in memory of Brooklyn)

Ellen and Andy Kaufman (in honor of Dr. Ken Fischer and Staff)

William Kay

Jane and Randy Kay (in memory of Tiffy)

Carla Kazanjian (in memory of Bart)

Kevin and David Keating (in memory of Klem-n-tine)

Honor Keegan (in memory of Riley)

Mr. and Mrs. John Keegan

Irene Kelly (in memory of Dougie)

Marilyn Kelly

(in memory of Sparky and Trotter)

Mr. and Mrs. George Kener (in memory of Trapper)

Victoria Kennedy (in memory of Cubby)

Mr. and Mrs. Steven Kenneson (in memory of BU)

Lucia Kerr (in memory of Diana)

Roger and Kelly Kerr

(in honor of Dr. and Mrs. Jess Buttery) Shari and Jim Kerr (in memory of Lola)

Michelle Kerty-Marin

(in memory of Boo, Brownie, and Tyler)

Robert Kesel

(in memory of all his past dogs)

Mr. and Mrs. Arthur Kesten (in memory of Dr. DuBois L. Jenkins)

Robert Killenbeck (in memory of Bailey)

Mr. and Mrs. William Kilmer (in memory of Oliver)

Edward and Jane King (in memory of Nala)

Mr. and Mrs. Lawrence King (in memory of Milton, Megan, and Toto)

Marylou King (in memory of Duke)

Louise King (in memory of Toby)

Joan Kingsley

(in memory of Max and Casey)

Linda Kinney

(in memory of Margaret and Sheba)

Renee Kinney

Karen Kiokemeister (in memory of Adie)

Peter Kirk

Eileen Kirk

(in memory of Pearl and Kelly)

Gayle Kirschenbaum

(in memory of Chelsea; in honor of Jane and Theresa)

Eva Klaczko

Ian Klassen (in memory of Blackie)

Eva Klatt (in memory of Reggie and Flash)

Linda Kleet (in memory of Stella) Edith Klein (in memory of Homer) Jo Ann Klein (in memory of Bunny)

Mr. and Mrs. Jan Knepshield (in memory of Frannie)

Mr. and Mrs. James Knight

(in memory of Jackson and Little One)

Charles and Sandi Koester, Jr. (in memory of William Wallace)

Susan and Fred Kolar (in memory of Charlie)

Jean Kolor (in memory of Travis and Ms. Blitz)

Connie Konefal (in memory of Willie)

Mr. and Mrs. Pavel Korchagin (in memory of Right)

Carol Koschak (in memory of Bowser)

Audrey Kotas

Susan Kovach

Kris Krablin and Ellen Krag (in memory of Dr. DuBois L. Jenkins)

Malcolm Kram and Mark Zwanger (in memory of Reilly)

Carolyn Kramer

(in memory of Buffy, Jack, and Tina)

Mr. and Mrs. Herman Kramer (in memory of Rocky)

Georgette Krauss

(in memory of Samantha)

Yolanda Krdvon

(in memory of Dr. DuBois L. Jenkins) Joann Krey (in memory of Eddie)

Ellen Kriger (in memory of Ben)

Nancy Kronstadt (in memory of Simon)

Mark Kruelle (in memory of Sasha; in honor of Dr. Rebecca Seacord)

Maryanne Krzewicki (in memory of Polo)

Fred and Fave Kuehnl (in memory of Artie)

Mr. and Mrs. Mark Kugelman

Gary Kull and Avalon Building Systems (in honor of Carl M. Dunham, Jr.)

Janet Kunciw (in memory of Goldie)

Mr. and Mrs. William Kunda (in memory of Casey and Rosie)

Mr. and Mrs. Steve Kuramoto (in memory of Sarah)

Myriam Kutscher (in memory of Maggie)

Andy and Paul Kuzma (in memory of Ranger and Heidi)

Constance La Forgia (in memory of Sasha) Judith Labadia (in memory of Chi)

Mr. and Mrs. Joseph Lacerda

Lorraine Laken (in memory of Maggie)

Mary Lalier (in memory of Bailey)

Mr. and Mrs. Peter Lamberti

(in memory of Baci) Barbara Lambros

(in memory of Amber) Donna Landry (in memory of Brandy)

Mr. and Mrs. Richard Landry (in memory of Dakota)

Betsy Landsman

(in memory of Dr. Bernard Bass) (in memory of Remi and Izzy)

Alan Landzberg

(in memory of Sherman)

Mr. and Mrs. Charles Laney (in memory of Buster and

Marshmellow) Kathryn Lang

(in memory of Benji, Tilly, and Ginger)

Carol Lantiegne and Adirondac Goldens (in memory of Jessie, Mackie, Connor, and Aspen)

Barbara Larson Wille (in memory of Rocky)

Eric Laubmeier Michael Law (in memory of Gabrielle)

Lois Lawrence

(in memory of Duke, Daisy, and Cutter)

Mr. and Mrs. Eric Lazo-Wasem

(in memory of Raz)

Diane LeBenger (in memory of Duncan)

Mr. and Mrs. Ray Leib

(in memory of Ruby, Raven, and Dylan)

Pepi Leids

(in memory of Hunter and Duncan)

Kathy Lembo (in memory of Corey) Barb and Bill Lennox

(in memory of Josh) Mr. and Mrs. Robert Leonardi

(in memory of Ashlee)

Maria Leone

(in memory of Clarke Ambrose; in memory of Roasalie)

Mr. and Mrs. Edmund Leone (in memory of Cassie)

Robert Lerner

(in memory of Otis; in honor of

Dr. Annie Viano) Carolyn Lesseos

Robin LeStrange (in memory of Gizmo)

Mr. and Mrs. Robert Leverette

Jerome Levin (in memory of Chy)

Donald Levin

Mr. and Mrs. Gary Levine

(in memory of Bailey, Bullet, and Lucky)

Sandra Levine

(in memory of Thor and Maximus)

Mr. and Mrs. Bill Levine (in memory of Maddie)

Mr. and Mrs. Mitchell Levine (in memory of Gizmo, Elliott, Sammy,

and Beau) Jeffrey Levine

Joy Levy (in honor of Komondor)

Mr. and Mrs. John Levy (in memory of Woody)

Rita Lewis (in memory of Toby)

Mr. and Mrs. David Lewis (in memory of Whiskers)

Mr. and Mrs. Bradford Lewis

(in memory of Ginger) Kathleen and Paul Lewis (in memory of Marley)

Frank and Patricia Lewis (in memory of Joanne M. Connor)

Gail Lieberson (in memory of Otis) Renee Ligay (in memory of Nutmeg

and Nikita)

Mary Liguori (in memory of Tucker)

Jacqueline Linehan (in memory of Maggie)

Donna Lioi (in memory of Abu)

Barbara C. Lippe

(in memory of Miss Piggy)

Normi Lipsit (in memory of Angel) Judith Lipton (in memory of Xerox)

Valerie Litt (in memory of Henry) Craig and Suzanne Litwin (in memory of Jennifer)

Marsha Lloyd (in memory of Willy)

Louis Lombardi (in memory of Lakota) James Lombardi (in memory of Sharpee

and Jake) Stephanie Londrigan (in memory of Maddie)

Lone Pine Kennel (in memory of Arky) Deborah Lord (in memory of Anna)

Tamara Lucas (in memory of Max) Mary Ann Luisi (in memory of April)

Benjamin and Diane Lukich (in memory of Blondie)

Debra Lurie (in memory of Mandi)

Virginia Lussier (in memory of Mittens) George Lust (in memory of Shadow)

Adrienne Lustig

Walter Luther (in memory of Buddy) Jody Lutter (in memory of Herren)

Sang-Bom Lyi

Dr. and Mrs. Stuart Lyman

(in memory of Dr. DuBois L. Jenkins)

Mr. and Mrs. Roger Lynch (in memory of Maggie)

Kevin Lynch

(in memory of Buffy, Molly, and P.J.)

