



TUFTS UNIVERSITY

CUMMINGS SCHOOL of VETERINARY MEDICINE

SUMMER RESEARCH TRAINING PROGRAM AWARDS 2011

ABSTRACT BOOK

SUPPORTED IN PART BY

NIH

U.S. Army Medical Command

Merial Veterinary Scholars Program

Morris Animal Foundation

Award Type	Student	Mentor	Class Year	Research Title
NIH	Anderson, Michael	Dr. Sandra Ayres	2013	Investigation of Anti-Oxidant Effects on Follicular Development and Oocyte Health in Dairy Cows
NIH	Borek, Alison	Dr. Mary Rose Paradis	2013	Evaluation and Standardization of Clinical <i>Salmonella</i> Real-Time PCR Diagnostic Testing
NIH	Broadley, Heidi	Dr. Emily McCobb	2013	Effect of Single-Cat Versus Multi-Cat Home History on Perceived Behavioral Stress in Domestic Cats (<i>Felis silvestrus catus</i>) in an Animal Shelter
Army	Burns, Monika	Dr. Claire Sharp	2013	Evaluation of Serum NT-pCNP as a Diagnostic, Monitoring and Prognostic Biomarker for Dogs Hospitalized in an ICU Setting
NIH	Carbone, Elizabeth	Dr. Larry Carbone	2013	Sustained-Release Buprenorphine's Duration of Anti-Nociceptive Action in Balb/c and SWR Mice.
Army	Chalam ,Yamini	Dr. Gretchen Kaufman	2014	Nutritional Analysis and Comparison of Diets Offered to Captive Elephants in Nepal
NIH	Colella, Acelyn	Dr. Sandra Ayres	2013	Following Follicular Patterns During, Before, and After the Use of a Short-Term Progesterone Priming Protocol in Anestrus and Late Transition Goats and Determining if this Protocol Results in Viable Pregnancies
Army	De Fabrizio, Melissa	Dr. Joann Lindenmayer	2014	The Use of Antibiotics in Small Ruminants in Muchila, Zambia
NIH	Etedali, Nahvid	Dr. Claire Sharp	2013	Evaluation of a Point-of-Care Test for Serum NT-pCNP as a Diagnostic Biomarker for Sepsis in Dogs Presenting for Emergency Care
NIH	Fagen, Ariel	Dr. Gretchen Kaufman and Sarad Paudel	2013	A Feasibility Study: Determining the Effectiveness and Applicability of Secondary Positive Reinforcement Training Elephants (<i>Elephas maximus</i>) in Nepal
Army	Fleming, Anne	Dr. Scott Marshall and Dr. Joann Lindenmayer	2013	Quantifying the Spatial Distribution and Population Size of Feral Cat Colonies in Rhode Island as a Function Population Management Strategies

Award Type	Student	Mentor	Class Year	Research Title
Army	Gordon, Max	Dr. Siobhan Mor	2014	Evaluating Cost-Effective Rabies Treatments in Uganda
NIH	Grindley, Johnathan	Dr. Donohue-Rolfe	2013	Surveying Leptospira Interrogans Prevalence Among Domestic Canine and Peccary Populations in Madre de Dios, Peru
Army	Hamilton, Jessie	Dr. Robyn Alders	2014	Identification of Constraints Impacting Poultry Production in Muchila, Zambia
Army	Holmes, Katherine	Dr. Jean Mukherjee and Dr. Kevin Lindell	2013	Surveillance of Brucella spp.in the goat population of the Dominican Republic
Army	Jacobus, Kristy	Dr. Sandra Ayres and Dr. Joanne Connolly	2014	Characterization of the Reproductive Cycle of the Platypus (<i>Ornithorhynchus anatinus</i>) Through Non-Invasive Identification of Fecal Hormone Metabolites
NIH	Johnson, Kelsey	Dr. Patrick Skelly	2014	Characterization of the Schistosome Carbonic Anhydrase
NIH	Katz, Jay	Dr. Arthur Donohue-Rolfe	2013	Comparing Methicillin-Resistant <i>Staphylococcus aureus</i> (MRSA) Prevalence and Strain Type in Peru Between Pecari (<i>Tayassu tajacu</i>) and Domestic Pigs
Merial	Khodari, Joe	Dr. Dominique Penninck	2013	Ultrasonography of Colonic and Cecal Neoplasia in Cats
Army	Lim, Sarah	Dr. Lois Wetmore	2014	Optimizing the Use of Pulse Oximetry and Assessing its Usefulness in Detecting Decreased Pulmonary Function in Elephants with Tuberculosis
NIH	Lin, Denise	Dr. Joann Lindenmayer	2014	Assessing Risk of Wild Animal Ownership in Thailand
NIH	Mazzaschi, Nicole	Dr. Elizabeth Byrnes	2014	Transgenerational Effects of Opioid Exposure
Army	Murch, Cecilia	Dr. Joann Lindenmayer	2013	Rabies Prevention in Kathmandu, Nepal: Evaluating the Efficacy of Canine Sterilization and Vaccination
NIH	Nussbaum, Lindsay	Dr. Patricia Provost, Dr. Patrick Skelly, Dr. Jean Mukherjee, and Dawn Meola	2013	Prevalence of Benzimidazole Resistance in the Equine Patient Population at the Tufts Cummings School of Veterinary Medicine

Award Type	Student	Mentor	Class Year	Research Title
Army	Penrod, Casey	Dr. BB Verma	2014	Studies on the Effect of Teat Dipping Post-Milking of Lactating Crossbreed Cows in Control of Subclinical Mastitis
Independent Morris	Petrosky, Keiko	Dr. Barbara Davis	2013	Evaluating Grading Systems for Accurate Prognosis of Canine Cutaneous Mast Cell Tumors
Army	Pogue, Natasha	Dr. BB Verma	2014	Seroprevalence of Caprine <i>Brucella melintensis</i> in West Bengal, India
NIH	Reiss, Eliza	Dr. Kristine Burgess	2014	Incidence of Canine Splenic Hemangiosarcoma in Dogs Presenting to the Cummings School of Veterinary Medicine with Suspected Splenic Hemangiosarcoma: A Retrospective Study
Morris	Robb, Alexander	Dr. Michael Kowaleski	2013	Accuracy, variability, and reproducibility of femoral varus and femoral torsion measurement using radiographic and computed tomographic imaging in clinically abnormal dogs.
Army	Roye, Emily	Dr. Emily McCobb and Dr. Joann Lindenmayer	2013	Assessment of Handwashing Protocols and Attitudes at Boston Area Animal Shelters
NIH	Schenk, Marian	Dr. Raimon Duran-Struuck & Andy Hoffman	2013	In vivo development of aggressive swine hematopoietic tumors for adoptive transfer studies.
Army	Sowy, Stanley	Dr. Abhineet Sheoran	2014	Neutralization of Stx2 by scFvs
Independent	Sylvane, Brittany	Dr. Randy Boudrieau	2014	
Army	Tucker, Casey	Dr. Jean Mukherjee	2013	Ducks as biological parasite control : a survey of snails, rats, ducks, and gibbons, and the prevalence of <i>Angiostrongylus Cantonensis</i> at the Pingtung Rescue Center, Taiwan
Independent	Turner, Laura	Dr. Elizabeth Rozanski and Dr. Emily McCobb	2014	Relationship Between Serum 25-Hydroxyvitamin D Level and Diagnosis of Upper Respiratory Infection in Cats in the Shelter Environment
Merial	Whitford, Annie	Dr. Alison Robbins	2014	Terbinafine Dosage and Safety in WNS Infected <i>Myotis Lucifugus</i> : Correlation of Survival, Drug Tissue Levels, and Toxic Effects

Awardee: Michael Anderson V'13

Mentor: Dr. Sandra Ayres

Award Type: NIH

Research Project: Investigation of Anti-Oxidant Effects on Follicular Development and Oocyte Health in Dairy Cows

Summary: Understanding the microenvironment of the follicle and its relation to healthy oocyte development is the goal of this study. Oxidative stress, which can be defined by levels of reactive oxygen species in relation to antioxidant levels, has been shown in many organ systems to be an important factor in mechanisms of development/aging and natural protection. We hypothesize that oxidative stress levels in the follicular fluid environment may help distinguish which follicles are destined to become dominant and which are subordinate. The healthy recruitment of dominant follicles is necessary for proper fertility. A better understanding of the mechanisms that lead to greater fertility in the cow help support agriculture and dairy science greatly.

