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April 21, 2015

Dear UGA Faculty and Students,

We are delighted and honored to recognize this year’s CURO Summer Research Fellows, each of whom is featured here with a summary of his or her faculty-mentored research proposal. The goal of the CURO Summer Research Fellowship is to provide opportunities for intensive, immersive, faculty-mentored research experiences for academically talented undergraduates. The program advances the students’ knowledge and abilities to think critically, solve problems, and contribute to a greater understanding of the world.

We are proud of the accomplishments of present and past CURO Summer Fellows and with the mentorship provided by our exceptional faculty. The Summer Fellowship program has contributed to building a culture of undergraduate inquiry at the University of Georgia, and the CURO Summer Fellows serve as ambassadors, sharing their enthusiasm and expertise in a variety of professional forums on campus as well as at regional, national, and international meetings.

The 2015 CURO Summer Research Fellowship is funded through the Honors Program, the Office of the Senior Vice President for Academic Affairs and Provost, and the Alumni Association.

Please join us in congratulating these young scholars on the occasion of being awarded these prestigious fellowships. Please join us also in thanking the faculty research mentors whose support and guidance are crucial to the CURO Summer Fellows’ success.

Sincerely,

Dr. David S. Williams, ’79, ’82  Dr. Martin P. Rogers, ’01, ’11
Associate Provost and Director  Associate Director
Localization of an Essential Regulator of Transferrin Endocytosis in
Trypanosoma brucei

2015 Summer Fellow: Bryan Aguanta
Research Mentor: Dr. Kojo Mensa-Wilmot, Department of Cellular Biology

Human African Trypanosomiasis (HAT), also known as sleeping sickness, is a neglected disease endemic to rural communities in Sub-Saharan Africa, and is caused by the protozoan parasite, Trypanosoma brucei. Infection is mainly spread by the bite of the tsetse fly, a large species of fly which feeds on mammalian blood and harbors the parasite in its midgut.1, 2 The disease is characterized by an initial onset of non-specific symptoms, such as fever, headache, itching at the initial infection site, and swelling of the lymph nodes, with more acute symptoms manifesting after the parasite has crossed the victim's blood-brain barrier.3 At this point, patients experience tremors, limb paralysis, behavioral changes, and severely disrupted sleep patterns, eventually leading to death.1 At present, only four drugs are used to treat the disease, all of which must be administered via intramuscular or intravenous injection, and all of which carry high potential for adverse reactions in patients.1 Given the environment in which HAT is endemic, this illustrates the need for the development of new drugs which can be administered outside of a hospital and do not possess the deleterious side effects of current treatment methods. In order for this to occur, new cellular signaling pathways must be studied and characterized in the parasite, to reveal new targets for drug discovery efforts.

T. brucei proliferates in the bloodstream of a mammalian host and utilizes endocytosis to uptake host transferrin, an iron-binding protein which normally serves to transport iron to the host’s tissues, as an essential source of iron for the growth of the parasite.3 Preliminary laboratory findings suggest that the enzyme glycogen synthase kinase-3, beta isoform (GSK3β), is an essential regulator of transferrin endocytosis in T. brucei. Because of this, we hypothesize that GSK3β localizes to organelles in the parasite’s endocytic pathway, such as the endocytic vesicles and endosomes. To evaluate this hypothesis, we will use endogenous protein tagging constructs, followed by immunofluorescence assays, which will allow us to visualize the distribution of the protein of interest in relation to proteins in known cellular structures. We will also use protein tags as a tool to identify other proteins with which GSK3β may interact. In doing this, my goal is to aid future drug discovery endeavors by defining the localization and protein interaction network of an important signal transduction component.
References:


Movements and Habitat Use of *Crotalus horridus* and *Terrapene carolina* in a Fragmented Landscape

2015 Summer Fellow: Katherine Bentley  
Research Mentor: Dr. John Maerz, Warnell School of Forestry & Natural Resources

Increasing suburban development creates significant challenges for the conservation and management of wildlife. Developed landscapes have dense roads and increasingly fragmented areas of smaller, degraded habitat. Fragmented landscapes are challenging for wildlife that move over large distances to access the different kinds of habitats required to complete their life cycles (Andrews & Gibbons, 2005). Information on habitat use and species movement within suburban landscapes is needed to identify threats and inform effective management.