Dr. and Mrs. Robert Lynk

(in memory of Dr. DuBois L. Jenkins)

Kristine Lynott

(in memory of Ginger Maricle)

Richard Lyons (in memory of Snickers)

Mr. and Mrs. Bernard Lyons (in memory of Bentley)

Dr. and Mrs. Steven Lysenko (in memory of Dr. DuBois L. Jenkins)

Mr. and Mrs. Archie Mac Millan (in memory of Missy Ling)

Vicky MacCollum (in memory of Odie) Linda Mack (in memory of Anna Kelley:

in memory of Tia)

Mr. and Mrs. Stephen MacLean (in memory of Chrissy)

Mr. and Mrs. Eric Madura (in memory of Troy Bielak; in memory

of Belle)

Susan Mahar Mr. and Mrs. Francis Mahar, Jr.

(in memory of Vicky) Megan and Thomas Maher

(in memory of Emmanuel) Ryan Mahoney (in memory of Mickey)

Mr. and Mrs. Henry Majewski (in memory of Pride and Colette)

Mr. and Mrs. Raymond Malbrough (in memory of Alphie)

Joan Mallernee (in memory of Nick) Pat and Trish Maloney

(in memory of Louie and Dodger) Frances Mandel (in memory of Jennie)

Valerie ManFredonia (in memory of Gizmo)

Mr. and Mrs. Mark Manfresca (in memory of Dakota, Taz, and Shadow)

Mr. and Mrs. Michael Mangano

Mr. and Mrs. Robert Mara (in memory of Duke of Mara) Anne Marcel (in memory of Bogie) Mr. and Mrs. Peter Marchand Randi Margolin (in memory of Fetch) Jeffrey Marin and Rita Levine (in memory of Darla and Rocky) Anne Marino (in memory of Sparky) Sharon Marosek (in memory of Molly) Susan Marriner Marriott Family (in memory of CH. Swinging Bridge) Jim and Colleen Marron (in memory of Nestle) Mr. and Mrs. Paul Marsh (in memory of Blackie and Rascal) Margaret Marshall (in memory of Penny-Lou and Spuds) Gloria Marshall (in memory of Chester) Barbara Martelli (in memory of Pucci) Mr. and Mrs. Ed Martin (in memory of Gracie) Mr. and Mrs. Eric Massa (in memory of Charlotte) Denise Mastriani (in memory of Angel) Mr. and Mrs. Robert Mastrogiovanni (in memory of Bear) June Mastronardi (in memory of Zack) Jean Matala (in memory of Libby and Kasey) Lolita Matczynski (in memory of Beau and Patton) Barbara Matura (in honor of Dr. Carol Carberry)

Doris Mathieson (in memory of Cooper)

Gale Mauck

(in memory of Kelly and Sunny)

Jeanne Maybee

(in memory of Penelope) Allison Mayer (in memory of Christabel)

Mr. and Mrs. James Maynard (in memory of Fred) Tony Mazzariello

(in memory of Sequogah)

Robert McAllister Marlene McBrier Maria McCaffrey Elizabeth McCarter

(in memory of Daisy and Sparky)

Dr. and Mrs. Richard McCarthy (in memory of Savannah)

Diane McCarthy (in memory of Roxy)

Gary McCarthy (in memory of Danny, Dreyfus, and Leah)

Donald McCaslin (in memory of Augie)

Mr. and Mrs. Donald McCollum (in memory of Normal Braun)

Diana McConnell

(in memory of Skye and Frisbee)

Mr. and Mrs. William McDevitt (in memory of Isabella and Roxy)

Janice McDonald

(in memory of Prince Harry)

Constance McGrath (in memory of Boots)

Dr. Douglas McGregor (in memory of Shadow)

Linda McGuire (in memory of Snowball)

Therese McGuire (in memory of Ginger) Jeannine McHale-babcock (in memory of Cassi) Terrence McIntee

Bob and Marge McKay

(in memory of Jamie, Woody, Tequila, and Whoopi)

Elizabeth McKnight (in memory of Elvis) Rick McLaughlin

Ian McLaughlin (in memory of Maggie)

Mr. and Mrs. William McLoud (in memory of Kassie)

Anne McNellis

Mr. and Mrs. James McRae (in memory of Mr. Macdoual)

John McSweeney (in memory of Buck)

Mr. and Mrs. Brian Meahl Mr. and Mrs. Allan Mehrtens (in memory of Max)

Irene Melander (in memory of Honey)

Bronislava Melandinidis (in memory of Pepsi)

Laura Mele (in memory of Cocoa)

Louis Melendez

Mr. and Mrs. Michael Melerski (in memory of Bishop and Kita)

Mr. and Mrs. Joseph Melone (in memory of Logan)

Dr. Susana Mendez (in memory

of Shadow)

Sonja Meshkati (in memory of Dyfus)

Mr. and Mrs. Gerald Messuri (in memory of Electra and Liefy)

Claudine Messuri (in memory of Buddy)

Roddy and Gregory Metcalf (in memory of Torry)

Mary and Dave Michaelson (in memory of Magnum)

Donald Middleton

(in memory of Dr. DuBois L. Jenkins) Ingrid Mielens (in memory of Champee)

Jean Migatz (in memory of Jane)

Laurie Milano (in memory of Dakota)

Mr. and Mrs. Robert Milano (in memory of Heidi and Princess)

Mr. and Mrs. Randy Miles (in memory of Yager, Snickers, and Savannah)

Dr. and Mrs. Douglas Miller Mr. and Mrs. John G. Miller (in memory of Mika and Touhey) Gail Miller (in memory of Chase)

Mr. and Mrs. Leonard Miller (in memory of KC)

Dr. and Mrs. Jay Miller (in memory of Grace and Sandy)

Jane Miller (in memory of Jack L. Hyde, DVM)

Leah Miller (in memory of Luna)

Suzanne Miller

Jane and Stephen Miller (in honor of Dr. Alan Baum's

70th birthday)

Marian Millhauser (in memory of Matt) Sharon Mills (in memory of Kayla)

Kathleen Mills

Richard and Grace Milot (in memory of Ulysses)

Mr. and Mrs. Elliot Mininberg (in memory of Louie)

Joe Miraglia

Edna Miraval (in memory of Lucky)

Bruce Mitchell

MJOJ Inc. (in memory of Magoo)

Diane Mogavero

(in memory of Tyler, Zeak, Rocky,

Logan, and Quincy)

(in memory of Boca)

Mr. and Mrs. Steven Moldveen (in memory of Mugsy) Mr. and Mrs. Bill Molinelli

Arlene Monaghan (in memory of Gizmo)

Mr. and Mrs. John Montgomery

Karen Moor (in memory of Hudson)

Mr. and Mrs. Scott Moore (in memory of Sinbad, Gunston, and Daisy)

Mary Moore (in memory of Ida)

Patricia Moran (in memory of Daisy)

Mr. and Mrs. Michael Moretti (in memory of Snickers)

Evelyn and Bob Morgan (in honor of Dr. Todd B. Friedland)

Patrice Morisco

(in memory of Tiffany and Baccio)

Mr. and Mrs. Michael Morris (in memory of Max)

Gloria Morris

(in memory of Sam; in honor of

Dr. Todd Friedland)

Mary Morris

Mr. and Mrs. Richard Morse (in memory of Shanna, Hobo, Patches, Jasper, Crystal, Sunny, and Storm)

Stanley Morytko, Jr. (in honor of Laddie)

Mosner Family (in memory of Racquet)

Mr. and Mrs. Robert Moulder (in honor of Dr. Marc Franz)

Mr. and Mrs. John Reynolds (in memory of Gromit and Ande)

Toni Lynn Mulhearn

(in memory of CH. Valentine's Amber)

Mr. and Mrs. Andrew Mullen (in memory of Maxine and Simon)

Julie and Mike Mullin (in memory of Zoey)

Mr. and Mrs. John Murphy (in memory of Stub-ee)

Doreen Murphy

(in memory of Madison)

Frances Murphy (in memory of Sherman)

Mike and Ann Murray

Anita Murphy (in memory of Missy)

(in memory of Patton) Mr and Mrs. Bernard Muscato (in memory of Faith)

Mr. and Mrs. Ronald Muto (in memory of Nicki)

Peter Nagowski (in memory of Estelle Niesciur)

Paul Naintre (in memory of Elvis)

