Claremont Colleges' Intercollegiate Neurosciences Program
2016 Summer Fellowship Placement Sites

Please select up to five Placement Sites for your application for the 2016 Summer Research Fellowships. You will be asked to rank them in order of preference on the application form. Placement sites are listed in alphabetical order by Principal Investigator/Supervisor, and have been bookmarked.

Represented institutions include:

- California State University, Los Angeles (CSULA)
- Champalimaud Centre for the Unknown, Portugal
- City of Hope
- House Ear Institute (USC)
- Huntington Medical Research Institute
- Loma Linda University School of Medicine
- Oregon Health Sciences University
- UCLA
- UCSD
- Western University of Health Sciences

Mike Barish, Ph.D.
Department of Neuroscience
Beckman Research Institute
City of Hope
Duarte, CA

Dr. Barish is investigating early electrical activity in the developing hippocampus and cortex and its relationship to neural birth, migration and maturation. In collaboration with Karen Aboody, M.D. , (Hematology/HCT) and Carlotta Glackin, Ph.D. , is also examining the molecular mechanisms of neural progenitor cell migration to glioma and tumors outside the brain, and targeting of these tumors with genetically-modified therapeutics using immortalized neural progenitor cells. For more detailed information on Dr. Barish's research please go to www.cityofhope.org/neurosciences or you may contact Dr. Barish at mbarish@coh.org.

Michel Baudry, Ph.D.
Graduate College of Biomedical Sciences
Western University of Health Sciences
Pomona, CA

Research Interests:

1. Mechanisms implicated in long-term synaptic potentiation and depression in
2. hippocampus and other brain regions.
3. Regulation of glutamate receptors.
4. Role of oxygen free radicals in central nervous system.
5. Mechanisms underlying selective neuronal degeneration.
6. Computational neuroscience

For more information please visit http://www.westernu.edu. You may contact Professor Baudry at mbaudry@weaternu.edu.

Xiaoning Bi M.D., Ph.D.
Basic Medical Sciences
College of Osteopathic Medicine of the Pacific
Western University of Health Sciences
Pomona CA

Research in my laboratory seeks to understand how neurons develop, mature, and function properly and how they die when challenged by natural aging process, by intrinsic genetic defects, or by various insults. We hope that by understanding the basic molecular cellular mechanisms that govern these processes we can develop better preventive and therapeutic strategies for central nervous system disorders in children as well as in elders.

For more information please visit www.westernu.edu. You may contact Professor Bi at xbi@westernu.edu.

Samantha Butler Ph.D.
Department of Neurobiology & The Edythe and Eli Broad Center of Regenerative Medicine and Stem Cell Research
UCLA David Geffen School of Medicine
Los Angeles, CA

The extraordinarily diverse functions of the nervous system, from cognition to movement, are possible because neurons are assembled into precisely ordered networks that permit them to rapidly and accurately communicate with their synaptic targets. My laboratory seeks to understand the mechanisms that establish these neuronal networks during development with the long-term goal of determining how this process may be co-opted to regenerate diseased or damaged circuits. Working the developing spinal cord, we have shown that molecules previously identified as morphogens, such as the Bone Morphogenetic Proteins (BMPs) family of growth factors, can also act as axon guidance signals. We are now determining the key intrinsic factors that translate the ability of the BMPs to direct cell fate and axon guidance decisions, two strikingly different processes in the generation of neural circuits. During the course of these studies, we have identified a critical mechanism by which the rate of axon outgrowth is controlled during embryogenesis, thereby permitting neural circuits to develop in synchrony with the rest of the embryo. My laboratory is currently assessing how this mechanism can be harnessed to accelerate axon growth in a regenerative context to stimulate the repair of neural circuits. The successful implementation of this technology could result in significantly improved recovery times for patients with damaged nervous systems.
For more information please visit www.faculty.neuroscieuce.ucla.edu or contact Dr. Butler at butlersj@ucla.edu.

D. Joshua Cameron, Ph.D. College of Optometry, Neuroscience
Western University of Health Sciences
Pomona, CA

Blindness, in many forms, affects millions of people around the world. The causes are varied and oftentimes poorly understood. The zebra fish has emerged as a model organism for many diseases and

basic biological processes. Zebra fish can be used in a variety of molecular, genetic, and behavioral techniques, making them aptly suited for complex experimentation.