Hormonal levels in follicular fluid will also be measured. It is known that estrogen-active follicles are less likely to undergo atresia. If antioxidant levels are high when estrogen levels are high in healthy, dominant follicles, this information may provide an explanation for how estrogen leads to follicular health.

Oocyte development *in vitro* will also be aided through information gained from this study. Properly mimicking the environment in which the oocyte matures is crucial for *in vitro* work, whether it be embryo development or manipulation of the oocyte for future research purposes.

My role in this project is to collect follicular fluid for analysis and organize samples and follicle size data so that principle investigators at the University of New Hampshire (Dr. David Townson) and Middlebury College (Dr. Catherine Combelles) can analyze the samples. I will be trained starting in late May to early June for rectal ultrasound evaluation of the ovarian follicles. We will synchronize the cow's estrous cycles and evaluate them daily for follicle size. When a defined size is reached, the follicle will be considered dominant. The dominant follicle and two next largest follicles will then be aspirated through transvaginal ultrasound. Tail blocking for sedation and pain management, along with aspiration technique will be taught to me by the resident veterinarian. Fourteen cows will be used for the study with 126 samples of follicular fluid gathered from three separate follicles in three consecutive estrous cycles.

Follicular fluid samples will undergo quantitative assay analysis for reactive oxygen species, antioxidants and hormones. *In vitro* maturation, fertilization and embryo culture will be used to look at how well the oocyte developed. All of the information gathered should help to define how oxidative stress affects the outcome of follicular selection and oocyte developmental success.

Awardee: Alison Borek V'13

Mentor: Dr. Mary Rose Paradis

Award Type: NIH

Research Project: Evaluation and Standardization of Clinical *Salmonella* Real-Time PCR Diagnostic Testing

Summary: Salmonellosis is a serious and potentially fatal disease among horses. The most commonly reported outbreaks of the disease are at veterinary teaching hospitals. This is most likely due to the various predisposing factors associated with hospitals such as: congregation of horses from multiple locations, stress, diet change and use of antimicrobials. Nosocomial spread of the disease within hospitals is a serious concern, making rapid detection and isolation of infected horses of paramount importance. Microbiological culture has historically been the 'gold standard' for detection of *Salmonella* spp., but recently PCR assays have been developed as a more rapid and sensitive diagnostic test. When developing a diagnostic test, it is important to receive accurate results of the infection status of the patient. In this study, we will evaluate the sensitivity of a real-time PCR assay developed at Tufts Cummings School of Veterinary Medicine through serial dilution testing. We will also evaluate the inter-operator error associated with the real-time PCR protocol. Finally, we will develop a positive and negative control for the DNA extraction step, through use of *E.coli* and *Salmonella* cultures.

Awardee: Heidi Broadley V'13

Mentor: Dr. Emily McCobb

Award Type: NIH

Research Project: Effect of Single-Cat Versus Multi-Cat Home History on Perceived Behavioral Stress in Domestic Cats (*Felis silvestrus catus*) in an Animal Shelter

Summary: The aim of this research is to determine whether the seven point, observational Cat Stress Score (CSS; Kessler & Turner, 1997) is significantly different in shelter cats from a single-cat household compared to those cats from a multi-cat household. This is a retrospective study, to be performed Summer 2011 at either the Boston MSPCA or Animal Rescue League (ARL), pending site approval. There will be two study groups, single-cat home versus multi-cat home history, as obtained from intake profile information. Each group will consist of 20 cats, age 1 year +. Each cat will be scored on 3 consecutive days, Day 1 being the day of intake. According to the CSS score, a value <3 suggests baseline stress levels; in support of this study's hypothesis, a 1.5-point (20%) difference will also need to be found. Results for each subject will be statistically analyzed using the Mann-Whitney test. The CSS has been applied to assess feline stress levels in shelter environments in light of several demographic variables. However, little attention has been given to the use of this scoring system in attempting to compare cats

from single-cat homes to those that are from multi-cat homes, and likely more accustomed to contact with other cats. Animal shelters, having a finite amount of space available for housing animals, may have to keep cats in ever-closer quarters during this time of year. This study seeks to assess whether CSS results significantly differ between cats that lived alone and those that lived with other cats prior to arriving at the animal shelter. Identifying such a relationship may assist shelter workers in the future, in terms of helping such cats adapt to a radically different environment.

Awardee: Monika Burns V'13

Mentor: Dr. Claire Sharp

Award Type: US Army

Research Project: Evaluation of Serum NT-pCNP as a Diagnostic, Monitoring and Prognostic Biomarker for Dogs Hospitalized in an ICU Setting

Summary: The purpose of this study is to evaluate the use of the amino terminal prohormone of C-type natriuretic peptide (NT-pCNP) as a biomarker for diagnosis, monitoring and determining the prognosis of dogs with sepsis in an intensive care unit (ICU) setting. Additionally, this study will compare a newly developed point of care (POC) assay for NT-pCNP with a validated, canine specific, commercially available enzyme linked immunosorbent assay (ELISA).

Sepsis is a condition that is associated with high morbidity and mortality in dogs, and can result in multiple organ dysfunction syndrome (MODS). Sepsis can be challenging to diagnose due to the overlapping clinical signs with non-infectious causes of the systemic inflammatory response syndrome (SIRS). In human medicine, delayed administration of appropriate antibiotics results in increased mortality; the same is likely to be true in dogs, and as such early diagnosis and prompt initiation of antibiotics is vital to ensure a good outcome. Therefore, it is essential that we have reliable diagnostic biomarkers for sepsis in dogs. This study aims to not only confirm the diagnostic utility of a biomarker (NT-pCNP) in a larger population of hospitalized dogs, but also to evaluate its utility to assess response to treatment and prognosticate.

This study will be a prospective, serial admission study. It will include all dogs hospitalized in the Intensive Care Unit at the Foster Hospital for Small Animals at the Cummings School of Veterinary Medicine at Tufts University over a two-month period.

There are few limitations currently foreseeable with this study. Since the point of care assay that will be used has already been developed, this study will be validating the assay. Thus, the pitfalls of assay development will be avoided. One potential limitation is that this study will rely on client consent for enrollment, but in the experience of the senior investigator, this has been relatively easy to obtain in >80% of patients in which consent is requested. Given that this is a serial admission study, there should not be a problem obtaining high numbers of subjects, but the number of patients with sepsis will be variable.

Awardee: Elizabeth Carbone V'13
Mentor: Dr. Larry Carbone
Award Type: NIH
Research Project: Sustained-Release Buprenorphine's Duration of Anti-Nociceptive Action in Balb/c and SWR Mice.

Summary: Buprenorphine, an opioid with partial mu-agonist activity, is a commonly used analgesic for laboratory mice undergoing surgical procedures. Available formulations of buprenorphine-HCl are effective for no more than 6-8 hours and must be re-administered for continued analgesia. A long-acting buprenorphine would reduce mice's stress of handling and provide uninterrupted analgesia, an important consideration for times of day when labs are unstaffed. A new formulation of sustained-release buprenorphine is claimed to be effective for 72 hours in dogs, but has not yet been studied in mice.

This study will assess the anti-nociceptive effects of a single injection of SR-buprenorphine, buprenorphine-HCl, and saline over 72 hours using the hot plate assay, a commonly used method of measuring opioid analgesia. In this assay, the latency for the mouse to flutter or lick her hind paw in response to heat is measured. Subjects will be young adult females of the Balb/CJ and SWR/J strains, two strains that have been shown to vary in opioid sensitivity. We hypothesize that SR-buprenorphine will have a longer duration of action in both strains, and that both buprenorphine formulations will have longer durations of action in SWR/J mice than in Balb/cj mice. If SR-buprenorphine does have a longer duration of action than buprenorphine-HCl, future studies can test this formulation in post-operative mice to determine whether it provides sufficient overnight analgesia.