Fragmented landscapes create barriers to reptile movement, which can result in high mortality and population isolation or declines (Andrews & Gibbons, 2005). The majority of research on habitat loss and fragmentation effects on reptiles is concentrated in mountains or coastal plains, with little study of the Piedmont. The Piedmont region is experiencing one of the highest rates of urban growth and development in the Southeast, resulting in rapid forest and wetland loss and habitat fragmentation (Burton & Samuelson, 2008).

This study focuses on two species of reptile that have relatively little known about their movement ecology within the southeastern Piedmont region. In northern parts of their range, timber rattlesnakes (*Crotalus horridus*) move long distances and have declined due to habitat loss and fragmentation (Brown, 1993). Information on movement of timber rattlesnakes is desirable to understand the potential for human-snake conflicts in suburban areas and is a high priority for conservation and public welfare. The second focal species is the eastern box turtle (*Terrapene carolina*), which is common throughout the eastern United States. Like timber rattlesnakes, box turtles are known to move large distances and have shown declines in areas of increased suburbanization and forest fragmentation.

My study site is the Warnell School of Forestry and Natural Resources’ Whitehall Experimental Forest, located in Clarke County, GA. The forest spans ~480 acres and includes planted pine and deciduous forest fragments, as well as wetlands along the Middle Oconee and North Oconee Rivers. This site is ideal for this study because I can measure whether animals prefer particular types of forest patches, how often and far animals move among patches, and whether animals occur disproportionately close to the few wetlands on the property.

I will use two approaches to study animal movements and habitat use. I will use radio telemetry to track at least five individuals of each species. I will affix external radiotransmitters to turtles and surgically implant transmitters into rattlesnakes. Using GIS software, I will analyze whether animal home ranges and movements are biased toward deciduous forest patches or patches that include wetlands, and I will determine whether certain features (e.g., roads or open areas) affect animal movements within the landscape. I will also use georeferenced “citizen science” data of reptiles encountered during student surveys to determine whether reptile encounter probabilities are associated with particular types or sizes of forest fragments or landscape features.

My project has significant broader impacts beyond its contributions to the ecology and conservation of these species. My project is a collaboration with the Orianne Society, an international reptile conservation organization collaborating with UGA. I will also work with Dr. Stephen Divers at the UGA Veterinary Hospital to surgically implant transmitters. My project is creating citizen science opportunities to engage students in native reptile ecology and the challenges those animals face in developed landscapes.
Proposals

References:


The Action of a Hemipteran-Active *Bacillus thuringiensis* Toxin in a Plant Bug, *Lygus lineolaris*

2015 Summer Fellow: Darcie Bruce
Research Mentor: Dr. Michael Adang, Department of Entomology

Phytophagous bugs, including the tarnished plant bug *Lygus lineolaris*, have emerged as major global crop pests. These insects in the order Hemiptera have piercing-sucking mouth parts, stylets that puncture plant cells and remove cellular contents. These species are cosmopolitan pests of high value crops. During the early bud and bloom stage, feeding by these insects causes bud and flower loss, reducing yield on stone fruits and a number of agricultural crops including cotton. As a result of the boll weevil eradication project in the U.S. and genetically modified Bt cotton, *Lygus* plant bugs have become serious economic pests of cotton. *Lygus* feed on developing flower buds of cotton, and plants respond by abscising damaged buds, causing crop yield loss. According to cotton insect loss estimates for 2013, *Lygus* was the top pest nationally, infesting about 37% of the acres in the U.S. (Michael Williams, MSU).