I am taking a two pronged approach to gain insight into several of these diseases using zebra fish as a model. First, I am exploring the developing eye, with a significant focus on the retina and the regulatory role of vitamin A. Second, I am working to develop several eye disease models that can be used to examine pathophysiology and treatments.

Because many causes of blindness are linked to other disease systems in the body, I am also collaborating with fellow scientists to study their associated causes and effects - again using zebra fish as our model.

Contact Information: http://www.westernu.edu; Email: jcameron@westernu.edu

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Douglas Ethell, Ph.D.
Molecular Neurobiology Division
College of Biomedical Science
Western University of Health Science
Pomona, CA

My research interests are focused on neurodegenerative disorders, specifically Alzheimer's disease and Parkinson's disease. Experimental systems we use include transgenic mice, cell and molecular biology, as well as human tissue samples. Recently, I have established stem cell techniques in my lab that allow us to produce neurons and immune cells from induced-pluripotent stem cells. My research has been supported by grants from NIH and the National Multiple Sclerosis Society, with current funding from the California Institute for Regenerative Medicine (CIRM) and the FRAXA Foundation.

For more information please contact Professor Ethell at dethell@westernu.edu.

Mike Harrington
Department of Molecular Neurology
Huntington Medical Research Institute
99 North El Molino Ave, Pasadena CA

In 1997, HMRI developed a new diagnostic tool – magnetic resonance spectroscopy (MRS) – that led to the discovery and patent of the first AD biomarkers, a revolutionary concept of the time.

Now MRS is being employed again, this time in tandem with molecular neurology in a two-year study to find AD biomarkers long before onset of symptoms.

For more information go to www.hmri.org or contact Dr. Harrington at mghworks@hmri.org.

Timothy Gentner, Ph.D.
Department of Psychology
University of California, San Diego
La Jolla, CA

Our research takes an integrative, systems-level approach to study the neural mechanisms that govern the sensory, perceptual, and cognitive processing of real-world acoustic signals. We want to know how the brain represents behaviorally important, complex, natural stimuli; what spatial and temporal forms these

functional representations assume; how they are learned and remembered; how perceptual representations function in higher-level decision processes; and how the outputs of such processes guide natural behaviors. Our primary focus is on the elaborate vocal communication system in songbirds. For more information please contact Dr. Gentner at tgentner@ucsd.edu or visit the lab website at http://gentnerlab.ucsd.edu.

David Glanzman, Ph.D.
Department of Integrative Biology and Physiology
University of California, Los Angeles
Los Angeles, CA

My laboratory is interested in the cell biology of learning and memory in simple organisms. The marine invertebrate Aplysia californica has a comparatively simple nervous system (~ 20,000 neurons) that provides a valuable experimental model for understanding the cellular mechanisms that underlie simple forms of learning, such as habituation, sensitization, and classical conditioning. Another experimental advantage of Aplysia is that sensory and motor neurons that mediate specific reflexes of the animal can be placed into dissociated cell culture where they will reform their synaptic connections. These in vitro sensorimotor synapses are extremely useful for cellular and molecular studies of short- and long-term learning-related synaptic plasticity. Currently, my laboratory is investigating the modulation of AMPA-type glutamate receptors during learning in Aplysia. We have found that serotonin, an endogenous monoamine that plays a central role in learning, modulates the efficacy of AMPA receptors in the motor neurons. Our current evidence indicates that serotonin modulates the trafficking of AMPA receptors in the motor neurons, causing additional receptors to be delivered to postsynaptic sites via exocytosis. We also wish to know whether long-term learning in Aplysia involves changes in the expression of glutamate receptors. We have cloned and sequenced ten AMPA-type and one NMDA-type glutamate receptor from the CNS of Aplysia. Currently, we are using the techniques of in situ hybridization and quantitative RT-PCR to examine whether long-term sensitization and long-term habituation are accompanied by changes in glutamate receptor expression. For more information please visit www.ibp.ucla.edu or contact Professor Glanzman at dglanzman@physci.ucla.edu.