Awardee: Yamini Chalam V'14
Mentor: Dr. Gretchen Kaufman
Award Type: US Army
Research Project: Nutritional Analysis and Comparison of Diets Offered to Captive Elephants in Nepal

Summary: The main objective of this study is to analyze the diets offered to the captive elephants in Nepal in order to determine the nutritional value of the diet. This will involve gathering background data on the elephant and the diet, chemical analysis of their feed and supplements, and body condition scoring.

The study will be conducted in the buffer zone of the Chitwan National Park, within the vicinity of Sauraha, located in the Chitwan District of Nepal. Approximately 160 of the 200 captive elephants of Nepal reside in this general area, under government care or private ownership. Data will be collected from elephants from a variety of settings including the government national park, the conservation breeding center, luxury and budget hotels, as well as those elephants under independent ownership.

The data collection and analysis will be broken down into three steps. First, the owner or handler (Mahout) will answer a questionnaire for an individual elephant in order to gather background data on the elephant and their current diet. Second, feed samples will be obtained from each elephant and chemically analyzed to quantify the presence of eight important nutritional components. The presence of these components among the different diets will be compared to identify any dietary trends. Third, the body condition of each elephant will be analyzed and scored to determine whether there is a correlation between dietary nutrition and body condition. The analysis will be used to identify nutritional deficits and help formulate dietary guidelines for captive elephants.

Elephants have a long history in Nepal and play a role in their cultural and religious traditions. The drastic decline in wild elephants over the last 50 years prompted the Nepalese government to institute captive elephant breeding programs for their protection and survival. These efforts are dependent on the health of the elephant, as disease and reproductive failure threaten captive elephant populations. Establishing good nutrition for these elephants is crucial to improving their breeding potential and decreasing their susceptibility to disease.

Awardee: Acelyn Colella V'13

Mentor: Dr. Sandra Ayres

Award Type: NIH

Research Project: Following Follicular Patterns During, Before, and After the Use of a Short-Term Progesterone Priming Protocol in Anestrus and Late Transition Goats and Determining if this Protocol Results in Viable Pregnancies

Summary: Estrogen synchronization and embryo formation have been achieved in goats during anestrus and the early transition period using a short-term progesterone priming protocol. We propose to further develop this protocol by determining appropriate timing of follicle stimulating hormone injections, using ultrasonography to follow ovarian follicular patterns before, during and after the progesterone priming protocol, and discover if a short-term protocol can be used to produce viable pregnancies. Our aim is to produce a successful breeding protocol to use during the nonbreeding season in goats (in anestrus and transition) that reduces both the amount of hormone delivered and the amount of time needed to perform the protocol.

Awardee: Melissa De Fabrizio V'14

Mentor: Dr. Joann Lindenmayer

Award Type: US Army

Research Project: The Use of Antibiotics in Small Ruminants in Muchila, Zambia

Summary: The aim of this study is to investigate the use of antibiotics and ethnoveterinary alternatives to treat disease in small ruminants in the village of Muchila, Zambia. Surveys, focus groups and direct observation will be used to attain information from local farmers and animal health professionals. Goat and sheep production are increasing in Zambia because they are easy to manage, cheap to buy and raise, are better adapted to the Zambian semi-arid climate, and are more resistant to diseases than cattle. Though many farmers chose to raise small ruminants because of their hardiness, these animals are still susceptible to many diseases. Some common small ruminant diseases in Zambia that can be treated include pneumonia, footrot, blackquarter, tetanus, mastitis, trypanosomosis, mange and tick, flea and louse infestations, which can be treated through the use of antibiotics or by traditional veterinary practices. So far there has not been any research done on antibiotic use in small ruminants in Muchila or in the Namwala district, therefore this project will be an important preliminary study on small ruminant production, health and antibiotic treatments used in this specific area. Qualitative and quantitative information will be gained through the use of participatory questionnaires. To provide more in-depth qualitative information, two gender-specific focus group discussions will be arranged with 10-15 community members. We hypothesize that antibiotics will rarely be used among the rural farmers of Muchila, and that traditional ethnoveterinary practices will be viewed as more effective and economical alternatives in treating disease in small ruminants.

Awardee: Nahvid Etedali V'13

Mentor: Dr. Claire Sharp

Award Type: NIH

Research Project: Evaluation of a Point-of-Care Test for Serum NT-pCNP as a Diagnostic Biomarker for Sepsis in Dogs Presenting for Emergency Care

Summary: The purpose of this study is to evaluate of a point-of-care (POC) test for serum NT-pCNP (the amino terminal of pro-C-type natriuretic peptide) as a diagnostic biomarker for sepsis in dogs presenting for emergency care.

Sepsis, the systemic inflammatory response to infection, is associated with very high morbidity and mortality in dogs. Prompt initiation of antibiotic therapy has been shown to significantly reduce mortality rates in patients with sepsis however it is difficult to clinically differentiate sepsis from other systemic inflammatory states (NSIRS, non-infectious systemic inflammatory response syndrome), often resulting in delayed treatment. Thus, it is important to find a rapid and accurate biomarker that can help differentiate sepsis from other systemic inflammatory states. NT-proCNP has shown promise in its ability

to delineate sepsis from NSIRS, but until recently has only been available in a laboratory setting. By validating a POC test for NT-pCNP we hope to enhance its clinical utility.

The study will be a prospective, serial admission study of all dogs seen through the Emergency Room at the Tufts Cummings School of Veterinary Medicine Foster Hospital for Small Animals. Blood will be collected into a red top tube, and serum will be removed following centrifugation. 250 µL will be used for a POC test for NT-pCNP that has been developed by a commercial laboratory (Veterinary Diagnostics Institute [VDxI], Simi Valley, CA), and the remainder will be placed in a bar coded tube and frozen at -80°C for shipment to VDxI for batch analysis by ELISA. Dogs will have a complete physical exam performed by the receiving ER veterinarian at time of presentation. A SIRS score will be determined for each dog, and additional diagnostics will be performed at the discretion of the attending veterinarian in order to differentiate sepsis from NSIRS.

Awardee: Ariel Fagen V'13

Mentor: Dr. Gretchen Kaufman and Dr. Sarad Paudel

Award Type: NIH

Research Project: A Feasibility Study: Determining the Effectiveness and Applicability of Secondary Positive Reinforcement Training Elephants (*Elephas maximus*) in Nepal

Summary: Zoo trainers have begun to rely on positive reinforcement training to teach animals to voluntarily participate in needed husbandry and veterinary procedures in an effort to increase reliability, practicality and welfare. However, positive reinforcement techniques are not yet the primary method of use by the handlers of the captive elephants in Nepal. The main objective of this project is to determine the effectiveness of secondary positive reinforcement training of free-contact adult elephants in Nepal. Elephants will be trained to voluntarily participate in a trunk wash for the purposes of tuberculosis testing as well as other basic veterinary medical procedures. Additionally, we aim to assess the level of acceptance of this training into the traditional Nepali setting, given cultural predispositions and practical considerations. The primary goal will be achieved by enrolling four to eight elephants in a secondary positive reinforcement training program that gradually demands increasingly complicated behavior tasks. We will statistically measure the success of the elephant training by their completion of each phase of the training program. The secondary goal will be achieved through subjective assessment based on conversations, interviews and exemplified willingness of the local handlers to engage and learn this new training process.

Awardee: Anne Flemming V'13

Mentor: Dr. Scott Marshall and Dr. Joann Lindenmayer

Award Type: US Army

Research Project: Quantifying the Spatial Distribution and Population Size of Feral Cat Colonies in Rhode Island as a Function Population Management Strategies

Summary: The increase in the size and number of feral cat colonies in the United States is a growing concern for public health officials, animal welfare organizations, wildlife advocates and the general public. Feral cats can carry zoonotic and infectious diseases that affect human, companion animal and wildlife health. In addition, wildlife advocates and management professionals are concerned about feral cats' hunting behaviors having a negative impact on native bird, small mammal and reptile populations. To date, studies on feral cat population management strategies such as trap-neuter-release and trap-euthanize have been limited to a single, or small number of colonies, and have reported conflicting results.