Current *Lygus* management relies on scouting and control with chemical insecticides. Need has developed for genetically modified plants that are tolerant to the *Lygus*-stink bug complex. *Bacillus thuringiensis* (Bt) Cry proteins have become vital tools for pest management, yet often their usage is challenged by resistance or low susceptibility in pest species. Unfortunately, *Lygus* are, at best, marginally susceptible to Bt toxins. Recently, BtCry51Aa was determined to have insecticidal activity against *Lygus* (Baum et al., 2012).

The Cry51Aa *Lygus*-active protein has been investigated in the Adang laboratory. Through collaboration with a visiting scholar in the Adang laboratory (Chengchen Xu), Dr. B.C. Wang (Professor at UGA), and a team of Chinese scientists, they solved the complete structure of this hemipteran-specific toxin by X-ray crystallography (Xu et al., submitted). Their work will be the first report of a Bt insecticidal toxin with high structural similarity to aerolysin-type β-pore forming toxins. Their study provides insights into the mechanism of action of this type of toxin, and the information will be useful in my project investigating Cry51Aa action in *Lygus*.

Under the guidance of Dr. Michael Adang my goals are to 1) Image BtCry movement and binding in *Lygus* nymphs. The Cry51Aa toxin will be labeled with Alexa fluor and Quantum dots for tracking toxins in nymphs of *Lygus* by confocal microscopy and near infrared (NIR) imaging. QDots are semiconductor nanocrystals that recently have become powerful tools for imaging molecular interactions in biological systems, including the imaging of BtCry movement and gut binding in silkworms. Nymphs of *Lygus* will be fed Alexa-Cry and QDot-Cry through a sachet feeding system and movement followed by confocal microscopy, and NIR fluorescent imaging for nymphs fed QDot-Cry using a Cri Maestro In-Vivo imaging system. Knowledge of the timing and locations of Cry in the guts of nymphs will guide proteomic analyses in the following objective. 2) BtCry51Aa processing and stability in *Lygus* gut will be monitored by LC-MS/MS mass spectrometry. Groups of *Lygus* will be fed buffer control or Cry51Aa. Guts from fed larvae will be dissected and total protein extracted. Protein will be resolved by SDS-PAGE, and then after staining the gel, twenty equal gel sections will be excised and processed for analysis by LC-MS/MS at the UGA proteomics resource facility. This approach has been used recently by scientists in the Adang laboratory. The data will be used to assess the quantities of intact and digested BtCry toxin in the gut tissue from the insects. The proposed research will provide fundamental information about the fate of this important Bt toxin in the gut of *Lygus* that will allow for strategic optimization of the Bt toxin for enhanced activity against *Lygus* and other hemipteran pests.
References:


Proposals

Development of Ocular Drug Delivery Micro Device
2015 Summer Fellow: Stephanie Collins
Research Mentor: Dr. Ramana Pidaparti, College of Engineering

Various ocular diseases such as glaucoma, age-related macular degeneration, diabetic retinopathy, and retinitis pigmentosa require lifelong treatment with either daily eye drops or monthly injections of medication into the eye to avoid blindness [1]. Ocular diseases are prevalent throughout society, especially affecting adults over the age of 50. An estimated 1.6 million adults suffer from age-related macular degeneration in the U.S. alone, and approximately 500,000 cases are diagnosed annually worldwide [2]. Age-related macular degeneration is treated through monthly ocular injections of medication costing time and money in doctor visits. In addition, the repeated ocular injections run the risks of intraocular infections, intraocular hemorrhages, and retinal detachment [3]. Developing an implantable ocular drug delivery micro device would reduce costs, save time in doctor visits, and reduce the hazards from frequent injections.

