UNDERGRADUATE SUMMER FELLOWSHIPS

Position Descriptions
Summer, 2017

Mentor: Kristine Coleman, PhD
Oregon National Primate Research Center/OHSU: Divisions of Comparative Medicine and Neuroscience

Dr. Coleman oversees the Behavioral Services Unit (BSU) at the ONPRC. This unit is responsible for attending to the behavioral and psychological needs of the monkeys at our facility. Research in the BSU is focused on examining ways to reduce stress and improve psychological well-being for laboratory primates. Such studies have included how differences in behavioral inhibition (shyness vs. boldness) affect stress-sensitivity in macaques, how predictability affects behavioral management practices, mate selection behavior and dominance in group-housed animals, and the effects of density on group dynamics.

Students will learn behavioral methodology, including the design and use of ethograms, how to use software specifically designed for behavioral observation, and statistical methods. S/he will also learn about species specific monkey behavior and how to improve the psychological well-being of captive animals.

Learn more about Dr. Coleman’s research at http://www.ohsu.edu/xd/research/centers-institutes/onprc/scientific-discovery/scientists/kristine-coleman.cfm

Mentor: Jon Hennebold, PhD
Oregon National Primate Research Center/OHSU: Division of Reproductive & Developmental Biology

The Hennebold laboratory focuses on defining the processes in the ovary that are necessary for female fertility. We are conducting molecular and cellular studies that will provide insight into the mechanisms responsible for follicle rupture and the release of the oocyte as well as the development and regression of the corpus luteum. Through recent genomic studies conducted in our laboratory we are beginning to understand how various cellular activities lead to the rupture of the ovulatory follicle and the release of a fertilizable oocyte. Areas of focus include defining the significant cellular reorganization and extracellular matrix remodeling that occur prior to and following ovulation, as well as the role bioactive lipid metabolites such as prostaglandins play in coordinating events necessary for follicle rupture.
Students will participate in studies that ultimately contribute to the development of novel approaches to control fertility, including the identification of processes that promote fertility in women seeking to have children or for the development of non-hormonal female contraceptives.

Learn more about Dr. Hennebold’s research at [http://www.ohsu.edu/xd/research/centers-institutes/onprc/scientific-discovery/scientists/jon-hennebold.cfm](http://www.ohsu.edu/xd/research/centers-institutes/onprc/scientific-discovery/scientists/jon-hennebold.cfm)

**Mentor:** Martha Neuringer, PhD  
*Oregon National Primate Research Center/OHSU: Division of Neuroscience*

The macula is the critical region of the retina responsible for high acuity central vision, and is present only in higher primates. This region is particularly vulnerable to damage, and age-related macular degeneration is the leading cause of blindness in the elderly. By using the exceptional resource of the Primate Center’s large monkey colony, we have shown that macaque monkeys spontaneously develop this disease, and thus they are uniquely valuable for defining environmental and genetic risk factors and for testing potential therapies. Together with collaborators from the Casey Eye Institute, we are testing promising new therapies, including gene therapy and stem cell therapy. We also are examining the roles of nutritional factors, including omega-3 fatty acids and carotenoids, in retinal health. In addition, we are examining the effects of these nutritional factors on brain development, function and aging. Methods employed include noninvasive retinal imaging, new brain MRI techniques, electrophysiological recording and behavioral tests of cognitive function. Candidates must be enthusiastic about working with animals. Biology, neuroscience and/or psychology background and excellent computer skills are preferred.

Learn more about Dr. Neuringer’s research at [http://www.ohsu.edu/xd/research/centers-institutes/onprc/scientific-discovery/scientists/martha-d-neuringer.cfm](http://www.ohsu.edu/xd/research/centers-institutes/onprc/scientific-discovery/scientists/martha-d-neuringer.cfm)

**Mentor:** Larry Sherman, PhD  
*Oregon National Primate Research Center/OHSU: Division of Neuroscience*

Dr. Sherman’s lab is focused on understanding ways to promote the repair of the damaged nervous system in a number of conditions including multiple sclerosis, Alzheimer’s Disease, and following chemical insults including cancer chemotherapy drugs and heavy drinking. The Sherman lab discovered that a sugar molecule, called hyaluronan (HA), regulates how neural stem cells and progenitor cells differentiate and proliferate, and that abnormal synthesis and degradation of HA prevents nervous system repair. A major goal of the lab is to develop novel strategies to promote nervous system repair by altering the catabolism of HA. They are currently looking at gene therapy, stem cell-based therapies, and drug discovery approaches to achieve this goal. The successful candidate will be expected to actively participate in designing, performing and interpreting data from these experiments. Candidates will be included on any publications arising from their time in the laboratory.

