# Comparative Health Sciences Faculty Interest Summaries 2024

**Holly Arnold**

The Arnold Lab is a diverse group of ecosystem biologists, bioinformaticians, biomedical scientists, wildlife ecologists, and microbiologists that study how microbiomes, the collection of microbes which inhabit the body, positively influence health and how they contribute to disease. As we are interested broadly in how microbiomes contribute to physiology and pathophysiology, we have applied this in human disease, biomedical lab animal systems as well as how microbiomes may help preserve wild animal populations. We have particular interest in how microbiomes influence host behavior and stress. For a list of the most updated projects see [https://arnold-lab.org/](https://nam04.safelinks.protection.outlook.com/?url=https%3A%2F%2Farnold-lab.org%2F&data=05%7C02%7CBeth.Chamblin%40oregonstate.edu%7C295eabc3c6de4412597b08dc9abbca15%7Cce6d05e13c5e4d6287a84c4a2713c113%7C0%7C0%7C638555378541336279%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C0%7C%7C%7C&sdata=BXXrto5rqPEOUqe2CtmzUQVSB1loBNKRfV0mngi7UHc%3D&reserved=0)

**Brianna Beechler**

My research seeks to understand the role of host physiology and immunology in disease transmission, primarily in free-ranging wildlife species.  I am also interested in identifying new parasite species in wildlife, understanding the impact of disease and parasites on wild hosts, as well as understanding interactions between parasites and diseases within these hosts.   My work spans numerous species and landscapes, including bighorn sheep in California and Oregon, African buffalo in South Africa, sea lions in the Pacific Ocean, walrus in Alaska and marbled murrelets in Oregon.  I also am interested in using eDNA to detect pathogens and parasite patterns in the aquatic landscapes.  My eDNA work is primarily on the distribution of leptospirosis and giardia in the Willamette Valley, although is likely to expand in the future to other systems and other parasites and pathogens.

**Luiz E. Bermudez**

Mycobacterial pathogenesis and new therapies to mycobacterial infection. *Mycobacterium tuberculosis*, *Mycobacterium avium*, *Mycobacterium abscessus* and *Mycobacterium avium* subsp *paratuberculosis*. Infection of the human and animal host interaction with mucosal surface, survival mechanism in the host, biofilm and its role in disease. Macrophages, Natural Killer cells and T lymphocyte participation in host defense against mycobacterial infection.

**Cecily Bishop**

Cecily Bishop, Ph.D. conducts research into fertility/infertility of ruminants and primate species. Her research seeks to clarify molecular and cellular processes critical to ovarian and uterine function as well as animal models of human infertility/fertility preservation. Recent research in Dr. Bishop’s lab has focused on the following projects:

* In vitro culture systems to support growth of ruminant follicles, and to discover critical factors for folliculogenesis
* Role of ovarian cell types in growth of follicles which may contribute to infertility in women and ruminants
* Animal models of ovarian cryopreservation as well as abnormal follicle growth and development leading to polycystic ovarian syndrome
* Impact of vitamin supplementation on fertilization and embryo development in cattle

**Gerd Bobe**

The focus of my research group is on dietary disease prevention using a “system biology” approach that integrates knowledge from nutrition & physiology, molecular & cellular biology, nutritional & molecular epidemiology, and biostatistics.  (1) In ruminants, the focus of my research group is on optimal nutrition during periods of stress, in particular the time around calving and markers that predict risk of disease.  Flaxseed, selenium, yeast fermentation product, and vitamin E are dietary compounds that we have looked at for improving health and performance of ruminants.  (2) In humans, the focus of my research group is personalized disease prevention using dietary flavonols and dry beans.  Combining “omics” techniques in parallel human and animal model studies provides the opportunity to improve risk assessment, allowing the development of new prevention and treatment options, and an individually tailored approach to prevention and treatment in humans.

**Susanne Brander**

As an ecotoxicologist, a portion of my research strives to understand the responses of aquatic organisms to emerging contaminants such as microplastics, nanoplastics, pesticides and other pollutants and climate change, across the biological hierarchy. My group also studies the occurrence and implications of microplastics in biological samples from land to sea. We focus on discerning mechanisms of toxicity and linking the results of laboratory experiments to ecosystem responses and contaminant levels. Current work examines environmental stress impacts on gene expression, development, reproductive behavior, sex ratio and population dynamics across multiple generations, with an emphasis on exposure during early life.

**Chris Cebra**

Dr. Chris Cebra’s main lines of inquiry involve novel immunotherapeutics, energy metabolism and gastrointestinal disorders. For immunotherapeutics, he works with a team of investigators to develop novel diagnostic and therapeutic agents based on camelid-origin heavy-chain antibodies. The main direction is cancer immunotherapy, but a variety of applications have been investigated. Regarding energy metabolism, he has primarily investigated the diabetes-like characteristics of llamas and alpacas, but has completed projects on cattle and horses as well. Regarding gastrointestinal diseases, he has concentrated on causes of colic, parasitic disorders, and other enteritides of camelids. He has also initiated or collaborated on projects in a number of other areas relevant to large animal internal medicine including equine and camelid peritoneal fluid analysis, diagnostic imaging, infectious diseases, and immunology.

**Patrick Chappell**

Work in my lab broadly focuses on basic mechanisms underlying endocrine control of reproduction, exploring the role of the molecular circadian clock in the brain’s timing of reproduction in female mammals, investigating how circadian disruption may initiate breast and prostate cancers, and how the hormonal control of reproduction evolved from more ancient species such as corals.