William Grisham, Ph.D.
Department of Psychology & Interdisciplinary Neuroscience Program
University of California, Los Angeles
Los Angeles, CA

Sex Differences in the Nervous System

For some time, my research has included undergraduate participants, and I am quite pleased that I have published both abstracts and peer-reviewed research articles with my undergraduate colleagues. My research focuses on sex differences in the nervous system and their development. We use songbirds as a model because sex differences between male and female songbird brains are large, and the behavioral consequence of these sex differences is known—males develop a full song system and sing but females do not. We are specifically trying to understand what triggers these sex differences during early development and also what changes occur during puberty to "lock-in" song behavior and deprive this system of its plasticity.
Most of my research has explored manipulations of steroid hormones in early development and their consequences on song system development. Some of this research has led to the conclusion that steroid hormones may not be the only factor in the differentiation of this song system, so we are currently exploring other factors as triggers in development.

Recently, Dr. Grisham has extended his research focus to investigating sex differences and the corpus callosum using functional magnetic resonance imaging (fMRI) and is actively seeking undergraduate students for collaboration.

For further information please contact Dr. Grisham at grisham@lifesci.ucla.edu.

Alicia Izquierdo-Edler, Ph.D.
Department of Psychology
California State University, Los Angeles
Los Angeles, CA

Research Interests

My main interests include: Uncovering the neural mechanisms important for flexible cognition and behavior, exploring the factors contributing to reward-related decision-making, and studying the neuropharmacology of [and effects of psychostimulants on] executive function. At best, addressing these research questions could contribute to a better understanding (and treatment) of diseases such as OCD, PTSD, addiction/relapse, and Impulse Control Disorder.

Contact: aizquie@calstatela.edu.

Edythe London, Ph.D.
Departments of Psychiatry and Biobehavioral Sciences, and Molecular and Medical Pharmacology, at the David Geffen School of Medicine, UCLA
University of California, Los Angeles
Los Angeles, CA

Dr. London's research has advanced the study of substance abuse and the development of new approaches and probes for studies of brain function. She has edited several books and authored over 200 original research articles and over 60 reviews. Her most recognized accomplishments involve PET scanning of human subjects who suffer from addictions. Dr. London's group was the first to show a relationship between drug craving and activity of brain regions that link memory with emotion. She also showed that drug abusers have structural abnormalities in prefrontal cortex and deficits in decision-making tasks that depend on prefrontal cortex function. Her work influenced other researchers to look toward the frontal lobe for an understanding of the compulsive self-administration of drugs despite detrimental effects, which characterizes drug addiction. Most recently, she and her colleagues have developed new probes for external imaging of those receptors in the brain where nicotine binds to produce its behavioral actions.

For more information you may contact Dr. London at elondon@mednet.ucla.edu or visit her faculty page at http://www.pharmacology.ucla.edu.

Bonnie Nagel, Ph.D.
Department of Behavioral Neuroscience
Developmental Brain Imaging Lab
Oregon Health Sciences University
Portland, OR

Dr. Nagel's clinical interests are in the area of pediatric neuropsychology. She has extensive experience in the clinical neuropsychological evaluation of children and adolescents with a variety of disorders and

diagnoses. Dr. Nagel's research focuses on adolescent brain and cognitive development in healthy and at-risk populations. Her recent work has focused on understanding the development of executive, emotional, and reward-based systems in the brain and how perturbations to these systems may result in a heightened vulnerability for psychopathology during the adolescent years.

You may contact Dr. Nagel at nagelb@ohsu.edu.

Katherine Narr, Ph.D.
Brain Research Institute
UCLA Brain Mapping Center
University of California, Los Angeles
Los Angeles, CA

Dr. Katherine Narr is an Associate Professor of Neurology at UCLA. She received her Ph.D. in Neuroscience, and completed her postdoctoral fellowship co-jointly in the Departments of Neurology and Psychiatry at the University of California, Los Angeles. Dr. Narr's program of research is focused on using imaging data from multiple modalities, including structural (sMRI), functional (fMRI) and diffusion tensor imaging (DTI), to facilitate a deeper understanding of the pathophysiological mechanisms and genetic contributions associated with schizophrenia and other psychiatric disorders. Though her work includes examining the regional specificity of structural brain abnormalities and functional impairments across several different brain systems, she is focused on using advanced imaging methodologies to determine whether aspects of a specific cortical network, the medial temporal lobe memory system, are selectively disturbed in schizophrenia. These experiments aim to establish the presence of structure-function relationships, and to identify system components indexing genetic vulnerability effects.