Charles Nardino

(in memory of Buster and Bridget)

Sandra Nardone

Mr. and Mrs. Elby Nash (in memory of Iris)

Nat Clymer Photography (in memory of Tad)

Mr. and Mrs. John Neary (in memoryof Maxi and Owen)

Linda Nelson (in memory of Ginger)

Lois Nelson (in memory of BoBo1

Lisa Nelson (in memory of Harris)

Kami Netri (in memory of Belle)

(in honor of Dr. Rebecca Seacord)

(in memory of Teddi)

Jeannette Neveu (in memory of Airy)

Mr. and Mrs. Michael Newler

Lexie, Rocky, Kansas, Chanel, Ziggy,

Mr. and Mrs. John Nicholl (in memory of Emmy Lou)

Ronald Nichols

Shirley Nickell (in memory of Gracie)

Karen Nolan (in memory of Natasha)

Mr. and Mrs. Michael Norman

Mr. and Mrs. Edward Norman

Grant North (in memory of Brit)

Barb Northam (in honor of Montrose Animal Health Center)

Teddy and Kristi Novin (in memory of Maddie)

Jackie and Jerry Novin (in memory of Max and Sasha)

Leonard Nowak

(in memory of Teddy #2 and #3)

Mr. and Mrs. William Nugent (in memory of Dylan)

Eileen O'Brien (in memory of Uke and Cody)

Timothy O'Connor

Thomas Oddo (in memory of Peanut)

Katy O'Donnell (in memory of Hannah)

O'Donnell Family (in memory of Shelly)

Mr. and Mrs. Donald Parker (in memory of Blackie, Dollie,

and Tippy)

Lee Parker (in honor of Blueberry) David Parker (in memory of Taylor)

M. Jean Parker (in memory of

Buttons and Foster)

Rip Parsells (in memory of Blue) Patricia Partridge

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Mr. and Mrs. Patrick O'Farrell (in memory of Pepper and Snowy) Mr. and Mrs. Leonard Offner (in memory of Allie) C. Joyce Ohl (in memory of Stella) Midori Oller Edmund and Janet Ollmann and BoBo2) (in memory of Dr. DuBois L. Jenkins) Robert Olszewski Lyle Ondayko Mr. and Mrs. John Neubauer (in memory of Grizabella, Zappa, Freida, and Tiny) Mr. and Mrs. Tom Neuman Joyce O'Neill (in memory of Goby) Dr. and Mrs. Paul O'Neill (in memory of Quentin and Bear) Mr. and Mrs. John Neville Ralph Orofino (in memory of Billy and Bear) (in memory of Belle, Princess, Magic, Mr. and Mrs. Robert O'Rourke (in memory of Mickey and Christy) Izzy, and Cooky) Mr. and Mrs. Ron Orr Kathleen Nice (in memory of Bailey) (in memory of Leroy and Mandy) Robert Ortman Christine O'Shea Mary Nichols (in memory of De De Maggio) (in memory of Dr. DuBois L. Jenkins) Ellen Oshins Mr. and Mrs. Larry Osterberg (in memory of Sebbie) (in memory of Sundae) Sandra Oteri (in memory of Pogie) Donald Nicolas (in memory of Lady) Mr. and Mrs. Robert Outwater (in memory of Emily Belle) Mary Pacifico (in memory of Chloe) (in memory of Casper) JoAnn Pagliughi (in memory of Prince) Kathleen Paine (in memory of (in memory of Lacey) Hildie and Bob's father) Mary Pakulski (in memory of Kashee) Peggy Pangalos (in memory of Tiffany) Julia Paradis

Gary and Laura Parziale (in memory of Fritoe) Linda and Ed Pasto (in memory of Deena and Teddy) Belgica Pastrana Natalie Patricio (in memory of Pee Wee and Gin Gin) Mr. and Mrs. Gary Patterson (in memory of Halee, Thunger, Jimmy, Ashley, and Midnight) Sherri Ann Patton (in memory of Rex) Cheryl Patton (in memory of Riley) Lynn Paul (in memory of Leilah and Carly) Mr. and Mrs. A. William Paulsen (in memory of Judy Ballerine and her dog, Missy) Asher Pavel and Priscilla Miller (in memory of Bosun) Serafino Pavone Karen Paxton Sandra Gail Pearl (in memory of Soleil) Sue Penny (in memory of Millie Kowalski) Diane Perazzo and Karl Jacob Mr. and Mrs. Felix Perez (in memory of Elmo and Chester) Cindy Pergolizzi (in memory of Layla in honor of Dr. Marcia Ziegler-Alexander) Cathy Perkins (in memory of Sam Buka and Barnaby) Amanda Perkins (in memory of JD) Norma Perry (in memory of Mocca Dancer; in honor of Dr. Barry S. Eisenkraft) Mr. and Mrs. Rocco Petitio Mr. and Mrs. Jeffrey Pettit (in memory of Ozzie; in honor of Somerset Animal Hospital) Suasn Phaneuf (in memory of Duncan) Patricia Phelan (in memory of Asia) Stephen Phillips (in memory of Cooper) Joseph Piazza Gerard Picardi (in memory of Angel) Pike County Conservation District

(in memory of Bonnie)

Mr. and Mrs. Gerald Pittz

Frank Pirri (in memory of Guiness)

Pauline Pinto

Mr. and Mrs. Joseph Pizzuti (in memory of Jeffrey, Colonel Blackman, and Ronan) Edward Platt (in honor of Scruffy) James Plunkett (in memory of Owen, Angus, and Tyler) Alicia Poinsatte (in memory of Bella) Melanie and Keith Poirier (in memory of Michael McDowell Smith) Domenica Polidoro (in memory of Bellina and Princess) Janine Polito (in memory of Shelby) Mr. and Mrs. Arthur Pollinger (in memory of Donna Heiseer) Susan Polnow (in memory of Clark) Alan Pomerantz (in memory of Tucker, Mitzu, Adelaide, and Maggie) Helen Ponton (in memory of Mugsy) Diane Porter (in memory of Zaggy, Phoebe, and Ziggy) Constance Porter (in memory of Kiley and Polly) Lisa Potkewitz (in memory of Wal Le Baron) Angie Poucher (in memory of Dr. DuBois L. Jenkins) Mr. and Mrs. Roger Powell (in memory of Max, Alex, and Clancy) Patricia Prezioso (in memory of Midget) Harry Price (in memory of Annie) Mr. and Mrs. Tom Primo (in memory of Rocky) Mr. and Mrs. Glenn Provencher (in memory of Mulligan) Leone Prue (in memory of Bandit) Ann Bernadette Pryer (in memory of Figaro) Joanne Puc (in memory of Orion; in honor of Odin) Tina Pullis (in memory of Pebbles) Mr. and Mrs. Richard Py (in memory of Buddy) Selma Quaglia (in memory of Misty) Margaret Quaritius (in memory of Callie) Ann Quinn Joseph Quinn Thomas Quirk (in memory of Deli, Brie, and Chips) Mr. and Mrs. Stephen Rabin (in memory of Molly)

Marcia Rachow (in memory of Margaret Michielsen and John E. Depew; in memory of Strike) Richard Raffa (in memory of Randy) Mr. and Mrs. Joseph Raiti Linda Ramirez (in memory of Vassaya) Janet Ramsey (in memory of Gus) John Ramsey (in memory of Shanna) Sumant and Kavitha Ranade (in memory of Dexter) Susan Randolph Hennessee (in memory of Maggie) Mr. and Mrs. Subhakar Rao (in memory of Qristy) John Rapp Julia Rappold (in memory of Pepper; in honor of Dr. March Wallach and Dr. Brandi Hurwitz) Lois Ray (in memory of Katy) Anne Reagan and Albanhaus Kennels (in memory of Max and Jack) Susan Priest (in memory of Schatzie and Misty) Mr. and Mrs. Alfred Reed (in memory of Dr. Gustave Gavis; in memory of Jazzy and Muggie) Diane Reed (in memory of Jodie Leopold) Judy Reedy (in memory of DJ) Barbara Regan (in memory of Mosquito, Boomer, Iris, Katie, and Dino) Roseann Reggiano (in honor of Natasha) Mr. and Mrs. John Rehbach (in memory of Onyx and Princess) Mr. and Mrs. Jonathan Reilly (in memory of Max) Beth Reilly (in memory of Uncle Bill; in memory of Bella and Ben) Priscilla Reilly (in memory of Roxie) Ken Reinman (in memory of Ranger) Diana Remlinger (in honor of Kathy Sneider, VMD) Rebecca Renaud Laura Rendano (in memory of Balu) Eugene Renske (in memory of Lugar) Joe and Jill Restifo (in memory of Maddie)