**Itchung Cheung**

I am a marine scientist (biological oceanography), instructor and program developer with specializations in academic and outreach programs, online and experiential education, and student research training programs, respectively. My interests are in emerging technologies in teaching, experiential education, student research training and diversity in the sciences. Research specialties include undergraduate student research training, HPLC, field sampling (estuary, coastal and open sea), microbiology, and plankton identification.

**Sandi Cleveland Phibbs**

Sandi supports the Oregon State University Center for Health Innovation’s purpose to connect Oregon State University faculty and students with external community, industry, and government partners, in order to create new and expanded opportunities to partner on innovative public health workforce development, practice and research. To date, the OSU Center for Health Innovation has completed research and evaluation projects related to mental health promotion, substance use disorder prevention, overdose prevention activities, COVID-19 response activities, health impacts of wildfire, and health system innovation.

**Claire Couch**

I study the interactions between wild animals, their microbiomes, and pathogens using integrated laboratory and field studies. I am particularly interested in understanding how human-caused changes in population structure, habitat, and climate are altering host-microbiome-pathogen relationships, and what the potential consequences are for fish and wildlife population health. I work in a variety of wildlife systems, including Pacific salmon, marine mammals, and terrestrial ungulates. Using molecular and bioinformatic tools, I study what happens at the animal-microbiome-disease interface when humans drastically change environmental conditions, e.g. through climate change, habitat fragmentation, and river impoundments. Understanding and predicting how host-associated microbes and pathogens respond to environmental change is critical from a One Health perspective, as it could help us predict changes to human, animal, and environmental health risks.

**Katie Curran**

Specializing in veterinary medical oncology, Dr. Curran appreciates providing clients with a comprehensive approach to diagnostic and therapeutic options for pets with cancer. She studies ongoing advances in veterinary oncology with a special interest in clinical trials.

**Benjamin Dalziel**

I have broad interests in ecological and evolutionary dynamics, particularly related to the health of human and animal populations, and to the maintenance of biodiversity. I am particularly interested in (i) the ecology and evolution of infectious diseases, especially the impact of host population structure on pathogen spread and diversification and (ii) how collective behavior affects trophic interactions and ecosystem stability. To address these questions I work with students and collaborators at the interface of mathematical models and empirical data.

**Lia Danelishvili**

I study the pathogenesis mechanisms of both non-tuberculous and tuberculosis causing mycobacterial pathogens. The non-tuberculous mycobacterial (NTMs) pathogens that my group investigates belong to Mycobacterium abscessus complex and Mycobacterium avium complex (prevalent in HIV patients and in individuals both with immunosuppression and chronic lung pathologies) and M. avium subsp. paratuberculosis (etiological agent of Johne's disease in ruminant animals). We investigate bacterial virulence mechanisms and host-pathogen interactions. I also have ongoing drug discovery projects to identify novel compounds that target a) virulence factors uniquely expressed by intracellular bacteria and b) host factors influencing the pathogen's survival, and c) the biofilm formation. In addition, we isolate mycobacteriophages from environmental samples and characterize them to understand phage-bacteria interaction mechanisms and phage-mediated innate immune responses by macrophages in order to overcome bacterial drug resistance and advance the phage therapy. The multidisciplinary approaches employing microbiology and cell biology techniques, bacterial genetics, high throughput screening libraries, gene knockout systems, the high-resolution microscopy, bioinformatics and mass-spectrometric sequencing are used in the laboratory to understand many basic questions that will help in the development of new therapeutic strategies.

**Helio De Morais**

My focus is on vector-borne and emerging infectious disease of dogs and cats.

**Brian Dolan**

Research in my lab is focused on two main areas. The first is the biology of antigen presentation, the process by which the cells of the body alert the adaptive immune system to the presence of intracellular pathogens, such as viruses, or oncogenic transformation. We are trying to determine which cellular pathways are necessary to successfully present the foreign peptide on major histocompatibility complex class I (MHC I) proteins at the cell surface, which serve to flag down disease specific cytotoxic T cells. We are also interested in studying immune responses in wild animal populations as it relates to disease spread.

**Charles Estill**

Dr. Estill is a Theriogenologist in the Department of Clinical Sciences. Research areas of interest include corpus luteum physiology and control, nutritional influences on reproduction, and ontogeny of sexual development. Current projects include collaboration on studies of ovarian cryopreservation and testing novel anthelminthic compounds.

**Elain Fu**

The goal of the Fu Lab is to advance the engineering of novel microfluidic tools and devices for field use through improving our understanding of the devices' underlying physicochemical processes. Research in the lab consists of three areas of focus: the investigation of molecular interactions and fluid transport in microfluidic systems, the development of tools and methods for use in high-performance microfluidic assays, and the implementation of microfluidic assays for clinically relevant analytes. Global health application domains of interest include human disease diagnosis, veterinary medicine, environmental monitoring, and agriculture.

**Jean Hall**

My research is concerned with how nutrition affects immunity. I am interested in nutrigenomic technology, or the study of how nutraceuticals affect the expression of genes involved in the immune response. My projects involve sheep and cows supplemented with selenium and its effects on immune responses, animal health, and animal production. In particular, we are interested in using selenium as a fertilizer to enhance forages fed to ruminants. I am also interested in the health benefits of dietary n-3 fatty acids and antioxidants in geriatric dog and cat foods. We are currently investigating these supplements in renoprotective foods used to slow the progression of chronic kidney disease in dogs and cats. In conjunction, we are assessing novel renal biomarkers used for monitoring disease progression and therapeutic interventions.