The proposed device would be surgically implanted in the eye and last up to two years. The device will consist of a reservoir where the drug will be stored and attached to a refillable ring. The refill ring will allow for the device to hold up to six months’ worth of medication at a time. This will allow the device to only need to be refilled every six months. In addition to decreasing the amount of doctor visits for a patient, the device will allow for a more consistent rate of drug delivery to the eye. When drugs are first injected into the eye, the eye receives a large burst of drug at the beginning of the month followed by less than ideal dosages toward the end of the month [4]. Due to the hassle of monthly doctor visits, some patients only get injections every three months. Less frequent injections result in less than ideal eyesight, whereas those who receive monthly injections have improved results [5]. The proposed device will allow for even diffusion of the drug throughout the six-month period.

The device will be made out of PDMS material and will contain a reservoir to store the drug while it is diffused to the eye at a constant rate through hydrophilic nano-channels. The nano-channels will replicate patterns of the blood vessels in the eye and be designed with specified lengths and widths to create a precise diffusion rate. Ideally, the device would be surgically attached to the sclera of the eye and be practically unnoticeable.

I am currently in the process of researching design ideas under the guidance of Dr. Ramana Pidaparti. We have begun narrowing down our designs for the device and soon we will be defining the appropriate dimensions for the proposed device. Once we have determined the design and dimensions, I will create the device on AutoCAD. Our goal is to have the device designed and dimensioned on AutoCAD by the end of May 2015. This summer, we plan to create the device with a 3D printer and perform experiments on the device to measure the diffusion rate of the drug from the device. By measuring the diffusion rate over short periods of time, we will predict the approximate rate of diffusion for the drug throughout a six-month period.
Proposals

Proposed Research Time Table:

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References:


Fusing History: Modern Enameling Via Historical Techniques

2015 Summer Fellow: Melissa Cousins
Research Mentor: Lola Brooks, Lamar Dodd School of Art

During the Medieval times, the process of enameling – fusing powdered glass onto metal – was adapted to imitate precious stones. While enameling had been used before by ancient cultures throughout the world, its uses had been rudimentary and its techniques undeveloped. As the process of cloisonné enameling, where cells of wire enclose sectors of enamel, became more and more widespread by the Byzantines, the art of enameling became more and more prevalent, and a heretofore neglected practice gained a resurgence in popularity. The widespread usage of enamel led to further developments, rediscovering lost techniques, and higher refinements.

Enameling hit its peak during the Art Nouveau time period, which ran from 1890-1910. As jewelers rejected popular techniques and materials and the mass-produced commercialization of art that came with the Industrial Revolution, new and forgotten processes came to the forefront of jewelry design. Enamels became the most important and widely used of these, and the excellence in craft, technique, and design found in the enameled jewelry of the time is unparalleled.

My research deals with tracing the developments and refinements of enameling from the 5th to 20th century in order to better understand enameling and to aid in my own production of enameled jewelry. Throughout the spring semester, I will begin researching the history of enamels in Europe to chart innovation, usage, styles, and production. While Art Nouveau featured the most prestigious, refined, and well-executed enamels throughout history, this would not have been possible without the developments that happened in the Byzantine Empire, through the Middle Ages, and up to the 20th century. After gaining an understanding of the rise of enameling, I will begin studying the specifics of Art Nouveau enamels, focusing on the techniques, designs, and the technical approach to enameling and enameled jewelry from this time. This historical research will give me the knowledge base necessary for my active, creative research during the summer.

My exploration of enameling will begin with the recreation of Medieval and Art Nouveau techniques. Using what I studied during the spring semester, I will be creating new pieces of enameled jewelry using historical, rather than modern, techniques. I will briefly work in the Byzantine style, then in the style of Limoges, where grisaille (enamel painting done using black and white enamels to create a monochrome, greyscale image) and other enamel painting techniques were developed and perfected. The main focus, however, will be on the techniques of the Art Nouveau jeweler René Lalique, who revolutionized jewelry and heavily employed enamel in his work. To that end, I will create plique-à-jour (enamel without a backing, so that it gives the effect of stained glass) and basse taille (transparent enamel over an etched, engraved, or otherwise textured surface) jewelry using the methods that would have been employed in Lalique’s studio. Stylizations and designs will follow the Art Nouveau aesthetic, and modern electric kilns, binders, and tools will be eschewed in favor of more historically appropriate materials.