The proposed study will provide baseline data on the locations of a representative sample of feral cat colonies in Rhode Island, an estimate of their current populations, and the management approach, if any, used for each colony. Locations of feral cat colonies and associated management strategies will be identified by conducting interviews with individuals with knowledge of the specific feral cat colonies in Rhode Island. Using a Geographic Information System (GIS), a statewide map of the location and spatial distribution of representative feral cat colonies will be developed. A Lincoln-Peterson Index will be used to estimate population size at each colony, where animals visually identified on day 1 are treated as "marked," since no physical capture of animals is planned. Thus, animals seen on day 2 that were not detected on day 1 would be assumed to be "unmarked." The L-P index uses the ratio of marked to unmarked animals to estimate population size. The GIS maps will be amended to include estimates of feral cat colony population size based on L-P indices. In addition, estimates of cat density (cats/mile²) per colony's home range will be provided for select colonies around the state (exact methodology will be discussed and further refined with the RI Feral Cat Working group). Descriptive statistics of the colony data by management approach will be calculated using SPSS release 18.0.0.

This information will be used in a subsequent study in 2012 to evaluate the efficacy of the various management approaches applied, and ultimately develop a comprehensive evidence-based recommendation for feral cat colony management in Rhode Island. Given the absence of any similar comprehensive, statewide evidence-based analysis of this issue, other communities dealing with feral cat management issues may benefit from the findings of this research.

Awardee: Max Gordon V'14

Mentor: Dr. Siobhan Mor

Award Type: US Army

Research Project: Evaluating Cost-Effective Rabies Treatments in Uganda

Summary: Study Objectives: Rabies is a zoonotic disease endemic to Uganda that is considered to be entirely preventable when appropriate measures are taken. Utilizing a two-step process this study aims to determine the most cost effective preventative rabies treatment for Uganda. This study also intends to identify the factors that account for the Moyo district's high incidence of rabies.

Hypothesis: The cost of vaccinating the main rabies reservoir, the domestic dog, is the most cost effective preventative rabies treatment for Uganda.

Experimental Design and Significance: This experiment will investigate the cost of treating rabies by either post exposure prophylaxis vaccine in the human population or vaccinating the domestic dog population in Uganda.

The results of this study will provide a recommendation for combating rabies in rabies endemic Uganda.

Awardee: Jonathan Grindley V'13

Mentor: Dr. Arthur Donohue-Rolfe

Award Type: NIH

Research Project: Surveying *Leptospira Interrogans* Prevalence Among Domestic Canine and Peccary Populations in Madre de Dios, Peru

Summary: The Peruvian region of Madre de Dios is undergoing modernization resulting in a more intricate dynamic between domestic and wild animals therein. Feral and domestic animals in Peru have been known to carry such infectious diseases as *Leptospira interrogans*, a bacteria with the potential to cross-infect wild animals. Two protected reserves of the Southern Peruvian Amazon, Bahuaja-Sonene National Park and Tambopata National Reserve, are at the center of the Madre de Dios region, but lack a current management strategy which takes into account the impending stress that growing domestic and feral populations will put on the wildlife native to the rainforests.

My project will be a surveillance study intended to create a baseline of data regarding the prevalence of *Leptospira* serovars in the Madre de Dios region. The mammals being tested are feral and domestic canine and peccaries. With an understanding of which infectious diseases are most concentrated

among nearby domestic animals, appropriate plans can be implemented to minimize spread and protect wildlife against disease.

Blood/serum samples will be collected following a physical exam of test animals, and samples will be brought to the National Institute of Health (INS) lab in Peru, where microscopic agglutination assays (MAT) and RT-PCR will be run on the samples to determine *Leptospira* prevalence and strain proportion. The data will serve to create a baseline of data on *Leptospira* in domestic and feral animals in Southern Peru.

Awardee: Jessie Hamilton V'14

Mentor: Dr. Robyn Alders

Award Type: US Army

Research Project: Identification of Constraints Impacting Poultry Production in Muchila, Zambia

Summary: This project aims to identify and document the major constraints to rural poultry production in the village of Muchila, Zambia. A combination of household interviews and focus group discussions will be used to collect data representing the community members' perceptions about various topics relating to poultry production. Poultry production is pivotal in the lives of Zambians culturally, economically and for their health. Unfortunately, there are many constraints that impede poultry production. This can be devastating for families, especially for those who depend on poultry to generate a significant portion of their income. Research to identify the main constraints impacting production in the village of Muchila, in the Namwala district, has not yet been conducted. This project will serve to provide important baseline data that will allow for the development and implementation of improvement programs in Muchila in support of increased production.

Awardee: Katherine Holmes V'13

Mentor: Dr. Jean Mukherjee and Dr. Kevin Lindell

Award Type: US Army

Research Project: Surveillance of *Brucella* spp. in the goat population of the Dominican Republic

Summary: **Aim 1:** Determine prevalence of Brucellosis in goats within selected regions of the Dominican Republic. **Aim 2:** Identify husbandry practices and meat and milk handling processes that could be improved to prevent transmission of Brucellosis. **Aim 3:** Provide simple recommendations to prevent Brucellosis transmission.

Animals: Privately-owned, rural, small-herd goats from provinces of the Dominican Republic with the highest, median, and lowest documented incidence of Brucellosis within the human population.

Procedures: Serological testing will be performed using the Rose Bengal Serum Agglutination Test. A questionnaire of the goat tenders for assessment of customary goat management practices will be conducted verbally. Information for prevention measures against zoonotic disease transmission will be provided verbally and in a brochure.

Relevance: Brucellosis is a zoonotic disease that affects mammals globally. More than 500,000 humans are affected annually. Between January of 2008 and of June 2010, 650 humans in the Dominican Republic were diagnosed with Brucellosis. As the livestock population is a very possible reservoir, serological testing to assess the prevalence of *Brucella spp.* in the goat population would provide evidence that *Brucella* is present in the goat population in the Dominican Republic. At present, there is no evidence of this investigation in the Dominican Republic. Surveying the goat farmers is of importance. The identification of practices with potential risk for human infection is crucial. These same practices may also perpetuate the disease within the goat population. Obtaining information such as observed clinical signs associated with Brucellosis, dairy product and birthing material handling procedures, and vaccination history would be useful in inference production of disease transmission. Culturally and linguistically-sensitive information on safe animal and animal product handling procedures would aim to prevent future zoonotic disease transmission.

Awardee: Kristy Jacobus V'14

Mentor: Dr. Sandra Ayres and Dr. Joanne Connolly

Award Type: US Army

Research Project: Characterization of the Reproductive Cycle of the Platypus (*Ornithorhynchus anatinus*) Through Non-Invasive Identification of Fecal Hormone Metabolites

Summary: The purpose of my study is to examine reproductive hormone metabolites collected from free-ranging platypuses (*Ornithorhynchus anatinus*) in order to make inferences about the platypus reproductive cycle and to determine the validity of the use of fecal hormones as a noninvasive mode of determining reproductive activity in the platypus. This research will be performed under Dr. Joanne Connolly at Charles Sturt University in Wagga Wagga, NSW, Australia. Platypuses were caught from the Murrumbidgee catchment using a catch and release method. The platypuses were assessed for a variety of physiological parameters, and blood and excreta were obtained and saved. Hormone levels from collected serum have been determined using enzyme immunoassay.

I will use high performance liquid chromatography (HPLC) to assess the estrogen and progesterone metabolites from the feces of these platypuses. This hormone metabolite data will be compared to the previously determined levels of hormones from the blood to determine if there are correlations of hormonal metabolites in the feces to hormone levels in the blood. If correlates are found, it could allow for a non-invasive way of assessing the reproductive cycle in both wild and captive platypuses. This

research is part of an overlying, comprehensive study of platypuses from the Murrumbidgee catchment that is being performed in order to gain an understanding of this specific population of platypuses. The platypus is currently not considered an endangered or threatened species, however, declines in numbers and changes in distribution have occurred since the settlement of Australia by Europeans. Furthermore, captive reproduction of this species has yielded little success further highlighting the need for an increase of our knowledge of their reproduction. By gaining an understanding of their reproductive cycle and through identification of a noninvasive assay for reproductive activity, we may be able to assist in their reproduction both through natural and artificial means in the wild and in captivity to ensure their continued survival.