**S. Marie Harvey**

I am a public health researcher with 35 years of experience conducting research focused on the behavioral, contextual, and policy aspects of sexual and reproductive health (SRH) among diverse samples of young adults, including men, women, and couples. The overarching goal of my research program has been to reduce disparities in risky sexual behavior and increase well-being and access to sexual and reproductive health services. I have published widely in the area of prevention of unintended pregnancy and STIs and have been the recipient of numerous research grant awards. More recently, I have extended my research focus to examine the impact of new health policies and healthcare reforms on SRH. I served as PI on a six-year project funded by the Centers for Disease Control and Prevention to examine the impact of Medicaid expansion on the health of low-income women of reproductive age and infants in Oregon. In addition, I was PI on a study that investigated the impact of Oregon’s Medicaid reforms on abortion access and utilization. I am dedicated to the use of research findings to inform policies and practices that improve the health of women, men, and families.

**Claudia Häse**

The genus *Vibrio* consists of a group of Gram-negative bacteria that naturally inhabitant aquatic environments worldwide. Among this diverse group of microorganisms are a few human pathogens, namely *Vibrio cholerae* and *Vibrio parahaemolyticus*. In addition, our lab studies some *Vibrio* species that cause disease in aquaculture (*Vibrio tubiashii*) and corals (*Vibrio coralliilyticus*). We are applying various modern molecular techniques to better-understand the virulence properties and environmental survival strategies of these pathogens. In addition, we are developing detection assays that can be used in aquaculture facilities to reduce the economic impact of vibriosis.

**Adam Z. Higgins**

Dr. Higgins’ research activities fit within the broad theme of medical bioprocessing, with a particular emphasis on technologies for long-term stabilization of cell-based products (e.g., cryopreservation, freeze drying) and microfluidic devices for chemical processing of blood. Current research projects focus on mathematical modeling and optimization of cryopreservation procedures, development of microfluidic cell washing methods to facilitate the use of frozen blood for transfusions and extracorporeal blood processing for treatment of sepsis.

**Kenton Hokanson**

All of the wonderful things our brains do, from visual perception, to coordinating our movements, to memorizing the lyrics of a new song, depend on the electrical activity of neurons. I study how these electrical signals are generated and transmitted, and how they drive communication between neurons connected by specialized structures called synapses. To do this, I use a technique called electrophysiology, which involves placing tiny electrodes near or inside individual neurons to record their behavior with remarkable sensitivity. As the Director of the Electrophysiology Core Facility, I am working to bring this technique to the many other neuroscience laboratories at OSU.

**Michael Huber**

Research projects included surgical manipulation of endometrial cups in mares to manage infertility associated with pregnancy loss, and the impact of bone fragments on joint health. Still focusing on some innovative ideas for limiting reproduction in BLM and Tribal horse and burro populations. Ongoing clinical testing of devices for treating clinical disease in humans and animals. Development of an instrument to facilitate a surgical procedure.

**Arup Indra**

Our laboratory is investigating into the mechanisms of spatio-temporal development of skin (largest organ in the body) from stem cells and the role of lipids in skin barrier formation, suppression of inflammation and preventing the onset of inflammatory skin disease (e.g. eczema) using mouse genetics, biochemical, cellular and molecular approaches. My group pioneered a simple, non-invasive way to extract and profile skin lipids from rodents and humans using both “un-targeted” and “targeted” lipidomic approach that has opened up a new field of research in predicating onset of inflammatory skin diseases (e.g. AD or psoriasis).

We are also focusing on the mechanisms underlying the crosstalk between the various skin cells and immune cells, and the role of microenvironment in the promotion and progression of “melanoma”, the deadliest and the most aggressive of all skin cancer types. Over the past 16 years, our laboratory has generated multiple novel pre-clinical models of human diseases with skin barrier defects, hair loss, atopic dermatitis ((highlighted by the Office of the NIH Director), delayed wound healing, skin pigmentation disorder and for invasive metastatic melanomas.

In alignment with the drug discovery program of the College of Pharmacy, we are preforming high throughput screening and evaluating anti-cancer properties of unique bioactive natural compounds and novel metabolites that are generated by collaborators Professors Taifo Mahmud and Fred stevens at OSU and external collaborators across the nation. We are establishing their role to regulate cancer cell metabolism and activate host-immune responses to pursue our goal to identify and characterize new molecules that could be effective for therapeutic interventions and control disease progression.

**Jane Ishmael**

Our research focuses on understanding the functional relationship between autophagy (“self-eating”) and cell death signaling in brain tumor cells. Glioblastoma multiforme is the most common malignant primary tumor of the central nervous system and remains very difficult to treat. These tumors arise from astrocytes and have many biological characteristics that allow them to evade cell death. We utilize a range of human cancer cell types and genetically modified mouse embryonic fibroblasts (MEFs) to determine how cells use autophagy as a survival response to stress. Our research interests are closely aligned with the drug discovery efforts in the College of Pharmacy and we study a number of unique compounds that have arisen in nature in diverse and unusual ecosystems. The main projects in the Ishmael laboratory are currently centered around structures with anticancer potential that were discovered by Drs. Kerry McPhail and Taifo Mahmud at collection sites in Panama, South Africa, Indonesia and the Red Sea.  By working at the interface of Medicinal Chemistry and Pharmacology we seek to understand the potential of these naturally occurring structures to modulate autophagy, inhibit cellular proliferation and induce apoptotic or alternate modes of cancer cell death.  Our long-term goal is to characterize new chemical entities with the potential to inspire drug development for and identify new cellular targets for cancer chemotherapy.

**Urszula Iwaniec**

Current research foci include: 1) Neuroendocrine regulation of body weight and bone metabolism. 2) Nutrition as a factor in tumor metastasis to bone. 3) Regulation of stromal (stem) cell differentiation into bone cells and fat cells.