After achieving a level of virtuosity in this manner, I will begin incorporating more modern conveniences into my enameling work, while still retaining the sensibilities and sensitivity of Art Nouveau jewelry. By moving away from strict recreation to a more personal subject matter and style, I not only will realize personal and artistic growth, but can also bring to light how understanding the previous developments, techniques, and styles of enameling can aid modern enamelists in their search for higher art and craft.
Bulgaria was communist from 1944 until 1990, when free elections were held for the first time due to the growing internal protests and the transition to democratization and privatization began. Nonetheless, the transformation has been unstable and continues to result in political unrest in Bulgaria and in other Eastern European countries. In early 2013, protests against corruption and political non-transparency forced the resignation of the Bulgarian government, and there has also been a recent resurgence of communist parties that nostalgically idealize the security and stability of the pre-1990 era. Although this year marks the twenty-fifth anniversary of the end of communism, the continuing presence of political and economic instability and protests in Bulgaria suggests that the transition is ongoing and still relevant.

I want to explore how modern Bulgarians of different generations remember the post-communist transition period, and how and what they remember informs their response to and involvement in current events. Anthropologists and oral historians have already begun to research people’s remembrances of life both during communism and after communism. Additionally, the book Twenty Years After Communism: The politics of memory and commemoration examines the creation of “memory regimes” through organized political and institutional practices, designed to frame or reframe the commemoration of the communist past. I am interested in taking this study of memory a step further by analyzing the effectiveness of these memory regimes in terms of contextualizing them within individual memories.

Thus, my research is driven by the complementary impulses of documenting the experiences of people who lived through the transition period and examining the effect of post-transition practices of memory-making on the way that people remember that time. The proposed project will rely on oral history methodology. Oral history serves as an alternative to traditional written history by privileging the lived experiences of ordinary people whose personal narratives allow for a more complex contextualization of the relationship between past and present.

I will record ten in-depth oral history interviews with people representing two generations—one which experienced the transition as young adults and the other which was very young or was born during the transition. I want to compare the perspectives of these generations to document differences in what is remembered. I will use this comparison to examine the process of memory-making: understanding how interviewees came to remember certain things and looking at what influences have shaped their interpretation of the past.

I will conduct archival research and the recording and transcription of the interviews during May-July in Bulgaria. Upon returning to the U.S. in August, I will translate the interviews, host a select few in the Oral History Archive at the Russell Special Collections Library, and create an online interactive interface that will connect the recorded interviews with supplementary sources, including photographs, reference materials, historic documents, and links to relevant organizations. I hope to make my research process visible and accessible to people beyond the scope of my individual project and also contribute a new, comparative focus to the research on remembering communism.
References:


Identification of CRISPR Adaptation Proteins and Nucleic Acids
2015 Summer Fellow: Justin Dumrongkulraksa
Research Mentors: Dr. Michael Terns & Dr. Rebecca Terns,
Department of Biochemistry & Molecular Biology

CRISPR (Clustered, Regularly Interspaced, Short Palindromic Repeats) loci and their associated genes (Cas) comprise an adaptive defense system in bacteria and archaea (1). This immune system protects the organism against viruses/phages and other foreign genetic elements (1). Immunity is conferred via the acquisition and incorporation of invader DNA into the CRISPR locus (1). The locus is then transcribed to produce an RNA complement or (crRNA), which guides Cas nucleases in targeted invader DNA or RNA destruction (1). In the archaeon Pyrococcus furiosus, our lab has recently obtained genetic evidence linking four CRISPR associated (Cas) proteins (Cas 1, Cas 2, and Cas4-1 and 4-2) to the function of integration of new invader sequences in a process called CRISPR adaptation. However, the individual roles of each protein in the process are unknown and will be an area of exploration in my research. To examine how each of these proteins functions in the cell, a number of experiments will be performed in order to test whether or not each protein is a member of a larger functional complex. Additionally, the ability of each protein to bind, recognize, or capture CRISPR and invader DNA will be tested.