Awardee: Kelsey Johnson V'14

Mentor: Dr. Patrick Skelly

Award Type: NIH

Research Project: Characterization of the Schistosome Carbonic Anhydrase

Summary: Schistosomes are parasitic worms that infest both wild and domestic animals as well as humans, largely in countries without consistent clean water supplies. The worms live in the blood, where they absorb and ingest nutrients. They cause symptoms ranging from fever and chills to hepato- and splenomegaly, and can survive for years in the body. According to the World Health Organization, schistosomiasis contributes to the mortality of a quarter of million people per year in sub-Saharan Africa alone¹, in addition to equally dramatically affecting both livestock and wildlife.

While a single schistosomiasis drug treatment exists, no vaccine has yet emerged, and reinfection is frequently inevitable. Perhaps the most intriguing aspect of schistosome physiology is their ability to evade the immune system's radar, which is what has brought discovery of a vaccine to a standstill. However, equally pressing and possibly more accessible is the development of a second drug treatment, to counter resistance to the available drug in the worm population as well as to broaden therapeutic options for affected individuals. Our laboratory focuses on understanding how the parasite's host-interactive skin (or tegument) contributes to their success. The major proteins of the schistosome's outer tegument have lately been identified by proteomics², among them the enzyme carbonic anhydrase^{2,3}. Given that this enzyme is located on the surface of the worm's body, it is likely that it interacts with the surrounding host environment in various but essential ways—and this makes it a tempting target for disabling the parasite.

This research proposal has three specific goals, focusing on schistosome tegumental carbonic anhydrase (CA). First, we aim to test the enzyme for host-interactive activity; that is, to determine if the enzyme indeed operates on the outside of the worm. Second, we aim to silence the carbonic anhydrase gene with RNAi, and observe whether the parasites live, die, or are otherwise visibly impacted *in vitro* and *in vivo* (specifically in mice). Third, we aim to test known carbonic anhydrase inhibitors, such as acetazolamide⁴, for their effects on the worms, again in culture versus in mice.

Based on the results of these approaches, the schistosome carbonic anhy-drase enzyme may be identified as a viable target to treat schistosomiasis.

Awardee: Jay Katz V'13

Mentor: Dr. Arthur Donohue-Rolfe

Award Type: NIH

Research Project: Comparing Methicillin-Resistant *Staphylococcus aureus* (MRSA) Prevalence and Strain Type in Peru Between Pecari (*Tayassu tajacu*) and Domestic Pigs

Summary: Methicillin-resistant *Staphylococcus aureus* (MRSA) in pigs is an area of global concern. Different strains of MRSA, specifically ST398 and ST8, have been isolated throughout Europe, Asia and the Americas. In order to better understand MRSA and prevent outbreaks in local communities, a better understanding of which strains are affecting which species, and the zoonotic potential of the disease need to be understood.

Although extensive research has been done on MRSA in the European pig and the zoonotic potential has been clearly documented, there are no studies on MRSA in Pecari (*Tayassu tajacu*). This study aims to identify the prevalence of MRSA strains in Pecari (*Tayassu tajacu*) in the Amazonian region of Peru, where pecari are a common rural livestock. This study also aims to identify the origin of presenting MRSA strains. To this end, isolated MRSA strains will be verified as either MRSA ST398, a MRSA strain associated with livestock origins, or if the strains are MRSA ST8 – a strain of MRSA linked to human origins.

For this study, samples will be collected via nasal and oropharyngeal swabs. Samples will then be transported to Lima and plated at San Marcos veterinary School in Lima. Suspicious colonies will be tested via colony morphology, Gram stain, catalase and coagulase to confirm MRSA and PCR and pulse field electrophoresis will be used to determine virulence factors and specific strain types.

Awardee: Joe Khodari V'13 – University of Pennsylvania

Mentor: Dr. Dominique Penninck

Award Type: Merial Veterinary Scholars Program

Research Project: Ultrasonography of Colonic and Cecal Neoplasia in Cats

Summary: A few reports in the veterinary literature have addressed the ultrasonographic appearance of tumors in small animals. Currently, no studies evaluating the place of ultrasonography in evaluating colonic and cecal tumors in cats, are available.

This retrospective research project reviewing cases collected since 2004 aims to describe the demographics, clinical presentation and ultrasonographic features of the most commonly encountered colonic and cecal tumors affecting cats. All of these features will be organized on a excel table.

The ultrasonographic and histopathological findings will then be compared in order to extract possible features such as extension/size of the lesion, regional lymphadenopathy, and metastasis that can assist in better ranking these lesions prior to final diagnosis. Whenever available, the treatment choice and outcome will also be evaluated. These features could also assist the clinician in choosing the next suitable procedure (ultrasound-guided core biopsies versus surgical biopsies).

This retrospective descriptive study will complement the current literature by addressing and comparing both the imaging and histopathological aspects of these tumors.

Awardee: Sarah Lim V'14

Mentor: Dr. Lois Wetmore

Award Type: US Army

Research Project: Optimizing the Use of Pulse Oximetry and Assessing its Usefulness in Detecting Decreased Pulmonary Function in Elephants with Tuberculosis

Summary: Captive elephants have historically been an integral part of Nepalese culture and society. Tuberculosis caused by *Mycobacterium tuberculosis* or *Mycobacterium bovis* has re-emerged as an important infectious disease in many domestic and wild animals, especially captive elephants. A seropositive rate approaching 25% has been determined with ongoing systematic testing of nearly all the captive elephants in Nepal. In these infected elephants, the major pathology occurs in the lungs and thoracic lymph nodes. Though pulmonary function is affected by the sequelae of the disease, clinical signs are not always apparent. Significant efforts have been made to find increasingly sensitive tests to detect *Mycobacterium* infection in elephants, as well as to develop effective management strategies to limit spread of the disease between humans, cattle, and elephants. Early diagnosis would help reduce this risk of transmission and allow for earlier implementation of treatment.

The use of pulse oximetry as a non-invasive mode of assessing oxygenation is becoming more prevalent in anesthetized animals and in humans with compromised pulmonary function associated with pneumonia and tuberculosis. Currently, there is no recommended method of assessing lung function in elephants. The purpose of the initial phase of the study will be to find the optimal combination of a pulse oximeter and a sensor placement site on elephants that produces the most reliable oxygen saturation readings. This combination will be adopted in the second part of the study that will test the usefulness of the technology in detecting decreased pulmonary function in elephants with tuberculosis. It will also be used to monitor oxygenation in TB-positive elephants showing clinical signs or undergoing treatment over the course of six to eight weeks.

Pulse oximetry offers a noninvasive method to detect hypoxia as a result of a decrease in pulmonary function due to the sequelae of tuberculosis. This technology would be useful in identifying animals with a high probability of pulmonary disease and could ultimately be used as an adjunct to more specific and sensitive serological diagnostic techniques for tuberculosis.

Awardee: Denise Lin V'14

Mentor: Dr. Joann Lindenmayer

Award Type: NIH

Research Project: Assessing Risk of Wild Animal Ownership in Thailand

Summary: In recent years, Thailand has shown a trend of increasing exotic pet ownership as a status symbol for the burgeoning middle and upper classes. These animals may be wild-caught or farmed, and include a diverse range of bird, mammal, reptile, and fish species. It is imperative to proactively monitor diseases that may arise in exotic and wild animal pets and to educate pet owners about possible dangers to humans and endemic wildlife, especially since they are uniquely placed to assist ongoing monitoring efforts. Therefore, the purpose of this project is to identify and characterize risks and routes of exposure to known and emerging zoonotic diseases in the context of wild and exotic animal ownership in Northeast Thailand, to describe clinical presentation and suspected disease patterns among wild animal or exotic pets, to evaluate potentially relevant socioepidemiologic factors characteristic of wild animal or exotic pet owners, and to use that data as a baseline for future in-depth investigation and to predict the exposure impact on population health if the popularity of exotic pets in Thailand continues to rise.