**Ling Jin**

My lab is interested in understanding the mechanism of viral diseases and virus evolution. The latency of herpesviruses is the main focus of research in my laboratory. My lab uses several different herpesviruses to study the mechanism of herpes virus latency-reactivation cycles and the pathogenesis of herpes viruses, such as Herpes Simplex Virus 1 (HSV-1), Koi herpesvirus (KHV), and Oyster Herpesvirus 1 (OsHV-1), and host-virus interaction in the central nervous system. In addition, my lab is interested in anti-viral drug development that targets host response in virus replication. Currently, we have research projects on OsHV-1 latency reactivation and infectious disease theory on Alzheimer's Disease using the HSV-1 latency model in 5xFAD mice.

**Jennifer Johns**

Research in our lab focuses on several areas:

1) Translational research utilizing canine mesenchymal stem cells (MSCs) and nanoparticles derived from the MSCs. We are specifically interested the potential for therapeutic use of the nanoparticles to delivery chemotherapy drugs in canine cancers such as osteosarcoma.

2) Immune-cell function in elephants, focusing particularly on monocyte responses to bacterial infection.

3) Research on tick-borne rickettsial infections, including granulocytic anaplasmosis and related obligate intracellular bacterial infections.

4) Veterinary diagnostic testing with an emphasis on laboratory animals and wildlife species, and hematopoietic disorders.

**Anna Jolles**

Dr. Anna Jolles is a disease ecologist and epidemiologist at Oregon State University, where she has appointments in the College of Veterinary Medicine and the Department of Zoology. The Jolles lab studies the ecology and eco-immunology of infectious diseases in wild mammals. Current study systems include infectious diseases of African buffalo, feline immunodeficiency virus in African lions and Hanta virus in small mammals in Oregon. We collaborate with Dolan’s group on comparative immunology across a broad range of mammal species, and with Clint Epps (OSU Fisheries & Wildlife) on pneumonia in desert bighorn sheep.

**Lacy Kamm**

Dr. Kamm's primary research interest is in repair of joint and soft tissue injuries through the use of mesenchymal stromal cells and other regenerative therapies. The Kamm Lab studies immune reactions which occur when donor mesenchymal stromal cells are administered to a recipient. Dr Kamm also performs clinical research including the improvement of surgical treatments for both orthopedic and soft tissue diseases of horses.

**Michael Kent**

Dr. Kent’s research focuses on diseases of fishes and parasitology. Currently he is leading projects investigating diseases of importance to zebrafish in research facilities as this fish is now a very important model in biomedical research. Two groups of pathogens that he is studying are mycobacteria and microsporidia that infect zebrafish. He also is investigating diseases of importance in wild salmonid fishes, and presently is studying multiple pathogens associated with pre-spawning mortality in Chinook salmon.

Dr. Kent is no longer mentoring new graduate students, but still has an active research program and is open to new collaborations.

**Molly Kile**

My major research interests are environmental, molecular epidemiology and global health. I am interested in understanding how exposure to chemicals in our environment influences maternal and child health. Specifically, I am interested in how chemical exposures in utero may alter epigenetic mechanisms that could contribute to chronic diseases later in life. I am also interested in how genetic and other individual factors such as nutritional factors may interact with chemical exposures to influences susceptibility to disease. I have a very strong background in exposure biology and developing cohorts for environmental epidemiological studies. I also have a very strong interest in international environmental health studies.

**Chrissa Kioussi**

The precision in formation of a developing embryo is the result of an intricate mechanism of morphogenetic events, which bring cell populations together for interactions to form three dimensional structures. Complex cascades of signal transduction pathways coupling with an overlapping array of transcription factors constitute the basis for interpreting the transient morphogenetic code. Chrissa Kioussi focuses on the molecular mechanisms by which transcription factors, such as the homeobox genes, mediate cardiovascular and muscle development. Using mouse model systems she searches for a better understanding of congenital heart diseases, muscular dystrophies and human syndromes.

**Siva Kolluri**

Our research efforts are directed toward discovering molecular targets that are selective for cancer, developing agents that are selectively toxic to cancer cells, and devising optimal combinations of therapeutic agents aimed at different molecular pathways for the prevention and treatment of cancer. We are currently focusing our efforts to (i) Develop small molecules to treat Bcl-2 overexpressing cancers and (ii) Therapeutic targeting of the Ah Receptor in cancer and autoimmune diseases.

**Michelle Kutzler**

My laboratory focuses on three areas related to animal reproduction.

**Focus area #1: *Role of luteinizing hormone in the long-term health problems following spaying and***

***neutering in dogs.*** Background: Spaying and neutering dogs is commonly used to prevent the birth of unwanted animals

and eliminate the risk of reproductive diseases. However, removal of the gonads prevents the feedback of estrogen and testosterone on the pituitary and hypothalamus. As a result, luteinizing hormone (LH) is continuously elevated at supraphysiologic concentrations. Although the main role of LH is for reproductive function (e.g., ovulation), there are LH receptors present in several normal tissues including the thyroid and adrenal glands, gastrointestinal tract, cranial cruciate ligament and round ligament, and lymphocytes. In addition, there are LH receptors present in several neoplastic tissues (e.g., lymphoma, hemangiosarcoma, mastocytoma, transitional cell carcinoma, and osteosarcoma). The role of LH receptors in non-reproductive normal and neoplastic tissues is not known but may stimulate nitric oxide release and induce cell division. The precise etiology of the increased incidence of several non-reproductive long-term health complications following spaying and neutering is not known but may be related to LH receptor activation in these non-reproductive target tissues. Alternative methods for sterilizing dogs that do not result in elevated LH concentrations should be considered.