Joann Restivo (in memory of

Gibson and Bently)

Robert Reynolds (in memory of Boomer) Margaret Rhoda (in memory of Babe) Valerie Riccardi (in memory of Heidi, Bentley, and Princess) Gracemarie Riccardi (in memory of Pugsly) Laverne Rich (in memory of Franny and Simon) Kathy Rich (in memory of Annie) Marvellen Riche (in memory of Casey; in memory of Keno and Midnight) Florence Rickard (in memory of Dr. DuBois L. Jenkins) Mr. and Mrs. Bruce Ricker (in memory of Misty, Benson, and Irish Whiskey) Mr. and Mrs. Jay Riedinger (in memory of Mike and Dante) Mercedes Riley (in memory of Hansel) Michele Rinaldi (in memory of Yeti) Joanne Ripley and Marie Sherwood Kim and Michael Rivera (in memory of Pirate) David Rivet Monica Rizzacasa (in memory of Ludlow) Vince and Sue Rizzo (in memory of Charlie) Elizabeth Roberts (in memory of Tucker) Mr. and Mrs. James Robinson (in memory of Keesha) Mr. and Mrs. Wayne Rodd (in memory of Buddy) Monica Rodgers (in memory of Calvin) Mr. and Mrs. Richard Rodgers (in memory of Kobe) Debra Roe (in memory of Pete) Mr. and Mrs. Samuel Rogers Phyllis Roitsch and Long Pine Kennel, LLC (in memory of Sammie) Cheryl Roman (in memory of Ruby) John Romansky (in memory of Barney) Mr. and Mrs. William E. Romig (in memory of Nikita, Fairway, and Rommel) Bob Rose (in memory of Mad Max, Bird Dog Extraordinare) Barbara Rosen (in memory of Tyler)

of Hannah) and Lady) and Tov) of Tia) of Panda) of Annie) Marsha Sacco

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Olga Schoman (in memory of Casey) Karen Beth Schreiber Bonnie Schubel Joyce Schubert Judith Schultz (in memory of Tom and Geri) Dr. and Mrs. Richard Schwalb (in memory of Bun-Bun Bunny; in honor of Alli Hemmer) Mr. and Mrs. Jeffrey Schwartz (in memory of Molly) Marilyn Schwartz (in memory of Dr. Peter V. Poggi) Julie and Brian Scott (in memory of Mikayla) Margaret Seeley (in memory of Honey) Mr. and Mrs. Martin Sefranek Barbara Seiden (in memory of Griff) Shirley Seipel (in memory of Dr. DuBois L. Jenkins) Christine Seisler (in memroy of Truffes and Kouchaloo) Diane Sek (in memory of Sandy) Chervl Senese (in memory of Molly and Tucker) Marian Sension (in memory of Elizabeth Roth)

in memory of Chelsea and Teddy)

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Mr. and Mrs. Daniel Shevchik

Mr. and Mrs. Larry Shields

Mr. and Mrs. William Shustack

Mr. and Mrs. Richard Siegel

Rosemary and Alan Siegel

Mr. and Mrs. Carroll Sigur

(in memory of Booga Lee)

Gloria and Mary Sikora and

(in memory of Kasey Sue)

Lisa Signorelli and David Parker

(in memory of Wolfie, Bo, and Sandy)

Mary Stepniak (in memory of Kaylee)

Karen Shevlin (in memory of Reggie

(in memory of April)

(in memory of Brio)

(in memory of Iris)

(in honor of Bean)

(in memory of Ella)

Cindy Silberberger

and Lucy)

Elizabeth Silverman (in memory of Snickers) Mr. and Mrs. Barry Silverstein (in memory of Chouchi) (in memory of Mindy and Gatsby) Dr. and Mrs. Michael Shapiro Natalie Skrzyniarz (in memory (in memory of Casey) of Mickey) Mr. and Mrs. John Sharkey Mr. and Mrs. Daniel Slaninka (in memory of Snuggles) (in memory of Zoey) Mr. and Mrs. Raymond Shaver Lillian Slater (in memory of Jilly) (in memory of Heidi and Buffy) Richard Slaughter (in memory of Spot) Mr. and Mrs. John Shaw (in memory of Dee Jay, Casey, and Theo) Mary Elizabeth Slevin (in memory of Ginger) Lori Shaw Klein (in memory of Corkey) Patricia Slote Mr. and Mrs. Doreen Shea Mr. and Mrs. James Smith (in memory of Barkley) (in memory of Daisy and Pupper) Heidi Shegoski (in memory of Sinclair) Marjorie Smith (in memory of Annie) Mr. and Mrs. Jonathan Shell (in memory of Oscar) Lancy Smith (in memory of Lynette Smith) Doris Lee Shenk-Huber Mr. and Mrs. Richard Smith Lisa Sheridan (in memory of Ross (in memory of Noah) and Sadie) Mr. and Mrs. Donald Smith Mary Shermet (in memory of Busco; (in memory of Max)

Ann and Richard Smith (in memory of Reggie) Anne Smith Gertrude Smith (in memory of Mary W. Harvey) Linda Smith (in memory of Jesse) Karen F. Smith (in memory of Lilly) Nancy and Richard Smoker (in memory of Jesse) Mr. and Mrs. Gary Smoller (in memory of Rose) Mary Lou Smullen (in memory of J.D.) Bobbi Snapper (in memory of Dr. DuBois L. Jenkins) Bob and Lyn Snedeker (in memory of Roxy) Mr. and Mrs. Wayne Snell (in memory of Hudson) Mr. and Mrs. Samuel Snyder Kari Snyder (in memory of Baco) Fran Sobel (in memory of Misha, Susie, and Sharka) Patricia Sokolow (in memory of Bounty, Bryce, and Bearly) Mr. and Mrs. Joel Solomon (in memory of Leia, Prince, and Spoogie) Phil Sondergaard (in memory of Molly) Carol and Ricky Sortomme (in memory of Moll) Judy Sovak (in memory of Scout and Carmine) Robert Sowers (in memory of Rosie and Buffy) Leslie Spelke (in memory of Bernie and Boomer) Marcia Spencer (in memory of Walter) Mr. and Mrs. Paul Spera (in memory of Pinut Pinut) Mr. and Mrs. Austin Sperbeck (in memory of Beauty and Max) Helen Spittle (in memory of Keeper and Jeeves) Mr. and Mrs. James Spoonley (in memory of Fiona) Roger and Diane Stahl (in memory of Weiss) Elaine Staley (in memory of Cassie) Rosemary Stanfield (in memory of Basha, Nikki, and Charlie) Joyce Stanion (in memory of family and pets)

Janet Statfeld (in memory of Stanley Weissman) Barbara Steffensen (in memory of Gus) Joan Stegman (in memory of The Skipper) Mr. and Mrs. Steven Stein (in memory of Nemo) Steven and Rosemary Steinberg (in memory of Ston) Dr. and Mrs. Francis Stellaccio (in memory of Sabrina) Joan Stepanian Julie Stephens Mr. and Mrs. Jeffery Stern (in memory of Hudson, Adrienne, and Buddy) Margaret Stiff (in memory of Ruffles) L.J. and Dolores Stiglianese (in memory of Cookie) Lyman Stinson (in memory of Border Collies and Huskies) David Stone (in memory of Sandy) Suzanne Stone (in memory of Corky) Daphne Storey (in memory of Sophie) June Stott (in memory of Denali) Julian Strauss Aaron and Maryanne Strindberg (in memory of Iris) Hugh Strople (in memory of Indy) Helen Stuber (in memory of Angel) Barbara and Cliff Stutts (in memory of Ziggy) Arletta Subocz (in memory of Rex) Mr. and Mrs. Barry Sullivan (in memory of Tobey) Gail Sullivan (in memory of Kona) Nancy Sullivan (in memory of E. Irene Viegelmann) Fern Sunday (in memory of Skipper) Melinda Sunnarborg Deborah Sutherland (in memory of Suki and Winny) Mr. and Mrs. Eric Swanson (in memory of Schatzie) Donald Swart Elizabeth Swenson Christine Swift (in memory of Quincy) Susan Symmons (in honor of Bailey) Mr. and Mrs. Alphonse Szigethy (in memory of Sadie) Gail Taddeo (in memory of Charleigh)