For more information go to http://narr.bmap.ucla.edu. You may contact Dr. Narr at narr@ucla.edu.

Arbi Nazarian, Ph.D.
Pharmaceutical Sciences Division
College of Pharmacy
Western University of Health Sciences
Pomona, CA

The use of drugs of abuse during development can lead to a greater propensity to drug addiction in adulthood. Therefore, in order to understand the changes that occur in the developing brain, my research investigates animal models of opiate and psychostimulant addiction across different developmental stages (neonatal, adolescence and adulthood) by using behavioral, pharmacological and cell biological approaches.

A second research theme in my laboratory is to study nociceptive processing as it pertains to the underlying mechanisms of opiate tolerance at the level of the brain and the spinal cord.

For more information please contact Professor Nazarian at anazarian@westernu.edu

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Andy Obenaus, Ph.D.
Division of Biochemistry
Loma Linda University School of Medicine
Loma Linda, CA 92350

Dr. Obenaus serves as the Director of the Non-Invasive Imaging Laboratory in the Radiation Biology Program at Loma Linda University. His laboratory is well known for its state-of-the-art equipment. His expertise is in the area of neuroimaging of disease, and the Noninvasive Imaging Laboratory has experience with a broad range of topics and models of disease including Alzheimer's disease and neurorepair using stem cells. He has been involved in teaching Biomedical Imaging and Radiation Biology, and he has supervised a number of undergraduate and graduate students.

For more information: http://www.llu.edu/llumc/neurosciences/ or you may contact Dr. Obenaus at aobenaus@llu.edu

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Robert Pechnick, Ph.D.
Neuropharmacology
College of Osteopathic Medicine of the Pacific
Western University of Health Sciences
Pomona, CA

The research in my laboratory is focused on three aspects of neuropsychopharmacology: using animals models to understand the causes of and to develop new potential treatments for various forms of mental illness; utilizing both in vivo and in vitro approaches to study the neuropharmacology of drugs of abuse; and defining the role of hippocampal neurogenesis in health and disease states. Primary goals include: characterizing the role of developmental insults (prenatal, neonatal and adolescent) in producing neuropsychiatric disorders; defining the involvement of cytokines and stress in neurogenesis and depression; understanding the role of neurogenesis in post-chemotherapy-induced cognitive function, and determining the neurochemical mechanisms underlying the effects of nicotine, cocaine and phencyclidine (PCP), and the pathophysiological and neurochemical consequences of the repeated administration of these drugs. Experimental approaches involve studying the effects of the systemic and central administration of selective agonists, antagonists and antisense oligonucleotides, using transgenic animal models, utilizing viral-mediated gene delivery, and characterizing functional responses as well as changes in receptor subunit gene expression, neurotransmitter levels and neurotransmitter receptors after acute and chronic drug administration.

For more information: www.westernu.edu. You may contact Professor Pechnick atrpechnick@westernu.edu.

Ephron Rosenzweig, Ph.D.
Assistant Project Scientist
Center of Neural Repair
Department of Neurosciences
University of California, San Diego

My research addresses two different approaches to spinal cord repair: regeneration of cut axons and sprouting of intact axons. Although regeneration of cut axons is the ultimate goal of spinal cord repair research, data from our lab and others suggests that a more practical approach may be to stimulate the compensatory sprouting of axons spared by the initial injury. These axons could form new circuitry

beyond the lesion, potentially restoring function. Because even severe human spinal cord injuries (SCIs) generally leave some axons intact, many people currently living with SCI could benefit from such a treatment.

For more information please contact Dr. Rosenzweig at ephronr@gmail.com. You may also contact the Director of the Center for Neural Repair at UCSD Dr. Mark Tuszynski at mtuszyns@ucsd.edu.