**Focus area #2: *Improving fertility in livestock.***Background: Livestock provide an important source of animal protein in the diets of humans. The success of livestock production is dependent upon many factors including female fertility. Genetic

selection and a variety of treatment strategies can improve female fertility and production. The research projects listed below were designed to validate specific novel and innovative treatment strategies and improve on existing therapies.

**Focus area #3: *Alternative methods for sterilizing horses.*** Background: Free-roaming (wild) horse management is a complex issue incorporating social, economic, emotional, political, and environmental factors. When the Wild Free-Roaming Horses and Burros Act of 1971 was signed into law, the provisions assigned the Bureau of Land Management (BLM) and the Forest Service as responsible for the “management and protection” of these horses “in a manner that is designed to achieve and maintain a thriving natural ecological balance on the public lands”. With a lack of natural predation, the free-roaming horse and burro population increases annually by 20-25%. The current population stands at about 81,951 free-roaming horses and burros and is confined to 10 states. The BLM estimates that 26,690 individuals would be an appropriate population limit that would allow for conservation of the natural resources on the public lands. Reducing the free-roaming horse and burro numbers has become a priority by the BLM in order to conserve natural resources and ecological integrity. Surgical and nonsurgical sterilization methods need to be developed to reduce the number of foals born each year.

**Christopher Langdon**

Research Areas: Aquaculture; nutrition and genetics of oysters and other marine bivalves; microencapsulation; seaweed culture

Chris’s research is broadly interested in aquaculture of oysters, marine fish larvae, and of sea vegetables such as dulse. He also works with microencapsulation of nutrients to feed bivalves and other fishes in aquaculture operations. His work with the Molluscan Broodstock Program focuses on the genetic selection of oysters in order to improve all aspects of oyster production. Chris also studies ocean acidification and hypoxia and its effects on oyster production.

**Christiane Löhr**

My research focuses on the molecular pathology as it applies to a wide range of diseases especially carcinogenesis, cancer prevention and treatment and infectious diseases. As a board certified anatomic veterinary pathologist with an appointment in the Veterinary Diagnostic Laboratory I encounter new or poorly understood disease conditions with regularity. Such cases provide excellent opportunities to identify specific, potentially novel, causes and mechanisms of disease processes. Much of my research is conducted in collaboration with colleagues in the College, on campus and outside the University. I find it very rewarding to provide critical input and data to large projects and to contribute to the training of researchers at all levels.

**Kathy Magnusson**

Our human population is aging. The percentage of the population in this country that is over the age of 65 is projected to increase from 12.6% in 2005 to 20% by 2030. With this increase will come a rising financial burden to both families and society, unless we can prevent the declines that are currently associated with aging. Declines in brain functions during aging, including memory and cognitive flexibility, affect almost half of the human population over 65 years of age. This interferes with people’s quality of life as they get older. It also can become an economic burden, because they can no longer live independently. Pet animals can also experience these changes, which may limit their functional lifespan. These problems suggest that there is a decline in the optimal functioning of regions of the cerebral cortex and hippocampus. The N-methyl-D-aspartate receptor, a subtype of glutamate receptor, is highly expressed in these brain regions and plays a role in many of the functions that decline during aging. Our laboratory has found a selective vulnerability of the NMDA receptor to aging. This decline in NMDA receptors correlates with declines in memory function. We will be exploring the effects of drug or micronutrient intervention on these receptors during aging with the use of stereotaxic surgery, chronic drug administration, and/or behavioral testing using mice as our model system. We may also be examining the effects of interventions on receptor binding density, and subunit mRNA and protein expression with the use of receptor autoradiography, in situ hybridization and Western blots, respectively.

**Erica McKenzie**

Dr. Erica McKenzie is a specialist in large animal medicine and sports medicine and rehabilitation. Her research interests relate to exercise physiology, muscle function and disease, and common clinical problems in large animal medicine.

**Jan Medlock**

My primary research interests are in the epidemiology of infectious diseases. I also have broader interests in using quantitative and computational methods for questions in biological sciences. I am currently working on a variety of projects, including the epidemiology of foot-and-mouth disease virus in African buffalo and the ecology and epidemiology of pathogens in bighorn sheep. In the past, I have worked extensively on the epidemiology of HIV, influenza, dengue, and African sleeping sickness.

**Tim Miller-Morgan**

Dr. Tim Miller-Morgan is the OSU Associate Attending Veterinarian for Aquatics and an extension aquatic veterinarian with Oregon Sea Grant. He leads the Oregon Sea Grant Aquatic Animal Health Program, which supports animal care at the Hatfield Marine Science Center and provides the aquarium fish industry, aquatic research laboratories, students, and public aquaria with scientifically based, conservation minded disease management techniques, consultation, and training. Our research and outreach focus on applied research aimed at current and emerging animal health issues generally associated with the management of wild-caught aquarium fish species and the management of disease throughout the chain of custody from the collector/farmer to the end consumer, the aquarium fish hobbyist.

**Andriy Morgun**

Our lab is focusing on health problems in which an unbalanced interaction between immune, other host systems and different microbes leads to pathology. Those diseases range from immunodeficiency- associated enteropathy to cervical cancer and acute rejection of heart and renal transplants. We employ multiple large-scale quantitative approaches (also called “omics” (<http://en.wikipedia.org/wiki/Omics>) to generate the data and use this data to make predictive statistical models and networks that allow us to address three major topics:

- Discover new or repurpose old drugs

- Generate diagnostic/predictive “omics” signatures for personalized medicine

- Validate experimental animal models for human research using “omics” approaches.