Awardee: Nicole Mazzaschi V'14

Mentor: Dr. Elizabeth Byrnes

Award Type: NIH

Research Project: Transgenerational Effects of Opioid Exposure

Summary: Maternal adolescent opioid exposure causes changes in the neuroendocrine and reward pathways in the female user and transgenerational effects in the neuroendocrine, reward, and locomotor pathways of her future offspring. The development of these pathways become entwined and regulated by the endogenous opioid system during adolescence. Therefore, high levels of exogenous opioids during adolescent development systems likely alter the endogenous opioid system and thus modify opioid-mediated functions. As many women could have a history of drug use prior to starting a family, understanding how prior drug experiences impact future offspring will help inform decisions

regarding pain management and possible interventions during pregnancy or during development. The purpose of the present proposal is to begin to identify changes in gene transcription associated with this altered behavioral phenotype.

Recent research with rats has shown that male offspring of females exposed to morphine during adolescence had significant changes in locomotor activity while in a novel environment. These shifts in activity are age dependent, with hyperactivity observed in adolescent males and hypoactivity observed in adult males. Regulation of locomotor activity involves many process and pathways, including some that are regulated by the endogenous opioid system. Dopamine is involved in many aspects of regulation of this system. It is well known that dopamine is also involved in the reward pathway, which is also regulated by opioids.

I aim to prove that these male offspring have locomotor activity correlated with increased or decreased dopamine levels and/or dopamine receptor expression. I will conduct locomotor testing on F1 male rats whose mothers were exposed to opioids in their adolescence. Testing will be performed during early-, mid-, and late-adolescence as well as adulthood. In addition to behavioral analyses, separate groups of F1 males will be sacrificed for examination of gene expression and dopamine content in the prefrontal cortex, nucleus accumbens, striatum and ventral tegmental area. Expression studies will focus on alterations in DA receptor subtypes.

Awardee: Cecilia Murch V'13

Mentor: Dr. Joann Lindenmayer

Award Type: US Army

Research Project: Rabies Prevention in Kathmandu, Nepal: Evaluating the Efficacy of Canine Sterilization and Vaccination

Summary: Rabies is a zoonotic viral disease that poses a substantial public health threat to developing nations. Although rabies is preventable, tens of thousands of individuals die from the disease each year. In countries where rabies is endemic, there is the added challenge of having limited resources with which to combat the disease. Barriers to effective disease control include poor reporting systems, low levels of public awareness, and sparse availability of post exposure care. Many cases of rabies go undiagnosed, misdiagnosed, or unreported. As a result, nations are rarely able to determine the true burden of the disease, thus perpetuating the cycle of under-recognition and inadequate action.

Evaluating the actual cost of the disease and the efficacy of current control methods is essential in order to bolster governmental and institutional support for prevention programs. Because dog bites are the leading cause of rabies transmission, recent prevention strategies have focused on the control and vaccination of dog populations. In order to demonstrate the efficacy of such programs, an association must first be drawn between the implementation of dog sterilization and vaccination programs and a decline in the transmission of rabies.

In Nepal, rabies is thought to claim over 200 lives each year. Over the past six years, prevention efforts have consisted of mass vaccination and sterilization of community dogs, which has resulted in a steep decline in their population. The goal of the proposed study is to evaluate the effectiveness of current prevention efforts as they relate to the dog population and the occurrence of dog bites and reported rabies cases. Characterizing the relationship between the dog population and rabies transmission will be key in establishing support for the continuation of current prevention programs.

Awardee: Lindsay Nussbaum V'13

Mentor: Dr. Patricia Provost, Dr. Patrick Skelly, Dr. Jean Mukherjee and Dawn Meola

Award Type: NIH

Research Project: Prevalence of Benzimidazole Resistance in the Equine Patient Population at the Tufts Cummings School of Veterinary Medicine

Summary: Cyathostomes are important gastrointestinal nematode parasites of horses. Traditionally, infection has been controlled with benzimidazole (BZ) drugs, but widespread resistance to this drug has recently been reported. To date there has been little to no characterization of cyathostome populations in the northeastern United States. *The aim of this study is to test the hypothesis that, as in other areas of the US, there is a high prevalence of genetic BZ resistance in the equine cyathostome population in New England.*

Resistance arises due to simple single base mutations in the BZ target protein, beta tubulin. A genetic assay for resistance was developed by Lake et al in 2009 which involves amplifying the relevant fragment of the tubulin locus by PCR and sequencing the product. This technique will be employed in the present study to determine if and the extent to which the anthelmintic resistance (AR) trend has affected the strongyle population of the horses that are treated at the Tufts Cummings School of Veterinary Medicine (TCSVM) in North Grafton, Massachusetts. In this study, fecal samples from individual horses will be collected. Small strongyle eggs will be isolated from each horse and genomic DNA will be extracted. The genetic assay developed by Lake, et al. will then be employed to determine the prevalence of benzimidazole resistance.

The rise of anthelmintic resistance in equine parasitic nematodes has forced veterinarians to re-evaluate traditional deworming protocols. Decades of frequent and indiscriminate anthelmintic use has created an environment in which resistant worms are selected. Small strongyles, once considered to be of little concern, have demonstrated resistance to benzimidazole drugs across the world. This poses a huge threat not only to horses harboring these resistant populations, but to other herd members as well. It has become clear that in order to effectively and sustainably protect horses from intestinal parasites, the characterization of individual worm populations is essential, and those horses which are most heavily infected and carrying resistant worms must be targeted. The data collected from this study will be valuable in directing clients in the development of future deworming protocols, and will also serve to better characterize the growing trend of cyathostome benzimidazole resistance.

Awardee: Casey Penrod V'14

Mentor: Dr. BB Verma

Award Type: US Army

Research Project: Studies on the Effect of Teat Dipping Post-Milking of Lactating Crossbreed Cows in Control of Subclinical Mastitis

Summary: Bovine mastitis is the most costly disease of dairy cattle due to economic losses from reduced milk yield, treatment cost, increased cost of labor, milk withholding after treatment, death, and premature culling due to loss of productivity of the mammary gland. Subclinical mastitis is often overlooked by farmers as no visible signs of disease are evident and changes in the milk and in the gland can go undetected to the level of the loss of both production and the gland. Mastitis is caused by a variety of pathogens, most notably bacteria such as *Staphylococcus aureus*, *Streptococcus agalactia*, *Streptococcus dysgalactia*, *Streptococcus uberis*, and *Escherichia coli*. At most commercial farms regular indirect testing of individual milk samples or pooled milk samples is done to detect subclinical mastitis, however some farmers are not aware of certain hygienic measures like post-milking teat disinfection, to control the spread of pathogens.

India stands number one globally in milk production by the number of animals in production, and while control measures have been taken to prevent occurrence of infectious disease, mastitis remains a challenge. Studies have indicated that approximately 10-50% of India's cows suffer from subclinical mastitis. Realizing the importance of the disease in dairy economics for the farmers, it is absolutely necessary to monitor and detect subclinical mastitis, take necessary measures for control, and reduce the level of disease within the herd.

The incidence of subclinical mastitis will be determined among a dairy herd at an organized farm near Kolkatta, through the indirect California Mastitis Test. Once I have determined a baseline prevalence of infection of quarters throughout the herd, I will introduce the farmer to the method of postmilking teat-disinfection. The farmer will be advised to dip teats in antiseptic after both the morning and evening milking. I will return to the farm weekly to conduct further indirect tests on the herd throughout the duration of my stay to determine the effect of the teat-disinfection method on the incidence of subclinical mastitis within the herd, as determined by somatic cell count.