Mr. and Mrs. R. W. Tait Michael Talarski S.J. Taney (in honor of Tojo) Holly Tanguay (in memory of Gus) Sally Tanner (in memory of Abby and Buddy) Terrie and Brian Tarbox (in memory of Hannah Mae and Jordan) Mr. and Mrs. Thomas Tarr (in memory of Sadie) Margaret Tassiello (in memory of Buffy; in honor of Spike and Sasha) Amanda Tate (in memory of Romeo) Barbara Tatum (in memory of Sophie) Mr. and Mrs. Silvio Tavernise (in memory of Annie) Diane Taylor Ruth Taylor (in memory of Cubby and Clarence) Mr. and Mrs. David Taylor (in memory of Tammy Fay) Mr. and Mrs. Thomas Taylor Marjorie Teagno Margaret Teetsel (in memory of Duffy; in honor of Molly) Jill and Bob Ten Eyck (in memory of Reginald D. WIlliamson; in memory of David Hall; in memory of Krom) Eleanor Terzian (in memory of Max) The Ali Bridge Group (in memory of Dr. DuBois L. Jenkins) The Kenavan Family (in memory of Oreo and Kitty) Laure Thiessen (in memory of Annie) Sylvia Thomas Pamela Thomas (in memory of Penny) Peter Thomas (in memory of Salem) Deanna Thorn (in memory of Cletus) Jessica Thorpe (in memory of Emily and Perry) Dan Tiefenwerth (in memory of Duke) Michelle Tillapaugh (in memory of Freckles) Rita Timmer (in memory of Forchin) Joanne Titus (in memory of Sara) Mr. and Mrs. Kenneth Titus Vicki and Arnold Toffler

(in memory of Ranger)

Patricia Tolchin (in memory of Jill and Ned) Anne Toombs (in memory of Ryley) Nellie Torres (in memory of Honey) Jessie Toscano (in memory of Jasmine; in honor of Dr. Richard Caputo) Doris and Jim Trapasso (in memory of Maggie Mae) Mr. and Mrs. Wilbur Trask (in memory of Winkie and Nikita) Alexander Travis (in memory of Shadow) Duc Trinh (in memory of Bucky) Mr. and Mrs. Bill Truncali Iris Tuck (in honor of Cecilia and Murray) James Tucker (in memory of Derek) Virginia Tully (in memory of Ruthis, Dozer, and Naomi) Mr. and Mrs. Richard Tuozzo (in memory of Bubba) Mr. and Mrs. John Tuyn (in memory of Duffy and Meisha) Rose Tuzzi (in memory of Cuddles and Snuggles) Anne Udell (in memory of Cassie, Lotus Blossom, Miss Mia, and Molly) United Materials, LLC (in memory of Jemma) Mr. and Mrs. Paul Valentine Kathy Valletutti (in memory of Casey) Brinda Van (in memory of Charro) Jonathan and Ann Van Eyk (in memory of Dusty) Mattie Van Glynn (in memory of Lily Ann) Susan and Carl van Kesteren (in memory of King) Tara Van Keuren (in memory of Coffee)



Irving Van Woert, Jr. (in memory of Dr. DuBois L. Jenkins) Rhoda Vanderwall (in memory of Tory) Patricia VanKouwenberg (in memory of Emily, Sampson,

Mr. and Mrs. Frank Vassallo Mr. and Mrs. Michael Vaughn (in memory of Duke)

and Buster)

Mr. and Mrs. Edward Vazquez (in memory of Clarence and Sapphire)

Mr. and Mrs. Stephen Veillette (in memory of Skylar)

Mr. and Mrs. Ray Vento (in memory of Buddy)

Catherine Ver (in memory of Abbie)

Mr. and Mrs. Marvin Veverka (in memory of Albert Stein, Mother, and Valerie's Father)

Mr. and Mrs. Bruce Vickers (in memory of Mo Pierre and Spencer) Dianne Viglione (in memory of Chloe)

Mr. and Mrs. Salvatore Vilardo (in memory of Sassparilla Cream)

Brian Visokay (in memory of Ziggy)

Jo Ann Vitale

Marie W. Von Gontard (in memory of Bentley and Pepper)

Nancy Wackerbarth (in memory of Prince)

Charles Wagner (in honor of Dr. Martin DeAngelis and Dr. Richard Bohning)

Jennifer Wainright (in memory of Lucky)

Mr. and Mrs. Craig Wakeley (in memory of Dusty)

Kyle Walker (in memory of Sonny)
Dayl Walker (in memory of Zig Zag)

Marian Walker (in memory of Princess)

Karla and Chris Wallach (in memory of Dakota)



Eva Walsh and Joan Palmer (in memory of Toby)

Mr. and Mrs. Mark Walsh (in memory of Blue)

Don and Marsha Welshans (in memory of Chewy)

Karen Walter (in memory of Bubby) Hilda Walters (in memory of Zeke)

Judy Walters (in memory of Frazier)

Michael and Mary Ward (in memory of Sammy)

Jackie Ware (in memory of Bailey)

Betsey Warne (in memory of Elmo) Karen Warner (in memory of Lucky,

Cody, and Trout Line)

Janice Washburn

(in memory of Philly and Fallon)

Lauretta Washy (in memory of Keesha)

Charlene Watkins

(in memory of Ruby and Oppie)

Mr. and Mrs. John Weaver (in memory of Bocci)

Norman Webber

(in memory of Deacon)

Lynda Weber (in memory of Sandy)

Kathleen Webster

(in memory of Brewster and Otis)

Amy Weed (in memory of Mugsy and Mitzy Gaynor)

Robert and Geraldine Weeks (in memory of Charlie and Cassie)

Mr. and Mrs. Lew Weingard

Doris Weiss (in memory of Pea Nut)  $\,$ 

Harriet Welburn (in memory of Dino)

Mr. and Mrs. Robert Wells (in memory of Penny and Sissy)

Mr. and Mrs. James Welsch

Frances Werthman

Alice Westlake (in memory of Laddie)

Weston Plains Acres
(in memory of Murdock, Rosie,

Fern, and Zak; in honor of Jim and Terry Gray)

Mr. and Mrs. Ron White (in memory of Forest and Max)

Steven and Ann White (in memory of Bailey, Truffles, and Daisy)

Tiffany White (in memory of Missy)

Janet Whitman (in memory of Code
Red, Tyler, Meena, Lovey, and Bailey)

Mr. and Mrs. David Whitmyre

Sheila Whitney (in memory of Cassie)

Mr. and Mrs. Bruce Whittaker

(in memory of Dr. DuBois L. Jenkins)

Catherine L. Wilhelmsen

Lynda Wilkie (in memory of Phoenix and Miss Kitty)

Mr. and Mrs. Robert Wilkins (in memory of Duffy)

Susan Williams (in memory of Lilly)

Deborah Williams (in memory of Sammy)

Jess and Mary Williams

(in memory of Tequila and Buster)

Marie Williams (in memory of Zoe)

Mr. and Mrs. Paul Williams (in memory of Truffles)

Williamsburg Jewelers

(in memory of Mrs. Anne Nersesian)

Jane Williamson

Pauline Williman

(in memory of Sandy and Wofat)

Donald and Joyce Wilson (in memory of Georgia)

Suzanne Wiltsie

(in memory of Barney)

Mr. and Mrs. Thomsa Winiecki (in memory of Cooper)

Mr. and Mrs. Dean Winkler

Susan Winnick (in memory of Snoopy)