**Hong Moulton**

Morpholino oligomers are a class of steric-blocking antisense molecules that have been widely used to knock down gene expression, modify pre-mRNA splicing or inhibit miRNA maturation and activity. Injection of Morpholinos into single-celled embryos of many creatures results in specific knockdown of targeted genes with little toxicity. Morpholino oligomers have revolutionary potential for treatment of a broad range of human diseases, including viral, bacterial, age-related and genetic diseases, but they suffer from poor delivery into cells. We work on improving the delivery of morpholino oligomers into cells in adult tissues, enabling the therapeutic use of ASO for treatment of a broad range of diseases. Chemical structures have been found that, when linked to a PMO, enhance the delivery of the PMO from blood into the cytosol of cells. Dr. Moulton invented a class of compounds, the peptide-conjugated morpholino oligomers (PPMO), which are in clinical trials and are the workhorse molecules produced in my laboratory for many applications for eukaryotic and prokaryotic systems. Our team is actively researching alternative strategies for enhancing morpholino delivery in vivo by other forms of chemical modifications, formulations and tissue-specific targeting.

**Lauren Newsom**

Dr. Newsom is interested in research that focuses on practical applications of computed tomography and ultrasound, specifically as it relates to diagnosis and prognosis of oncologic, surgical, and medical illnesses in small animal patients

**Fikru Nigussie**

My research interest is in adult hippocampal neurogenesis and its role in learning and memory, regulation of stress and circadian rhythm using animal and cell culture models.

**Ana Pacheco**

Dr. Pacheco’s research interest are in respiratory medicine, endocrinology and emergency and critical care.

**Si Hong Park**

My goal is developing a food safety program included genomics, metagenomics (microbiome and whole genome sequencing) and transcriptomics based on a next generation sequencing and bioinformatics. Research is focusing on the detection, identification and control of foodborne pathogens such as Salmonella, Listeria, Campylobacter and E. coli from farms to forks using various molecular techniques. Currently, I am working on microbiome sequencing in gastrointestinal tracts of humans, food animals (poultry and cattle), catfish and experimental animals to evaluate the microbial diversity in the presence of food and feed supplements (prebiotics, probiotics and antimicrobials) and/or foodborne pathogen challenge.

**Manoj Pastey**

Dr. Pastey’s laboratory is conducting research work on the pathogenesis of influenza, HIV, and respiratory syncytial virus (RSV) and developing a new diagnostic method to detect Dengue virus, Bovine Herpes virus, and sexually transmitted infections in clinical samples.

HIV Research Study: Our laboratory is testing a poly herbal vaginal microbicide named “BASANT” that has been shown to inhibit a wide range of sexually transmitted pathogens including HIV. Preliminary studies have also shown safety and acceptability in Phase I (acceptability and toxicity study) human trials in India. Therefore, the next step is to verify the effectiveness of the BASANT in preventing HIV transmission *in vivo*. We are also working on a novel HIV protein that is required for replication in T cells. HIV sequestration in the CNS and the failure of antiretroviral drugs to penetrate through blood-brain barrier to eliminate latent CNS reservoir continues to be a major road block in AIDS therapy. Therefore, we are developing Nanotechnology based delivery systems to target the virus within different tissue compartments.

RSV Research Study: Respiratory Syncytial Virus (RSV) is a leading cause of bronchopneumonia in infants and the elderly. There are no vaccines or effective treatment available. Knowledge of viral and host protein interactions is important for better understanding of the viral pathogenesis and may lead to development of novel therapeutic drugs. In our lab, we have shown that Respiratory Syncytial Virus Matrix (M) protein interacts with cellular adaptor protein complex (AP)-3 and its medium (µ) subunit. We are also looking into the role played by Myeloid cell leukemia-1 (MCL-1), an anti-apoptotic member of the B-cell lymphoma-2 (Bcl-2) family, in Respiratory Syncytial virus pathogenesis.

New Diagnostic method: We are developing a new rapid diagnostic method to detect dengue virus, bovine herpes virus, and sexually transmitted infections at Point-of-Care within 30 mins at room temperature using recombinase polymerase amplification (RPA) technology without the need for sophisticated equipment.

**Jana Raessler**

Dr. Raessler’s interests are education, endocrinology and gastroenterology.

**Stephen Ramsey**

My lab's aim is to use the tools of computational systems biology to advance precision medicine. Currently, we are working on projects in four areas: (1) artificial intelligence for drug repurposing; (2) electrochemical sensing of drug levels in saliva for therapeutic drug monitoring for epilepsy; (3) transcriptomics in immunology; and (4) Chlamydia trachomatis genomics.

**Dan Rockey**

Interactions between chlamydiae and the mammalian host. All species of chlamydiae are obligate intracellular bacteria that cause disease in a wide variety of animal species. In humans, *Chlamydia trachomatis* and *C. pneumoniae* cause a variety of diseases of the eye, genital tract and lung. These conditions affect millions of people worldwide and lead to billions of dollars in medical expenses yearly in the U.S. alone. A variety of  diseases of cats, pigs, sheep and koalas are also caused by different chlamydial pathogens. Very little is known about how chlamydiae interact with the host to cause a particular chlamydial condition, and why some hosts have serious disease and others are asymptomatic. My laboratory works on chlamydial pathogens of humans and production animals, with a goal of furthering both basic understanding and therapeutics against chlamydial infection and disease.