Awardee: Keiko Petrosky V' 13

Mentor: Dr. Barbara Davis

Award Type: Independent Research/Morris Animal Foundation

Research Project: Evaluating Grading Systems for Accurate Prognosis of Canine Cutaneous Mast Cell Tumors

Summary: Clinical signs of cutaneous mast cell tumors can vary from easily cured isolated tumors to fatal metastases; failure to accurately predict the outcome can result in patients being subjected to painful and expensive treatments unnecessarily or conversely not getting the intensive treatment they need. Our goal is to determine which method will provide the most accurate prognosis for canine patients diagnosed with cutaneous mast cell tumors in order to simplify outcomes assessment and aid in the selection of appropriate treatment options. First, we will assemble a database of all cutaneous mast cell tumor biopsies submitted to the Tufts Cummings School of Veterinary Medicine Section of Pathology in 2001-2010. Biopsy samples from patients with four-year follow-up data and sufficient tissue for analysis will be examined using a variety of histological and biochemical methods. Each method will be evaluated for statistical significance in predicting time to metastasis and survival time. Based on a recent study which found that the gold standard three-grade method to be wanting in consistency and prognostic value, we will test our hypothesis that a simpler two-grade method will provide better prognostic value. If time and resources permit, other methods previously found to have high prognostic value, including immunohistochemistry and morphometric analysis of KIT staining patterns, proliferation markers Ki67 and AgNOR, and immunohistochemistry and PCR to determine the presence of c-KIT mutations, will also be evaluated.

Awardee: Natasha Pogue V'14

Mentor: Dr. BB Verma

Award Type: US Army

Research Project: Seroprevalence of Caprine *Brucella melitensis* in West Bengal, India

Summary: *Brucella melitensis* infection (Brucellosis) is an important re-emerging disease that has become a neglected endemic in India. Its zoonotic potential and harm to the Indian economy makes it a significant veterinary and public health concern. With an estimated 124.4 million goats and 1.1 billion people in India, the prevalence of this disease should be known, but unfortunately, it has not been determined.

My study will be located in West Bengal, India where I will be examining seroprevalence of *B. melitensis* in goats. I will be collecting blood samples from 300 goats. My study sample will be from 150 randomly selected privately owned goats in villages near the West Bengal University of Animals and Fishery Science, and my control sample will consist of 150 randomly selected government owned goats that are managed with preventive measures against infection. The composition of both the control and study population will be similar based on vaccination status, age, sex and breed to control for these confounding variables. Goats considered eligible for both populations will include all unvaccinated goats over 6 months of age and *B. melitensis* vaccinated Rev-1 vaccinated goats older than 18 months.

A pre-tested interview questionnaire will be administered to goat owners and/or managers at the time of sample collection to gather demographic information as well as a complete animal history from both sample populations. It will also assess the owner/manager's knowledge of animal husbandry as well as animal and human risk factors for brucellosis. Serum samples collected will be insulated in a portable cooler and then tested at the veterinary school's laboratory by the Rose Bengal plate agglutination test,

and if positive, will be verified with standard tube agglutination tests. If the doe is lactating, milk samples from each teat will be collected and tested by iELISA at the school laboratory. The proper officials will be notified of any positive cases.

In order to protect the goat industry and humans against *Brucella* infection there needs to be continuous and accurate surveillance of *B.melitensis*. Since *B.melitensis* seroprevalence studies have been limited in India my study will help to expand baseline surveillance and determine the prevalence of *Brucella* in goats raised by private farmers as well as those under control of the government. It will identify risk factors and demonstrate the need to institute preventive animal husbandry among the private goat farms.

Awardee: Eliza Reiss V'14

Mentor: Dr. Kristine Burgess

Award Type: NIH

Research Project: Incidence of Canine Splenic Hemangiosarcoma in Dogs Presenting to the Cummings School of Veterinary Medicine with Suspected Splenic Hemangiosarcoma: A Retrospective Study

Summary: Objective: To retrospectively evaluate dogs who presented to the Foster Hospital for Small Animals at Tufts University with a splenic mass and clinical signs that could indicate hemangiosarcoma. All patients had their splenic tissue evaluated upon splenectomy or necropsy. We hope to determine the incidence of splenic hemangiosarcoma in these patients, as well as other common splenic diseases that represent alternate diagnoses. Since hemangiosarcoma is a uniformly fatal cancer, it is crucial to distinguish it from benign splenic growths or less aggressive types of cancer that may present similarly. Also we intend to characterize the relative survival times of dogs who were not euthanized and underwent a splenectomy with or without chemotherapy treatments.

Awardee: Alexander Robb V'13

Mentor: Dr. Michael Kowaleski

Award Type: Morris Animal Foundation

Research Project: Accuracy, variability, and reproducibility of femoral varus and femoral torsion measurement using radiographic and computed tomographic imaging in clinically abnormal dogs.

Summary: Medial patellar luxation (MPL) is one of the most common orthopedic problems of the canine stifle. Unfortunately, recent studies have shown that traditional methods for diagnosis and treatment of MPL may be inaccurate and unsuccessful, respectively, with a high rate of relaxation after surgery. Novel surgical strategies have focused on femoral varus correction via distal femoral osteotomy (DFO). This is done when the anatomic Lateral Distal Femoral Angle (aLDFA) is greater than the reference range and reduces the risk of post-operative patellar relaxation. Because DFO is a complicated and expensive procedure, it is imperative to establish an accurate and repeatable method for measuring aLDFA and Femoral Torsion Angle (FTA), as torsion likely contributes to the distal angulation of the femur, so that DFO is performed accurately and when necessary.

The purpose of this study is to establish the accuracy, variability, and reproducibility of aLDFA and FTA measurement using radiographic and computed tomographic (CT) imaging, compared to the reference standard of digital photography of the anatomic specimens, in clinically abnormal dogs. We will do so by using 10 cadavers, with femurs plated such that aLDFA is clinically abnormal. Each femur will be radiographed, reconstructed in a 3D model from CT images, and then dissected free of soft tissues for a digital photograph. From these images, two experienced orthopedic surgeons and one veterinary student will calculate aLDFA and FTA and these calculations will serve as the data for the study. Calculations of aLDFA and FTA from the radiographic and CT images will be compared with those from the digital photographs to evaluate accuracy, variability, and reproducibility of each method relative to the reference standard. It is our hypothesis that the CT 3D reconstruction technique will prove to be more accurate than that using radiographs, for clinically abnormal femurs.

Awardee: Emily Roye V'13

Mentor: Dr. Emily McCobb and Dr. Joann Lindenmayer

Award Type: US Army

Research Project: Assessment of Handwashing Protocols and Attitudes at Boston Area Animal Shelters

Summary: It is known that hands serve as mechanical vectors for bacterial, viral and parasitic diseases. This is the rationale behind hand-washing protocols in the hospital and clinic settings. Animal shelters vary greatly in design and capacity, but they can house large numbers of animals in relatively small spaces. Shelter animals are often subject to high levels of stress and are prone to high levels of infectious disease. Some of the diseases and parasites carried by these animals can be transmitted to humans and many are transmissible via human hands to other animals in shelters. Despite this, little is known about the frequency with which shelter personnel wash or sanitize hands.

This exploratory study aims to examine the frequency with which volunteers and staff members wash their hands between handling animals. Five shelters representing different facility design and operational types will be selected and each shelter chosen will be visited at specified times for one week. During that time, volunteers and staff will be told that they are being observed for a study, but the precise nature of the study would not be revealed. At the end of each observation period, willing

volunteers will be asked a series of questions which will include questions about their knowledge of the shelter's hand washing protocols, and assess their knowledge and attitudes about the importance of hand washing.

Furthermore, a sample of 25 shelters will be chosen at random to receive a questionnaire about hand – washing protocols, training in hand washing, and use of exam gloves.

This information will provide much needed information about hand-washing in the shelter environment, and can help inform further studies, including more targeted studies about hand-washing compliance in shelter settings.

Awardee: Marian Schenk V'13

Mentor: Dr. Raimon Duran-Struuck and Dr. Andy Hoffman

Award Type: NIH

Research Project: In vivo development of aggressive swine hematopoietic tumors for adoptive transfer studies.