Joan Winoker (in memory of Cotton and Poohie)

Bart and Sharon Winslow (in memory of Erin; in honor of Eastview Veternary Clinic)

Sara Witherell (in memory of Fred and Duncan)

Martha and Michael Witkowski (in memory of Jenna and CH. Graffin KNK Marshall)

Jill Wolfe (in memory of Kokomo and Pebbles)

Carol Wolitzky (in memory of Amigo)

Mr. and Mrs. R. Norman Wood (in memory of Tammy)

R. Paul Wood (in memory of Nellie) Bonita Woodring (in memory of Tim

Mary Woods (in memory of Bruno)
Mary Woolsey (in memory of Sparky)

Donald Worth (in memory of Pepper)

Sharon Worth (in memory of Truman) Mr. and Mrs. Douglas Woundy (in memory of Chas)

Stephen Wyler (in memory of Gianni, Rusty, Pebbles, and Max)

Winifred Wylie (in memory of Anzac)

Carrie and Dan Yakush

(in honor of Dr. James Glendening)
Jeanne Yamonaco (in memory of Roxy,
Mo, and Otis)

Laura Ybarra (in memory of Sam)

Mr. and Mrs. Robert Yonkers (in memory of Dusty)

Judy Yorio (in memory of Apollo)

Roxanne Young (in memory of Jax) George Young

Elizabeth Young (in memory of Fenway) Cheryl Young (in memory of Sugar) Rosemarie Zachary (in memory

George Zack (in honor of Dr. Lenka Babuska and

Dr. Joshua Atz)
Lois Zarembo (in memory of Lucky)

of Togo)

Berta Zeltner (in memory of Reka) Mr. and Mrs. Michael Zenobia

(in memory of Court and Stinky)

Linda Zeswitz (in memory of Mia, Silver, and Soapie)

Lin Zhou (in memory of the rescued wild goose)

Bill and Regina Zimmerman (in memory of Dr. DuBois L. Jenkins)

Mr. and Mrs. Dennis Zink (in memory of Kamin and Freddie)

Mr. and Mrs. Robert Zubaly (in memory of Clyde)

Selma Zucker (in memory of Ms. Z's Royal Trapper and Msr. Z's Silver Schatz)

Sally Zufall (in memory of Abigail)

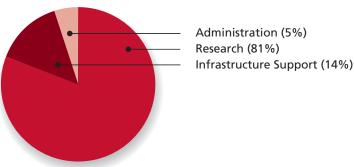
Stuart Zweighaft (in memory of Buster)

# Financial Summary 2009

# 2009 Revenue

# Other Sources (2%) Indirect Cost-Return (8%) Private Donations (11%) Competitive Research Grants (40%) College Support (15%) Endowment Income (24%)

# 2009 Expenses



# **Revenue Summary**

- Fully 40% of our income comes from competitive research grants.
- The percent of endowment income was similar to recent years.
- Private donations are gifts from individuals, veterinary practices, kennel clubs, foundations and corporations.
   College support represents funds from the College of
- Veterinary Medicine for faculty salaries.Indirect costs represent the non-research expenses associated with conducting research at Cornell. This

usually increases when grant support increases.

 Other sources represent miscellaneous income, such as royalties.

# **Expense Summary**

- More than 80% of our budget continues to be directed toward our research programs, which allows us to maintain a leadership position in both basic and applied research for companion animals.
- Infrastructure costs were down slightly from 2008, and we spent less than 20% of our budget on support costs such as building maintenance, utilities, administrative and public affairs staff and programs.

# Dear Friends.



Richard Henry



Dovid Bohnko

We are delighted to celebrate 60 years of research accomplishment by the faculty, students, and staff of the Baker Institute for Animal Health. A key contributor to this success has been Dr. George Lust, a groundbreaking researcher who advanced our understanding of hip dysplasia. It was with great admiration that we celebrated George's career at the time of his retirement in 2010.

The legacy of the Institute has a richness that is not always obvious to the observer. There are the outstanding research findings, of course, and this year we saw a collaborative report on the genetic basis of Lavender Foal Syndrome that quickly progressed to the development of a practical test to detect the defect. In addition, Institute researchers described novel functions for eosinophils that upended the dogma regarding their function in worm infections. New understanding emerged regarding the host range and infectivity of canine parvovirus and feline calicivirus. These are examples of the normal, always exciting, nature of progress that we have come to expect from the Institute.

The expanded legacy of the Institute comes with the guarantee that the discoveries will continue in the future. In addition to the continued efforts of current and future investigators at the Institute, many exciting discoveries will come at the hands of the students and post-docs who have honed their research skills at Baker. Institute alumni are scattered around the world, many leading their own research programs and often remaining connected to the Institute via collaborative work with their former mentors. In particular, Doug McGregor's Leadership Program for Veterinary Students has developed and supplied the larger scientific community with many promising young investigators. We anticipate great things from the next generation of Baker-trained scientists.

The scientific impact and reach of the Baker Institute has never been more evident. It is equally clear that the support provided by all of us, the friends of the Baker Institute, remains crucial to the success of the Institute's vital research and education efforts.

We are thankful for your generosity and loyalty and look forward to the next 60 years of success for the Baker Institute.

Richard Henry,
Chair

David Behnke, Vice Chair

# Baker Institute Advisory Council

The Baker Institute Advisory Council is comprised of scientists and veterinarians at the forefront of the animal and human health worlds. It also includes devoted pet owners, accomplished dog and horse breeders, exhibitors, and dog trainers and behaviorists, a number of whom are Cornell University and College of Veterinary Medicine alumni. They provide invaluable guidance, financial support, and assistance to the director and staff of the Institute, ensuring that our research programs, facilities, and outreach are not only the best possible today, but that we have the knowledge and insight to prepare the Institute for the future.

David Behnke (Vice Chair) Washington, Connecticut Managing Director, Head of US Investments Najeti Ventures LLC

Joanne M. Bicknese, DVM, MS, ELS Cream Ridge, New Jersey Principal Documentation Director Bristol-Meyers Squibb Research and Development

Sarah Rockefeller Bogdanovitch, Emerita Paul Smiths, New York Associate Professor of Forestry Paul Smiths College

Albert C. Bostwick Aiken, South Carolina

Philip B. Carter, PhD
Raleigh, North Carolina
Professor Emeritus of Microbiology
and Immunology
North Carolina State University

Ezra Cornell
Ithaca, New York
President
Cornell Pochily Investment
Advisors, Inc.

Richard P. Henry, DVM (Chair) Dix Hills, New York Past Director and Chief Executive Officer Scott, Henry, & Rosen, P.C. Deer Park Animal Hospital Gerry Hickey, MVB, PhD Westfield, New Jersey Director, Regulatory Affairs Merck Research Laboratories

William J. Kay, DVM
Plymouth Meeting, Pennsylvania
Hickory Veterinary Hospital/
Pennsylvania Veterinary Specialists

Joseph Kinnarney, DVM, MS Reidsville, North Carolina General Veterinary Practitioner Reidsville Veterinary Hospital, Inc.

Darlene L. Klein Ithaca, New York

Robert Marshak, DVM

Emeritus Newtown Square, Pennsylvania Dean Emeritus/Professor Emeritus University of Pennsylvania

Frederick A. Murphy, DVM, PhD, MD (hc), DSc (hc) Galveston, Texas Department of Pathology The University of Texas Medical Branch

Roy V.H. Pollock, DVM, PhD Emeritus Ithaca, New York Chief Learning Officer Fort Hill Company

Gene M. Pranzo, Esq.
New York, New York
President
Dorothy Russell Havemeyer
Foundation, Inc.

Margaret A. Reed, PhD Wilton, Connecticut Canine Training and Behavior Services, LLC

Philip Reilly, MD Concord, Massachusetts Venture Partner Third Rock Ventures

Andrew G. Sage II North Palm Beach, Florida

Sara Sanders, DVM Pittsford, New York General Veterinary Practitioner Mendon Village Animal Hospital

Mary Sloane Weston, Connecticut

Dina Tresnan, DVM, PhD, Diplomate ACVM Old Lyme, Connecticut Director, Safety and Risk Management Pfizer, Inc.