**Sarah Rothernberg**

Dr. Sarah Rothenberg is an Associate Professor in the OSU College of Health, in the Environmental and Occupational Health Program. She is a member of the Eastern Pacific Marine One Health Coalition (EPMOHC), which includes veterinarians, university faculty, state agencies, etc., focused on anthropogenic impacts to the marine ecosystem health. For this coalition, Dr. Rothenberg contributes her expertise on exposure to environmental pollutants (PFAS, heavy metals, PBDEs, etc.) and their impacts on marine mammal health. At OSU, Dr. Rothenberg is director of the Mercury Lab, which provides analyses of total mercury and methylmercury in biological matrices (blood, stool, whisker, fur, etc.) and environmental matrices (soil, surface water, etc.). Dr. Rothenberg is excited to collaborate on studies related to environmental pollutants and health.

**Carl Ruby**

My research interests include the assessment of tumor immunity in dogs with various types of cancer, including osteosarcoma and lymphoma. The involvement of immune cells in the natural history of these cancers can provide additional diagnostic information that complements existing readouts and guide therapeutic strategies. In addition, I am actively developing canine-specific cancer immune-based therapies that will provide clinicians and patient owners safe and effective options beyond the standard toxic chemotherapy regimens commonly available in the veterinary clinic.

**Duncan Russell**

My scholarly interests are applied clinical research, comparative pathology (particularly animal models of human disease and implant pathology), and educational science. I am especially interested in research questions that are directly applicable to clinical veterinary medicine. This has included histologic evaluation of surgical margins and descriptions of naturally occurring disease. My projects relating to educational science have evaluated the utility of alternative teaching strategies that enhance student learning and encourage metacognition.

**Justin Sanders**

My research is focused on host-parasite interactions and the impacts of ecological and evolutionary factors on these interactions. Current projects include:1. Production of monoclonal antibodies that recognize a number of zebrafish cytokines and characterization of the zebrafish immune response, 2. Development and characterization of an elevated temperature zebrafish model, primarily for the study of the apicomplexan parasite, *Toxoplasma gondii,* 3. Improvement of diagnostic techniques for the detection of important veterinary parasites such as *Giardia intestinalis* and the liver fluke, *Fasciola hepatica,* 4. Identification and characterization of the transmission dynamics of aquatic pathogens. This work is being performed with salmonid fishes in the wild as well as with laboratory zebrafish in order to determine the factors involved in prespawn mortality of salmonids and to guide diagnostic efforts aimed at improving the health of zebrafish in laboratory fish colonies.

**Mahfuzar Sarker**

The long-term goal of my research program is to develop strategies to inactivate *Clostridium* spores and to control *Clostridium*-mediated diseases. We mainly focus our work on spores of *C. perfringens* (*Cp*) causing *Cp* food poisoning, which currently ranks as the third most commonly reported food-borne disease in the USA. *Cp* also causes non-food-borne gastrointestinal (GI) diseases in humans and GI diseases in domestic animals. Specifically, we investigate the molecular mechanisms of *Cp*: i) spore heat resistance; ii) spore germination; iii) spore-host interactions; and iv) spore inactivation.

**Katherine Scollan**

My research in the field of veterinary cardiology is focused on three-dimensional imaging of the heart including 3D echocardiography and computed tomography (CT). I am investigating the use of these imaging modalities to assess size and function of the cardiac chambers in normal and diseased hearts.

**Stacy Semevelos**

Her research focuses on comparative orthopaedics, particularly postnatal cartilage development and osteochondrosis in horses. She has discovered molecular expression changes in osteochondrosis and has explored the quantitative and spatial alterations of matrix molecules, growth factors, and cell-to-cell signaling in this important disease. In addition, she has discovered age-related changes in gene and protein expression patterns of matrix molecules, growth factors and paracrine factors in articular cartilage of normal growing horses throughout postnatal development. She has also investigated musculoskeletal disorders of llamas and alpacas, using molecular, biochemical, and histological techniques to evaluate suspensory apparatus breakdown in these species.

**Thomas Sharpton**

Dr. Thomas Sharpton’s research is broadly directed towards ascertaining how commensal microbiota and their genomic characteristics (i.e., the microbiome) relate to health. His laboratory specializes in the development and application of high-throughput computational and statistical tools that characterize microbiome biology, and investigates how microbiomes are distributed across space, time, and host physiology. The Sharpton lab aims to develop testable hypotheses about how hosts and their microbiome interact, and strives to understand the evolutionary and ecological processes that influence community assembly, maintenance, and function within a host. Ultimately, this knowledge will be used to discover disease mechanisms, identify predicative and diagnostic biomarkers of disease, and develop tools to treat disease through manipulation of the microbiome. All of the data resources and software that his lab develops are freely available.

**Natalia Shulzhenko**

My laboratory studies interactions between the immune system, metabolism and gut commensal microorganisms (microbiota) in mouse models and human diseases. Microbial cells exceed ten times the number of our own body cells and contribute to several physiological processes. With the advent of new genomic technologies, the role of microbiota in health and disease is a rapidly evolving field of research. We apply novel systems biology approaches such as network reconstruction to analyze host and microbiota simultaneously. Our recent work on chronic enteropathy in immune-deficient hosts revealed a crosstalk between the immune system, the microbiota, and the epithelial cells affecting both intestinal and systemic lipid metabolism. Using metagenomic sequencing, we plan to reveal the microbial players contributing to this disorder and to test them in a mouse model of this disease. In another project, we are studying adverse effects of antibiotics on the intestinal immune system and on microbiota and how this disruption contributes to metabolic syndrome and type 2 diabetes.