Learn more about Dr. Sherman’s research at [http://www.ohsu.edu/xd/research/centers-institutes/onprc/scientific-discovery/scientists/larry-sherman.cfm](http://www.ohsu.edu/xd/research/centers-institutes/onprc/scientific-discovery/scientists/larry-sherman.cfm)
Mentor:  Trevor McGill, PhD  
Oregon National Primate Research Center/OHSU: Division of Neuroscience

Dr. McGill’s lab is focused on determining the causes and mechanisms of photoreceptor degeneration, their effect on visual function, and testing promising new therapies for retinal degenerative diseases. These therapies include gene therapy and stem cell transplantation strategies to replace lost sensory neurons or prevent their degeneration. The work is performed using both rodent and monkey models. These studies use a series of state-of-the-art imaging and functional measurement methods to examine the detailed structure and function of the living retina noninvasively in both normal and degenerating conditions. Our imaging methods are combined/compared with standard histological and immunohistochemical techniques. Candidates must be willing to work closely with animals. Biology, neuroscience and/or psychology background and excellent computer skills are preferred. Histology experience would be a valuable asset.

Learn more about Dr. McGill’s research at http://www.ohsu.edu/xd/research/research-expertise/researchers/index.cfm?personid=2834

Mentor:  Jonah Sacha, PhD  
Oregon National Primate Research Center/OHSU: Division of Pathobiology & Immunology

With more than 20 million dead and greater than 30 million currently infected with HIV, development of a prophylactic HIV vaccine or immunotherapies to achieve durable antiretroviral therapy (ART)-free HIV remission is a top global health priority. However, despite 30 years of intense research there is no vaccine or curative therapies, and new vaccine approaches and therapeutic treatments are urgently needed. The Sacha laboratory aims to identify novel immune responses and therapeutic approaches for use in prophylactic HIV vaccines and HIV-remission inducing treatments. Specifically, we are engaged in investigating how to harness non-classical T cells, allogeneic stem cell transplantation, and negative checkpoint inhibitors to achieve novel HIV treatments.

Learn more about the Sacha lab: http://www.ohsu.edu/vgti/Sacha_Lab/Welcome.html

Mentor:  Matthew Ford, PhD  
Oregon National Primate Research Center/OHSU: Division of Neuroscience

A primary interest of the Ford laboratory is polydrug abuse; alcohol and nicotine specifically. We are studying this co-abuse issue with a combination of self-administration and drug discrimination procedures. From the drug discrimination angle we have been studying how alcohol and nicotine may be interacting at the level of their subjective drug effects, and have identified dual mechanisms of overshadowing and potentiation that occur (see http://www.ncbi.nlm.nih.gov/pubmed/22763667). We are now undertaking additional studies to explore the receptor mechanisms and brain loci involved in nicotine’s ability to potentiate the ethanol cue. As far as self-administration, we are developing a model of concurrent oral intake of both drugs, and have uncovered some interesting findings that are consistent with the discriminative stimulus findings (mainly, that nicotine enhances ethanol intake as would be expected based on epidemiological evidence from human co-abusers). So far our studies have been in mice, but we are in the process of developing an e-cigarette procedure for nicotine delivery in cynomolgus macaques to facilitate the study of nicotine addiction as well as alcohol-nicotine co-abuse.
Another research interest is therapeutic intervention for excessive alcohol self-administration in macaques. We are investigating the role of gene therapy following delivery of adeno-associated virus directly into reward-related brain areas as well as pharmacotherapy via oral dosing with a novel compound with activity at GABA\textsubscript{A} receptors.