Summary: The goal of this project is to expand *in vivo* swine spontaneous lymphohematopoietic neoplasias in immunodeficient mice for the development of aggressive tumor clones. The overall goal of the project is to use immortalized and characterized aggressive clones to be injected into major histocompatibility complex (MHC) matched pigs and study anti-leukemia therapies. Two swine spontaneous tumors, a chronic myeloid leukemia (CML) from an inbred “DD” haplotype pig and a B-cell lymphoma (from an animal that developed post transplant lymphoproliferative disease (PTLD)), will be utilized.

CML and PTLN are neoplastic disorders that effect both humans and animals. CML is a common spontaneous myeloid tumor that occurs with higher incidence in the adult population (Jemel et al 2009) while PTLN develops from B-cells infected with a herpesvirus which becomes reactivated. In the case of swine, porcine lymphotropic herpesvirus (PLHV) during a state of immunosuppression induces PTLN (Huang et al 2001). Both diseases are of important human clinical relevance and development of a reliable large animal tumor model to investigate novel cellular and pharmacological anti-tumor therapies is crucial.

The availability of the MGH MHC defined miniature swine herd which have been inbred for over 30 years, and with a current coefficient of inbreeding >94%, provides us with the opportunity to develop a large animal tumor model for the first time (Mezrich et al 2003). We have selected two spontaneous tumor cell lines (13271 PTLN and 14736 CML) to expand into NOD/SCID Tg porcine IL-3/GCSF/SCF and NOD/SCID γ -/- mice for the development of an aggressive subclone (Cho et al 2007, Ito et al 2002). Tumors that grow in mice will be harvested and serially transferred for further expansion. The most aggressive subclones will eventually be transferred to MHC matched swine.

Awardee: Stanley Sowy V'14 – Western University

Mentor: Dr. Abhineet Sheoran

Award Type: US Army

Research Project: Neutralization of Stx2 by scFvs

Summary: Infection with Shiga toxin (Stx1)- and Stx2-producing *Escherichia coli* (STEC) is the most significant cause of hemolytic uremic syndrome (HUS), the leading cause of acute renal failure in children. While Stx1 and Stx2 are similar in basic structure, binding specificity and mode of action, Stx2-producing strains are more frequently associated with HUS than strains that produce both Stx1 and Stx2 or Stx1 alone. There is no specific treatment to prevent or ameliorate STEC associated HUS. Two Stx2-specific human monoclonal antibodies (HuMAbs), 5C12 and 5H8, have shown excellent protective efficacy in preclinical evaluation studies in animal models against systemic Stx2 or oral STEC challenge. However, the low production yield of these antibodies by hybridoma or Chinese hamster ovarian (CHO) cells, and likely cost, are major factors limiting commercial production in the large quantities needed for stock piling in the event of bioterrorist threat, or in the face of a major outbreak due to food contamination. Hence, we propose here to express Fv regions of 5C12 and 5H8 in *E. coli* as single-chain Fv fragments (scFv) in which the small Stx2-binding V_H and V_L domains are joined together separated by a flexible spacer region. ScFvs are cheaper to produce, and expression is much higher than antibodies produced by hybridomas or CHO cells. For *E. coli* expression, the gene containing the V_L domain-flexible spacer region-V_H domain of 5C12 or 5H8 will be synthesized, cloned in pET-32b vector, and expressed for affinity purification as His-tag scFvs. The selection of pET-32b vector is based on its ability to express proteins with improved solubility and sulfide bridge formation. The ability of scFvs to interact with and neutralize Stx2 will be analyzed by ELISA and HeLa cell cytotoxicity assay, respectively. If scFvs of 5C12 and 5H8 can neutralize Stx2, they will be far more cost effective for clinical use than antibody therapy.

Awardee: Casey Tucker V'13

Mentor: Dr. Jean Mukherjee

Award Type: US Army

Research Project: Ducks as biological parasite control : a survey of snails, rats, ducks, and gibbons, and the prevalence of *Angiostrongylus Cantonensis* at the Pingtung Rescue Center, Taiwan

Summary: This is a multi-faceted project to discover baseline data that will support potential future research. The goal is to eventually test whether ducks can be used to decrease the incidence of *Angiostrongylus cantonensis* infections in gibbons in captivity. In order to facilitate this, it is first necessary to determine the types and locations of snails present in the Pingtung Rescue Center, and if the snails are infected with *A. cantonensis*. Once it is known if the snails contain the parasite, and that

they are located within the gibbon's enclosures, then it will be possible to evaluate if the presence of ducks influences the number of snails. The goals of this project are:

- to map the number and distribution of gibbons, ducks and snails in the rescue center
- to determine the number and distribution of snails and other gastropods as well as the species
- to determine if the snails are positive for *A. cantonensis*
- to evaluate medical records to assess the morbidity and mortality of gibbons and ducks due to *A. cantonensis*
- to determine the population and species of rodents (especially rats) in the rescue center and determine the prevalence of *A. cantonensis* infection, with an aim to improve rodent control

I will collect samples of slugs and snails from the rescue center and examine their lungs for evidence of *A. cantonensis* infection. In addition, I will examine rat feces for evidence of stage one larvae. Also, I will count and compare the number of snails found daily in enclosures with ducks versus those without ducks, and compare how ducks influence the snail numbers. Finally, I will observe medical records and perform dot-blot ELISAs on the gibbons to detect non-lethal infections.

This project will establish baseline data on the types of local snails and their distribution, the relative numbers of snails in enclosures with ducks versus those without ducks, and the presence of *A. cantonensis* in snails, slugs and rats at the center. It will identify areas that can be controlled to minimize the spread of *A. cantonensis*, a serious zoonotic parasite. The data collected in this study will enable future research into the effects of ducks on parasite infection in gibbons.

Awardee: Laura Turner V'14

Mentor: Dr. Elizabeth Rozanski and Dr. Emily McCobb

Award Type: Independent Research

Research Project: Relationship Between Serum 25-Hydroxyvitamin D Level and Diagnosis of Upper Respiratory Infection in Cats in the Shelter Environment

Summary: Upper respiratory tract infection (URI) among cats is notoriously difficult to control in the shelter environment and, consequently, a leading reason for euthanasia and reduced adoption rates. The use of nutritional supplements to boost immune function and thus help prevent or manage the symptoms of URI could be a cost-effective way for shelters to reduce the spread of URI. Vitamin D has recently gained attention in human medicine as a modulator of immune function and inflammation. Specifically, strong correlations have been found between low vitamin D levels and several respiratory diseases in humans including tuberculosis, upper respiratory tract infections ('common colds'), cystic fibrosis, and asthma. Such promising human data lead to the hypothesis that low vitamin D levels will predict future upper respiratory tract diagnosis in cats.

For the proposed study, serum blood samples will be collected from cats upon intake at the shelter. Subsequently, the cats will be monitored for symptoms of URI for several weeks after their introduction to the shelter environment. Banked serum samples from cats which developed URI will be compared with age-matched cats that did not develop URI. If lower serum levels of 25-hydroxyvitamin D are found

in the cats with URI, dietary supplementation could be further evaluated in shelters as a prophylactic measure to reduce the incidence of upper respiratory infections among cats in the shelter, thus increasing rates of adoption.

Awardee: Annie Whitford V'14 – Louisiana State University Veterinary School

Mentor: Dr. Alison Robbins

Award Type: Merit Scholars Program

Research Project: Terbinafine Dosage and Safety in WNS Infected *Myotis Lucifugus*: Correlation of Survival, Drug Tissue Levels, and Toxic Effects

Summary: As a student working with this project I will be assisting in the tissue sample testing of Terbinafine levels of small brown bats (*Myotis lucifugus*) known to have White Nose Syndrome. Tissue will be taken at 1 month, 2 month and 5 month intervals from the wing, hair, pelt, and liver of bats treated with designated amounts of the antifungal drug Terbinafine. The amount of Terbinafine and the presence of WNS will be determined in each tissue and each tissue is categorized by the bat subgroup that it was taken from. This is a small part of a larger study being done to determine the effectiveness and dosage amounts of Terbinafine treatment for WNS in bats.

Dr. Robbins is working with other veterinarians on this project and I will be working with her as well as Dr. Court in the Medical school to collect data and measurements.