Amelia Russo-Neustadt M.D., Ph.D.
Biological Sciences Department
California State University, Los Angeles
5151 State University Drive, Los Angeles

Effects of physical activity and antidepressants on induction of BDNF in the brain.
My current research focus involves the study of physical activity and antidepressant treatment interactions in the brain. Our studies seek to reveal the mechanisms of growth factor regulation and behavioral/functional recovery resulting from these interactions.

For more information go to www.calstatela.edu.You may contact Professor Russo-Neustadt at arusson@calstatela.edu.

Felix Schweizer, Ph.D.
Department of Neurobiology
David Geffen School of Medicine
UCLA, Los Angeles CA

We are interested in molecular and cellular aspects of synaptic transmission. in the regulation of synaptic transmission and how this regulation affects neural systems. We are using acutely isolate neurons, brains slices and cultured cells in order to investigate these issues. We are using electrophysiology (incl. capacitance measurements), imaging and biochemical methods.

For more information please contact Professor Schweizer at felixs@ucla.edu or visit the lab website at http://schweizerlab.org.

Neil Segil, Ph.D.
House Ear Institute (USC)
Section on Cell Growth and Differentiation
Laboratory of Developmental Biology
Department of Cell and Molecular Biology
Los Angeles, CA

1. Cell cycle regulation during the development and regeneration of the inner ear.
   Coordinating cell proliferation, growth and differentiation is crucial for the development of animal form. This project investigates the biochemical machinery responsible for this coordination. Including:
   • Regulation of cyclin-dependent kinases and their inhibitors in development.
   • Role of proneural and neurogenic genes in cell patterning, differentiation, and cell cycle control.
2. Stem cells and progenitors in the developing inner ear.
   The goal of this project is the identification and molecular characterization of progenitor cells (stem cells) that are able to differentiate into the sensory and non-sensory cells of the auditory and

vestibular epithelium. This project involves the prospective identification, purification and growth in vitro of hair cell precursors. In the future, manipulation of these cells may offer an alternative to hearing aids and cochlear implants for the treatment of hearing loss.

3. Establishment and maintenance of the postmitotic state. We have shown that maintenance of the postmitotic state of inner ear sensory hair cells is an active process involving the cell type specific regulation of cyclin-dependent kinase inhibitors. Loss of the ability to maintain the postmitotic state leads to cell death. The focus of this project is on the molecular mechanisms that underlie the permanently postmitotic state of terminally differentiated cells and the signaling pathways leading from cellular stress to the cell cycle machinery.

For more information: http://www.hei.org/research/scientists/segil.html. You may contact Dr. Segil at nsegil@hei.org.

Alcino Silva, Ph.D.
Departments of Neurobiology, Psychiatry, Psychology
Gonda Neuroscience and Genetics Lab
University of California, Los Angeles

Our laboratory at UCLA is studying learning, memory and its disorders, including cognitive deficits associated with aging, learning disabilities and schizophrenia.

Our field of study is Molecular and Cellular Cognition. The goal of this field is to derive explanations of cognitive processes that integrate molecular, cellular, and behavioral mechanisms and to find treatments for cognitive disorders.

Highlights:

- We are searching for molecular, cellular and circuit processes that underlie the encoding, allocation, storage and recall of information in the brain.

- Additionally, we hope our studies of the mechanisms underlying extraordinary cognitive function may lead to general treatments for cognitive disorders.

- We are using insights into mechanisms of memory to unravel the causes and develop treatments for cognitive deficits associated with aging, learning disabilities and schizophrenia. Recently, we have shown that it is possible to reverse neurodevelopmental disorders, such as learning disabilities associated with TSC and NF1, in adults.

For more information you may contact Dr. Silva at asilva@ucla.edu or visit his website at http://www.silvalab.com.

Toshifumi Tomoda, M.D. Ph.D.
Department of Neuroscience
Beckman Research Institute
City of Hope, Duarte, CA

Initial neuronal polarity determines progenitor cell division and axon/dendrite partitioning, which ultimately ensures functional polarity of neurons, synapse and brain network formation. We study axonal trafficking mechanisms that underlie neuronal polarity establishment, using molecular cell biology, biochemistry, imaging and Drosophila / mouse genetics.