Fellowship candidates should anticipate working directly with mice or macaques, analyzing large data sets of behavioral data, be computer literate, and have budding interests in animal behavior, pharmacology, and addiction research.

*Learn more about the research being conducted by Dr. Ford*  
[http://www.ohsu.edu/xd/research/centers-institutes/onprc/scientific-discovery/scientists/Matthew-Ford.cfm](http://www.ohsu.edu/xd/research/centers-institutes/onprc/scientific-discovery/scientists/Matthew-Ford.cfm)

**Mentor:** Anna Roe, PhD  
*Oregon National Primate Research Center/OHSU: Division of Neuroscience*

How does the brain produce perception, thought, and behavior? The laboratory of Anna Roe studies how the functional modules of the cerebral cortex (roughly 200 um in size) underlie visual and tactile perception and mediate goal directed behavior. The lab’s experimental approaches include the use of implanted ‘windows on the brain’, intrinsic optical imaging, single and multielectrode recording arrays, anatomical tracing techniques, intracortical brain stimulation with electrical, optogenetic and near infrared laser methods, fMRI, and visual and tactile illusions. The lab is very interested in technology development and brain-machine interfaces. One goal of this combined behavioral, functional, anatomical, and neuroengineering approach is in the development of future mind-machine interfaces that can restore or enhance function after injury.

**Fellowship candidates should anticipate working on analyzing large data sets (imaging, electrophysiological, and/or anatomical), be computer literate, and have budding interests in animal behavior, brain circuitry, and perception. Candidates with neuroscience, psychology, and/or engineering background and excellent computer skills are preferred.**

*Learn more about the research being conducted by Dr. Roe at*  
[http://www.ohsu.edu/xd/research/centers-institutes/onprc/scientific-discovery/scientists/Anna-Wang-Roe.cfm](http://www.ohsu.edu/xd/research/centers-institutes/onprc/scientific-discovery/scientists/Anna-Wang-Roe.cfm)

**Mentors:** Alejandro Lomniczi, PhD/Hollis Wright, PhD  
*Oregon National Primate Research Center/OHSU: Division of Neuroscience*

The Lomniczi lab uses cellular, molecular, genetics and systems biology strategies, in addition to high-throughput approaches and computational biology methods to develop three interrelated concepts: 1) That mammalian puberty is controlled by genetic networks that, operating within different cell contexts in the neuroendocrine brain, coordinate the activity of GnRH neurons at puberty, 2) That these networks are controlled at the transcriptional level by a repressive mechanism exerted by discrete subsets of gene “silencers”, and 3) That this transcriptional regulation is under epigenetic control, i.e., a mechanism by which environmental factors (such as nutrition, man-made chemicals, changes in light/dark cycle, etc.) regulate gene activity without modifying the actual sequence of the encoding DNA.
Dr Hollis Wright, a Staff Scientist in Lomniczi’s lab, has a PhD degree in bioinformatics and is responsible for implementing and developing a variety of computational biology methods used to gain novel insights into the biology of the pubertal process and study the behavior of the genetic networks involved in the epigenetic and transcriptional control of puberty.

The lab seeks two types of interns: Students interested in exploring and implementing all the new cell biology and genomic technologies to further investigate the neuroendocrine system and also students with particular interest in further develop bioinformatics and systems biology methods that can be used to analyze the large and diverse data sets derived from the study of this important biological process.

Learn more about research in the Lomniczi lab at https://www.ohsu.edu/xd/research/centers-institutes/onprc/scientific-discovery/scientists/Alejandro-Lomniczi.cfm

Research that takes place at ONPRC/OHSU is undertaken to improve understanding of human health and disease. Animal models are essential in this pursuit, and applicants need to be aware that in certain cases invasive animal procedures are necessary. Ethical issues associated with research in humans and other animals can evoke strong controversy, yet animal research is presently our only means of answering certain critical questions that we hope will lead to improved therapies and/or cures for disease. Federal law mandates adherence to regulations that ensure our research procedures are both humane and justified in terms of their contribution to knowledge and medical practice. Persons who apply for apprenticeship positions at ONPRC should support the ethical conduct of animal research that is carried out in compliance with federal laws and regulations.