Judith Wilpon Frost Creek Farm Lattingtown, New York

Jan Witkowski, PhD Cold Spring Harbor, New York Executive Director, Banbury Center Cold Spring Harbor Laboratory

# Faculty, Staff And Student Directory, January 2009 – June 2010

# **Administration**

Douglas F. Antczak Director (-6/30/09): BA, Cornell University; VMD, University of Pennsylvania; PhD, Cambridge University, UK

Judith A. Appleton Director (7/1/09 -): BS, Indiana University; MS, PhD, University of Georgia

Joseph E. Bennett Facilities Manager: AALAS accreditation

Jane M. Miller Administrative Manager: BS, MPS, Cornell University

Lynne S. Williams Director of Development and Public Affairs: BA, Seton Hill College; MA, Slippery Rock University

# **Research Units**

# **Infectious Diseases & Immunology**

Albert C. Bostwick Laboratory of Molecular Biology: Canine and Feline <u>Parvoviruses</u>

Colin R. Parrish John M. Olin Professor of Virology: BSc, Massey University, New Zealand; PhD, Cornell University

Sang-Bom Lvi Research Associate: PhD, Cornell University

Laura B. Goodman Postdoctoral Fellow: BS, University of Michigan at Ann Arbor; PhD, Cornell University

Jessica J. Hayward Postdoctoral Associate: BSc. MSc. PhD. Univ. of Auckland. New Zealand

Carole E. Harbison DVM/PhD Candidate: BS, Oberlin College

Karin Hoelzer Post-DVM PhD Candidate (-5/09): DVM, Hannover Veterinary School, Germany:

PhD, Cornell University (5/09) Karla M. Stucker

DVM/PhD Candidate: BS, Cornell University; DVM, Cornell University (5/08)

Virginia Scarpino Research Technician: BS, Edinboro State College; MA, SUNY College at Geneseo

Wendy S. Weichert Research Support Specialist: BS, Cornell University

# Equine Genetics Center: Equine Immunology

Douglas F. Antczak Dorothy Havemeyer McConville Professor of Equine Medicine: BA, Cornell University; VMD, University of Pennsylvania; PhD, Cambridge University, UK

Jennifer L. Sones Postdoctoral Fellow (5/09-); Post DVM PhD Candidate (5/10-): BS, DVM, Louisiana State University

Margaret M. Brosnahan Post-DVM PhD Candidate: BA, Bates College; DVM, Tufts University; MS, Oklahoma State

Leela E. Noronha Post-DVM PhD Candidate: ScB with Honors, Brown University; DVM, Virginia-Maryland Regional College of Veterinary Medicine

Donald C. Miller Research Support Specialist: Cornell University

Rebecca M. Harman Research Support Specialist: BS, Cornell University

Jov T. Tseng Technician (1/10-): BS, Cornell University (5/10)

# Laboratory of Immunology of Infectious Diseases

Susana Mendez Assistant Professor of Immunology and Infectious Diseases: DVM, PhD, University Complutense of Madrid

Wenhui Wu (-10/09) Postdoctoral Associate: MD. Bengbu Medical College. China

Lu Huang PhD Candidate: BS, Zhejiang University, China

Meleana M. Hinchman Lab Manager/Research Technician: BS, Cornell University

# Laboratory of Immunoparasitology

Susan K. Bliss Sr. Research Associate: BA, Lawrence University; DVM, PhD, Cornell University

Diana Douglas Research Technician: BS, Truman State University

Meleana M. Hinchman (4/10-) Research Technician: BS, Cornell University

# Leadership Program and Training **Initiatives**

Douglas D. McGregor Director of Leadership and Training Initiatives: BA, MD, University of Western Ontario, Canada; D.Phil., Oxford University, England

# Laboratory of Mucosal Immunity, Nematodes and Immunoparasitology

Judith A. Appleton Alfred H. Caspary Professor of Immunology: BS, Indiana University; MS, PhD, University of Georgia

Lisa K. Blum PhD Candidate: BS, Cornell University

Nebiat Gebreselassie PhD Candidate: BS, Salem College

Lucille F. Gagliardo Research Technician: BS, Southhampton College

# Laboratory of Virology: Feline Caliciviruses and Mammalian Orthoreoviruses

John S. L. Parker Associate Professor of Virology: BVMS, University of Glasgow (Scotland); PhD, Cornell University

Alex Amaro Postdoctoral Associate: BS, University of Notre Dame; PhD, Cornell University

Jae-Won Kim Postdoctoral Associate: BSc, MSc, Yonsei University, Korea; PhD, North Carolina State University-Raleigh

Susanne Kaufer PhD Candidate: MS, Technical University Munich, Germany

Robert J. Ossiboff DVM/PhD Candidate: BS, Loyola University; PhD, Cornell University (1/09); DVM, Cornell University (5/10)

Brenda G. Werner (-11/09) Research Support Specialist: BS, Cornell University; MSCIT, Regis University

Brian M. Ingel (12/09-) Research Technician: BS, University of California-Davis

# **Genetics & Reproductive Biology**

The Albert C. Bostwick Foundation Laboratory: Canine Hip Dysplasia and <u>Osteoarthritis</u>

George Lust Professor of Physiological Chemistry: BS, University of Massachusetts; PhD, Cornell University

Elizabeth Corey Research Technician: Cornell Medical Genetics Archives (Todhunter Laboratory, Department of Clinical Sciences) BS, University of Vermont

# Laboratory of Epigenetics and Reproductive Biology

Scott A. Coonrod Associate Professor of Epigenetics and Reproductive Biology: BS, MS, PhD, Texas A&M University

Rui Kan Research Associate: BS, MS, Inner Mongolia University, China; PhD, Chinese Academy of Sciences, China

Brian D. Cherrington Postdoctoral Associate: BA. Washington State: MS, PhD, Colorado State University

Eric P. Morency Postdoctoral Associate: BS, MS, PhD, University Claude Bernard Lyon, France

Xuesen Zhang Postdoctoral Associate: BA, MSc, Dalian Medical University, China; PhD, Chinese Academy of Sciences, China

Boram Kim PhD Candidate: BS, Yonsei University, Seoul University, Korea

John L. McElwee PhD Candidate: BS, Binghamton University

Lynne J. Anguish Research Support Specialist: BS, University of New Hampshire; MS, University of Guelph, Canada

Ashley M. Palmer Research Technician: BA, Wellesley College

# Laboratory for the Study of Inherited Canine Reproductive Diseases

Vicki N. Meyers-Wallen Associate Professor of Genetics and Reproduction: BS, University of Maryland; VMD, PhD, University of Pennsylvania; Diplomate, American College of Theriogenologists

Shashikant Pujar Research Associate: BSc, Vijaya College, Bangalore, India; MSc, St. Joseph's College, Bangalore, India; PhD, University of Pune, India

# Inherited Eye Disease Studies Unit

Gregory M. Acland Professor of Medical Genetics: BVSc, University of Sydney, Australia; Diplomate, American College of Veterinary Ophthalmologists

Anna V. Kukekova Research Associate: MS, St. Petersburg State University, Russia; PhD, Institute of Cytology, Russian Academy of Science, Russia

Orly Goldstein Research Support Specialist: BS, the Hebrew University, Israel; MS, Tel-Aviv University, Israel

Jennifer L. Johnson Research Support Specialist: BS, Cornell University

Julie Jordan Research Technician: AS, Tompkins-Cortland Community College

# Laboratory of Reproductive Biology

Alexander J. Travis Associate Professor of Reproductive Biology: AB, Princeton University; VMD, PhD, University of Pennsylvania

Atsushi Asano Research Associate: BAgr, Kochi University, Japan; MAgr, PhD, Okayama University, Japan

Roy Cohen Postdoctoral Associate (3/10-): BSc, MSc, PhD, Hebrew University, Israel

Lizeng Gao Postdoctoral Associate (1/10-): BS, MS, Jilin University, China; PhD, Chinese Academy of Sciences

Danielle Buttke DVM/PhD Candidate: BA, University of South Dakota; DVM (5/09), PhD, Cornell University (5/10)