The four Cas proteins found to be involved in adaptation will be isolated using immunoprecipitation, a process that uses complementary antibodies to bind specific proteins that may further isolate potential protein partners (antibodies specific to Cas1, Cas2, and Cas4 have already been generated in the lab and are available for my research). Moreover, the same immunoprecipitation approach may also function to isolate protein bound nucleic acids of functional interest to CRISPR adaptation. These nucleic acids will need to be separated from the proteins via phenol chloroform extraction. Polyacrylamide gel electrophoresis will then separate the nucleic acids by size, and stains can be used to detect where the nucleic acids are. We have some data suggesting Cas 1 is associated with unique RNAs, but nothing definitive yet. Moving forward, testing of whether or not these isolated nucleic acids from each protein contain any relevant CRISPR or invader based sequences will be explored. This can be achieved by sequencing as well as PCR, northern and Southern blotting.

My previous western blot data of immunoprecipitation samples from Pyrococcus furiosus extracts strongly suggest that Cas 1 and Cas 4 form a complex and that Cas 1 and Cas 2 may also form a complex. Recently, however, one of my colleagues identified a Cas protein, Cas 4-2, which is not found in the CRISPR locus itself, but its presence significantly increases adaptation rates. Cas 4-1, on the other hand, seems to inhibit adaptation when overexpressed, and its deletion facilitates adaptation. Thus, my project will include not only figuring out what protein-protein interactions this new Cas 4-2 is capable of, but also continuing to try to isolate nucleic acids from these proteins.

A CRISPR locus sequence called the leader is required for adaptation (1). As Cas 1, Cas 2, Cas 4-1, and Cas 4-2 are believed to have some role in adaptation, the leader along with invader DNA is expected to be found when these proteins are immunoprecipitated. If such sequences are found bound to one or more of the Cas proteins under investigation, this finding would provide substantial insight into the adaptation mechanism. Given the emergence of Cas 4-2 as a major part of this process, a new strain has been created with Cas 4-2, Cas 1, and Cas 2 enriched, but Cas 4-1 is deleted. This strain in theory should encourage the greatest amount of adaptation in our cultures, thus increasing the likelihood that harvested proteins will have bound nucleic acids in detectable quantities.
Proposals

Reference:

Evaluating Diagnostic and Early Intervention Research Methodology in the United States and Ireland

2015 Summer Fellow: Allison Fialkowski
Research Mentor: Dr. David Gast, Department of Communication Sciences & Special Education

Based on data released from the Centers for Disease Control and Prevention, one in 68 children are diagnosed by age eight as being on the autism spectrum. In order to ensure these individuals have the highest possible quality of life, early diagnosis and intervention is critical and will be the focus of my career path. As I work towards a doctoral degree in nursing to both serve and research those on the autism spectrum, I have used research through the CURO Honors Scholar Program as a way to take control of my education and ensure that I am highly knowledgeable in the quickly evolving field of autism studies. With the support of the Summer Undergraduate Research Fellowship, contacts and mentorship from Dr. David Gast, and the flexibility of a summer schedule, I will continue creating a foundation for my career through a cross-cultural examination of the early diagnostic and intervention methodology in the United States and Ireland.

In May, I will utilize resources at Emory University to research present and emerging diagnostic and early intervention methodology in the United States. As one of only three Autism Centers of Excellence in the country, researchers collaborate between Children’s Healthcare of Atlanta, Marcus Autism Center, the Department of Pediatrics in Emory University School of Medicine, and Yerkes National Primate Research Center at Emory with a special focus on risk factors for autism and resilience for those diagnosed. Utilizing contacts that Dr. Gast has as the director of the Collaborative Personnel Preparation in Autism Project at Emory University, I will study what policies are put in place by school systems, healthcare facilities, and the government in the United States that either support or delay diagnoses and early intervention.