**Aleksandra Sikora**

The emergence and increasing occurrence of bacterial strains that are resistant to all classes of available antibiotics is a global problem. Current antimicrobials target a relatively small number of essential gene functions including: inhibition of cell wall biosynthesis, and synthesis of macromolecules (proteins, DNA and RNA). Treatment of infections caused by antibiotic resistant bacteria requires new approaches and agents with novel modes of action. The bacterial extracellular proteome (cell envelope, membrane vesicles and secreted proteins) plays a fundamental role in establishing infection by enabling the microbes to adhere to and invade host cells, facilitating nutrient acquisition, host tissue destruction, and suppression of host immune responses. Hence the components of the extracellular proteome are promising targets for drugs/vaccines aimed at preventing bacterial infections. The long-term goal of our research is to enhance our understanding of the phenotypic plasticity of the bacterial extracellular proteome and utilize this information to identify attractive targets for development of new therapeutic interventions. Currently, our research focuses on the role of bacterial extracellular proteomes in colonization and circumvention or exploitation of host immune response using two model organisms *Vibrio cholerae* and *Neisseria gonorrhoeae*. We examine these issues using comprehensive proteomic studies, chemical genomics, and state of the art genetic, molecular and biochemical methods.

**Susanne Stieger-Vanegas**

My research interests focus broadly in computed tomography and ultrasound of gastrointestinal, complex cardiac and musculoskeletal disease in dogs and New World Camelids. My interest not only includes the CT imaging of clinical patients, but establishing new imaging protocols to improve imaging of diseased veterinary patients using CT. Furthermore, my research focuses on 3D modeling and printing of complex disease processes with the goal to better understand complex disease processes, provide tools for enhanced student learning and improve patient outcomes by providing 3D models for individualized treatment planning and care.

**Stacie Summers**

Dr. Stacie Summers is board-certified in small animal internal medicine and has a special interest in feline medicine and urinary tract disease. Her PhD research evaluated novel causes of chronic kidney disease in cats with a focus on the fecal microbiome and role of microbial metabolites in the disease. Dr. Summers has expanded her research to dogs and cats with both intestinal and systemic disease. She evaluates therapies that have the potential to change the microbiome and its function to help treat dogs and cats with disease. She also has interest in the biological variation of biomarkers and investigation into novel biomarkers of disease diagnosis, treatment efficacy, and prognosis. She has collaborated on other projects relative to small animal internal medicine including infectious disease, nutrition, and primary gastrointestinal disease.

**Sue Tornquist**

My areas of research include hematology, metabolic disease and infectious diseases of camelids and use of immunocytochemistry in diagnosis and prognosis of neoplasia.

**Katy Townsend**

My research focuses on improving clinical outcomes for surgical patients, with a special focus on soft tissue surgery and oncologic surgery. My research focuses on clinical trials involving patients with naturally occurring tumors, accurately staging patients with advanced and novel sentinel lymph node mapping techniques. I am looking into emerging intraoperative modalities to accurately determine how cancer spreads throughout my patients’ body with cancer. This will help guide what further treatment we should perform with my collaborators. My other research focus is on assessing and designing animal models to assess and test novel implants.

**Richard Van Breemen**

Aligned with the Linus Pauling Institute, research in the van Breemen laboratory concerns the discovery and development of natural products as chemoprevention agents and the investigation of mechanisms of action and safety of botanical dietary supplements. The goal is to identify micronutrients and natural products that may be used to maintain optimal health and prevent cancer and neurological degenerative diseases. This research integrates the analytical tool of mass spectrometry into all aspects of the drug discovery and development from screening of botanical extracts for the identification of active natural products, to studies of drug metabolism and disposition, and to quantitative analyses of the bioavailability and pharmacokinetics of pharmacologically active compounds. These translational studies extend from basic science to clinical trials.

**Joy Waite-Cusic**

Dr. Waite-Cusic’s lab conducts applied research in four main themes: (1) pre-harvest food safety, (2) process validation, (3) prevalence of pathogens in food systems, and (4) microbiological quality indicators and spoilage.

**George Waldbusser**

Dr. Waldbusser’s research interests include ocean acidification effects on bivalves, benthic ecology and sediment biogeochemistry, tidal flat ecology.

**Jennifer Warnock**

Dr. Warnock is a Small Animal Surgeon with a practice focus on orthopedic surgery. Her major area of basic science research is on in vitro meniscal tissue engineering, using waste tissue obtained during clinical arthroscopy. Meniscal injury and deficiency is a major cause of pain, disability and irreversible osteoarthritis in dogs and humans. As the menisci have minimal to absent healing responses, creating autologous fibrocartilages in vitro through tissue engineering may be a viable strategy for addressing the meniscal deficient stifle or knee. Her current work has focused on creating fibrocartilage-like tissue from synovial and meniscal cells cultured from clinical patients in need of engineered stifle tissues. Specifically, her lab has synthesized autologous, scaffold free, tensioned neotissues, to avoid the complications seen with use of synthetic, allogenous, and xenogenic scaffolds in meniscal tissue engineering applications. Her clinical research focuses on minimally invasive surgery and validation of surgical techniques. She has a long-term goal of bringing discoveries made in her laboratory (following efficacy and safety analysis) to the hospital to benefit of her patients.

**Katja Zellmer**

I am interested in pathophysiology, diagnosis and treatment of musculoskeletal diseases in equines, specifically in osteoarthritis and tendonitis. Currently, we are investigating the effects of botulinum toxin on osteoarthritic joints, as well as signaling changes that may be responsible for the development of osteochondrosis (a developmental joint disease) in foals. We are also interested in rehabilitative methodologies for musculoskeletal diseases/injuries in horses, such as therapeutic laser. We are also investigating the effects of therapeutic exercises on muscle activation in horses and hope that this research will improve our rehabilitation of equine athletes from injuries, and possibly allow us to prevent injuries in the future.