Yeunhee Kim (-2/09) PhD Candidate: MS, University of Seoul, Korea; PhD, Cornell University (5/09)

Jacque L. Nelson-Harrington Research Support Specialist: AS, Jamestown Community College; BS. Cornell University

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Lauren Wu Technician: BS, Cornell University

# **Emeritus Faculty:**

Max J. G. Appel Professor of Virology, Emeritus: Dr.med.vet, University of Hannover, Germany; PhD, Cornell University

Leland E. Carmichael John M. Olin Professor of Virology, Emeritus: AB, DVM, University of California; PhD, Cornell University; PhD(hc), University of Liège, Belgium; Diplomate, American College of Veterinary Microbiologists

Ben E. Sheffy Caspary Professor of Nutrition, Emeritus: BS, MS, PhD, University of Wisconsin

# **Administrative Support**

Jennifer L. Benson Development Assistant BS, Temple University

Anita S. Hesser Assistant to the Director (7/09-); Administrative Assistant and Assistant Network Administrator: AS, SUNY Empire State College

Laurie A. Lychalk (-6/09) Administrative Assistant, Public Affairs: AAS, Tompkins Cortland Community College

Dawn M. Milbyer (-7/09) Assistant to the Director: AAS, Manchester Community College

Dorothy K. Scorelle Administrative Assistant: BS, SUNY College at New Paltz

Susan M. Williams Office Receptionist/Administrative Assistant

# **Maintenance And Grounds**

David H. Edwards, Jr. Maintenance Mechanic

Russell F. Haus Maintenance Mechanic

Carl J. Hazen (-6/09) Head Custodian

Wayne C. Weldner Custodian

# **Technical Support**

Timothy W. Anguish (-6/09) Manager, Core Scientific Instruments and Equipment: BS, SUNY College at Cortland

Gail M. Sullivan
Department Safety Representative:
AAS, SUNY Agricultural and Technical
College at Canton; BA, SUNY College at
New Paltz

Edward H. Thompson, Jr. Laboratory Attendant

# Vivarium/Animal Care

Kevin T. Draiss Animal Technician: AAS, SUNY Agricultural and Technical College at Delhi; BS, Cornell University; AALAS accreditation

Shannon D. Kellogg Animal Technician: AALAS accreditation

Julie D. Reynolds Animal Technician: AALAS accreditation

Emily J. Silvela Animal Technician: BS, Cornell University

Scott M. Soprano Animal Technician:

AAS, Finger Lakes Community College

Jonathan R. Wood (-4/09) Animal Technician: AAS, Finger Lakes Community College; AALAS accreditation

Jackie L. Wright Vivarium Supervisor: AAS, SUNY College of Technology at Delhi; BS, Syracuse University; AALAS accreditation

# **Veterinary Students**

John P. Loftus (2009-2010) Bliss Laboratory

Leigh MacAyeal (2009) Parrish Laboratory

# Summer 2009:

Mackenzie Adams 2009 Havemeyer Fellow, Antczak Laboratory

Dana Anchassi 2009 Hughes Scholar, from Qatar, Parker Laboratory Stuart Davenport 2009 Leadership Program, Parker Laboratory

Kate Huggler 2009 Havemeyer Summer Fellow, Antczak Laboratory

Shuhei Ito 2009 Leadership Program, Coonrod Laboratory

Magdalena Schmidt 2009 Leadership Program, Coonrod Laboratory

Meredith Sherrill 2009 Leadership Program, Acland Laboratory

Jolanda Verhoef 2009 Leadership Program, Mendez Laboratory

Hans Winkler 2009 Leadership Program, Parrish Laboratory

# Summer 2010:

Emily Ames 2010 Leadership Program, Coonrod Laboratory

Heike Bruer 2010 Leadership Program, Coonrod Laboratory

Erin Tsi-jia Chu 2010 VIP Program, Coonrod Laboratory

Lindsay Goodale 2010 Havemeyer Summer Fellow, Antczak Laboratory

Samantha Hodgkins 2010 Leadership Program, Parker Laboratory

Kate Huggler 2010 VIP Program, Antezak Laboratory

Marie Killerby 2010 Leadership Program, Parrish Laboratory

Anne Kimmerlein 2010 Leadership Program, Mendez Laboratory

Andrea Lopez-Cepero 2010 Leadership Alliance Program, Parker Laboratory

2010 VIP Program, Appleton Laboratory Ravee Padte 2010 Leadership Program, Acland Laboratory

Tamara Maehr

Gertje Petersen 2010 Leadership Program, Travis Laboratory

Maria Warren 2010 VIP Program, Mendez Laboratory

Kerrie Winstanley 2010 Havemeyer Summer Fellow, Antczak Laboratory

Sirima Yaesmsiri 2010 Leadership Program, Travis Laboratory

# **Undergraduate Students**

Jegath Athilingham, Parker Laboratory
Kate Backel, Travis Laboratory
Emily Bick, Appleton Laboratory
David Byun, Mendez Laboratory
Jennifer Cassano, Antczak Laboratory
Shirley Cheng, Appleton Laboratory
Jasmine Chiang, Mendez Laboratory
Lucas Dawson, Appleton Laboratory
Marine deMarcken, Antczak Laboratory
Amanda Fischer, Parker Laboratory
Eliese Friedel, Mendez Laboratory
Joseph Graterol, Parker Laboratory
Patricia Green (Honors thesis)
Mendez Laboratory
Matthew Hints, Parrish Laboratory

Mei Jin, Coonrod Laboratory
Natalie Johnson, Parrish Laboratory
Jason Kaelber, Parrish Laboratory
Natalie Katchmar, Parker Laboratory

Na Young Kim Volunteer, Appleton Laboratory Tyler Lillie, Parrish Laboratory Shana Mintz, Meyers-Wallen Laboratory Byung Joo (Justin) Nahm Mendez Laboratory

Alicia Ortega, Parrish Laboratory
Christian Owusu, Mendez Laboratory
Joy Tseng, Antczak Laboratory
Emily van den Blink, Coonrod Laboratory
Ichih Candy Wu, Parrish Laboratory
Bobby Yu, Parrish Laboratory

# Horse Barn Crew

Katie Boyd
Marine deMarken
Jill Greisman
Oliver Harwood
Caitlin Hokanson
Sasha Korn
Tyler Lillie
Meredith Lutz
Paula Patton
Tara Stonex

# Visiting Scientists, Researchers, And Students

# 2009:

Nick Ledesma (2009) Rotating Graduate Student, Appleton Laboratory

Dr. Laura Manna (2009) Visiting Scholar, Universita. di Napoli Federico II, Napoli, Italy, Mendez Laboratory

Swapna Mohan (2009) Rotating Graduate Student, Travis Laboratory

Eric Strobel (2009)
Rotating Graduate Student, Parrish
Laboratory
Dr. George Theodoropoulos (2009)

Dr. George Theodoropoulos (2009) Sabbatical visitor, Associate Professor of Veterinary Parasitology, Agricultural University, Athens, Greece, Appleton Laboratory

Victor Tse (2009) Rotating Graduate Student, Parrish Laboratory

# 2010:

Sara Cohen (2010) Rotating Graduate Student, Appleton Laboratory

Sha Li (2010) Rotating Graduate Student, Travis Laboratory

Molly Shook (2010) Visiting Graduate Student, Boyce Thompson Institute, Coonrod Laboratory

Abdelaziz Farhat, MD (2010) 2010 Hughes Scholar, from Qatar, Travis Laboratory

Adbulwahed Zainel, MD (2010) 2010 Hughes Scholar, from Qatar, Coonrod Laboratory

# Part-Time / Casual Assistants

Caleb Chan 2010 Leadership Program, McGregor Office

Shelagh M. Johnston Administrative Assistant, Parrish Laboratory

Susan E. Pearce-Kelling Research Support Specialist, Acland Laboratory

Cynthia Kwong 2009 Leadership Program, McGregor Office

Svetlana V. Temnykh Research Scientist, Acland Laboratory

Kathleen Williams Administrative Assistant, McGregor Office

Patricia Wolkmer Volunteer, Mendez Laboratory







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