As part of a study abroad trip focusing on developmental disabilities to Cork, Ireland, I will continue studying policies surrounding diagnosing and treating autism spectrum disorders. Dr. Gast leads this trip and has planned meetings for me with leading researchers at the Cope Foundation and the University College of Cork. In this setting, I will be able to analyze what effect culture, economy, government, school structure, etc. have on the diagnosing and treatment of autism spectrum disorders. One of a few schools in the world to offer a diploma in Autism Studies and Intellectual Disabilities Nursing, University College Cork leads Ireland in autism research paralleling Emory’s work in the United States.

With Dr. Gast retiring at the end of the summer, I am planning to transition to work with Dr. Ashley Harrison who researches the methodology used to diagnose autism in Tanzania. Her project looks at how differences in culture, healthcare, etc. change diagnostic and treatment methodology. In creating this foundation of cross-cultural examination of a common neurological disorder, I will be better prepared for my research with Dr. Harrison.

While the frequency of diagnoses and treatment of autism is highly variable, autism is a global disorder that has a similar prevalence across countries, races, and cultures. By researching across countries and cultures about the best methodology to help those with autism spectrum disorders, I will be able to aid not only in the earliest intervention for children in the United States but also internationally. By aiding in travel funds, supporting my research, and allowing me to publicize my findings at the end of the summer, I am certain that the Summer Undergraduate Research Fellowship is the best foundation for my goals.
Increasing Sustainability in Industrial Aquaculture in the European Union through the IDREEM Initiative

2015 Summer Fellow: Shreya Ganeshan
Research Mentor: Dr. Jennifer Rice, Department of Geography

Resource efficiency is a flagship goal of the EU towards achieving sustainable growth. The IDREEM\(^1\) (Increasing Resource Efficiency in European Mariculture) EU FP7 Project is a research initiative launched in October 2012 to increase the sustainability of aquaculture in the EU, under pressure by the rising demand for seafood products and the falling number of traditional fisheries. Currently, in the fish farming industry there is an overreliance on raw materials on fish stock, which emits a significant amount of waste into marine environments. The project aims to implement efficient practices through a new production technology, Integrated Multi-Trophic Aquaculture (IMTA),\(^2\) where fish are farmed with species from different levels of the food chain so that nutrients otherwise lost in fish farming can symbiotically be absorbed by additional organisms such as algae, seaweed, mussels, etc.

Demonstrating and assessing the environmental performance of IMTA through commercial-scale research, testing, and modeling will offer insight into the interdisciplinary constraints of sustainability in aquaculture. The IDREEM consortium encompasses the Scottish Association for Marine Science and fourteen industrial and research collaborators across Europe, of which CML-Leiden is a partner. The four-year plan of this project includes developing modeling tools to quantitatively assess the economic, technical, social, and regulatory practices of commercial aquaculture. One such tool, Life Cycle Assessments (LCAs) and Life Cycle Sustainability Assessments (LCSA) allow the benchmarking of the environmental performance of IMTA production in comparison to classic monoculture production. Through LCA software, background production processes directly responsible for negative environmental externalities can be detected, allowing researchers to quantitatively identify transformative opportunities. Some identified processes include agricultural production of components of animal (fish) feed and countries’ energy mixes. Integrated Assessment Models (IAMs) also generate scenarios and future pathways depending on key driving forces of the natural and human systems. Analyzing land-use and energy dynamics and modeling different political targets for climate, ecosystem conservation, energy, and agriculture demand and supply, this mechanism offers an interdisciplinary perspective that applies to both researchers and industrial executives. And in the long run, implementation of IMTA across the European and global aquaculture market will expand the market competition for seafood products as employment and production opportunities increase.