For more information on Dr. Tomoda's research please visit http://www.cityofhope.org/research/beckman-research-institute/neuroscience/ or you may contact Dr. Tomoda directly at ttomoda@coh.org.

Joshua Trachtenberg, Ph.D.
Department of Neurobiology
Brain Research Institute
University of California, Los Angeles

The goal of the research in my lab is to understand, on the level of single neurons and synaptic connections, how sensory information changes the "neural circuit" - the connections between neurons in the brain. It is quite clear that connections between brain cells are extremely labile when we are young (and wild and free), but progressively less so as we age out of adolescence, into adulthood, and old age. Yet it remains something of a mystery why. How is the young brain different than the adult brain? Why is it so trivial for children to learn new languages, symbolic representation, new motor movements, and so on?

To answer these questions, research in my lab employs imaging, genetic, optogenetic, pharmacogenetic, and electrophysiological tools to probe neural circuitry in the brains of adolescent and adult mice. A main technique in the lab is resonant scanning 2-photon calcium imaging, which allows us to visualize the activity of hundreds of neurons in the living brain with high spatial and temporal resolution. With this technique, we follow the activity of neuronal networks over hours, or days, or weeks and define exactly how the network changes before and after learning. We are also mapping neural circuit connectivity both in vivo, by modeling connectivity probabilities based on the calcium imaging data we acquire, and in brain slices using glutamate uncaging or channel-rhodopsin stimulation.

For more information on Dr. Trachtenberg's research please visit www.neurobio.ucla.edu.

Christopher Wilson, Ph.D.
Basic Sciences
Division of Physiology
School of Medicine
Loma Linda University School of Medicine
Loma Linda, CA 92350

My laboratory is primarily interested in the generation and modulation of respiratory rhythm in the mammalian central nervous system. In the past decade, we have focused on apnea of prematurity and other breathing problems that premature infants suffer. The questions we seek to answer are: How does the brain generate the drive for breathing? How is breathing pattern modulated by reflexes and chemosensation? How can we improve breathing regularity in premature infants?

We use electrophysiology techniques (extracellular single-unit recording, whole cell patch-clamp, electrochemistry) and fluorescence imaging (calcium indicators, pH sensitive dyes, cell specific markers) to explore the dynamic relationship between cells that are phasically active during breathing. Our chief animal model is the developing rat but we also use mice to explore genetic variability in the respiratory neural substrate. For me information please visit http:// www.llu.edu/medicine/basic-sciences/faculty/physiology/. Email: cgwilson@llu.edu

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Champalimaud Centre for the Unknown, Portugal

Claremont Colleges' Intercollegiate Neurosciences is willing to send a number of undergraduate students to intern at neuroscience laboratories in the Champalimaud Centre for the Unknown during the summer of 2016 as part of the of the Neuroscience Summer Fellowship Program. Students should be neuroscience majors enrolled at the 5-Cs.

The Champalimaud Neuroscience Program (CNP), part of the Champalimaud Centre for the Unknown, undertakes research by individual researchers and research teams working at the cutting edge of biomedical science. CNP seeks to facilitate the quest of scientists to forge new links between nervous system function and behavior. The scientific goals of the program are represented not by a particular field within neuroscience, but by the full intellectual scope of the scientists of the program. The CNP is located in a purpose built facility in Belém, Portugal and is a home to over 100 graduate students and postdoctoral scientists organized around the labs of approximately 17 principle investigators exploring many different levels of neurobiological investigation.

The students will receive $5000 towards expenses as part of the 5-C Neuroscience Summer Fellowship Program.

The CNP will provide some meals for students in the Centre cafeteria.

Students will be responsible for all travel expenses including flight costs and travel within the city.

The CNP will work with students to help them find appropriate and affordable housing during their time in Portugal, perhaps in shared accommodations with other American undergraduates interning at the CNP.

Students will be placed into a lab according to the interests and skills of the student and the space resources of the CNP.

Interested students should indicate Champalimaud Centre as one of their research site choices in the Neuroscience Summer Fellowship Program application form. This opportunity is subject to availability so please be sure to indicate alternative sites. Successful placement at the center will also depend on passing an interview.

For further information please visit http://www.neuro.fchampalimaud.org/

A general informational meeting will be held for interested students early in the spring semester.