This two-month research performed at Leiden University’s Institute for Environmental Sciences will focus on identifying IMTA background production processes of industrial aquaculture that carry environmental externalities through the use of LCA software and IAM models of potential land-use scenarios. Though this research will operate within the existing policy framework of the EU, its findings should provide possibilities for commercial policy reform. My role as research assistant would be to become acquainted with LCA software and literature on traditional monoculture and alternative production practices, and to apply data/conclusions from IAM and LCA analyses to relevant research protocols.
References:


Pneumococcal diseases such as pneumonia and meningitis are currently a major global health issue. Caused by *Streptococcus pneumoniae* (*S. pneumoniae*) bacteria, these diseases are responsible for up to 1.6 million annual global deaths according to the World Health Organization.[3][6] In particular, *S. pneumoniae* serotype III (Pn3) has increasingly victimized children under the age of five, who represent more than half of global victims.[2] The worldwide proliferation of microbial resistance to antibiotics accentuates the need for increasingly immunogenic, or effective, pneumococcal vaccines.[3] Glycoconjugate vaccines, vaccines composed of carbohydrates that are covalently linked, or conjugated, to carrier proteins, can be utilized to accomplish this task. Since serotype is determined by capsule structure, the carbohydrate of interest of Pn3 is the capsular polysaccharide (CPS) – a high molecular weight coating found on the microbial surface that is expressed by pathogenic bacteria.[1] The Pn3 CPS must be degraded without compromising its antigenic portions, or fragments of the CPS that are recognized by T cells as foreign bodies during an immune response, in order to create an effective glycoconjugate vaccine against Pn3.[1] In 1931, a *bacillus*, a rod shaped bacterium, named *Bacillus circulans* (*B. circulans*) was discovered in soil; it secretes a highly specific depolymerase enzyme capable of targeting and degrading the CPS of Pn3.[5] The effectiveness of this depolymerase in digesting the Pn3 CPS without damaging the Pn3 CPS antigenic components is unknown and thus comprises an ongoing investigation for potential utility in the preparation of glycoconjugate vaccines against Pn3.

The first step of the investigation is to purify then characterize the depolymerase enzyme through a variety of techniques. Following purification, characterization of the enzyme involves developing an understanding of the structure of the enzyme and its mechanism – how the enzyme utilizes its structure to interact with its environment (i.e., how the structure influences degradation of Pn3 CPS).[4] The Pn3 polysaccharide must also be characterized through different techniques to determine the mechanism and physical properties of Pn3 CPS. An understanding of the Pn3 CPS structure and properties helps determine, for example, where the Pn3 CPS is cleaved during degradation by the enzyme.

After purification of the enzyme, characterization of the enzyme and Pn3 CPS, and degradation of Pn3 by the enzyme, the final steps are to conjugate the degraded Pn3 capsular polysaccharide to a carrier protein and determine the glycoconjugate’s immunogenicity.[1] Following conjugation, mice are primed via initial exposure to the glycoconjugate vaccine and boosted with additional exposure to the vaccine after fourteen days. Serum is then collected from the mice and a test is run to determine the immunogenicity of the glycoconjugate vaccine by measuring the concentration of IgG antibodies in the serum sample. IgG antibody concentration is chosen over that of other types of antibodies for determining immunogenicity because upon second exposure to an antigen (in this case Pn3 CPS), the IgG antibody activates a strong humoral response which utilizes the memory of previous exposure to combat Pn3 pathogens.[1]

Overall, the primary goal of this research is to develop an immunogenic glycoconjugate vaccine which effectively counters Pn3 and reduces its prevalence. A secondary goal of this research is to understand the mechanisms and structures of both the depolymerase enzyme and Pn3 CPS. By producing an opportunity to save the lives of young children and opening the door to understanding
and applying mechanisms, the results of this research effort can initiate a successful counterattack against other deadly diseases.

References:


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Influence of Supplemental Folic Acid Dose on Maternal Folate Status and Infant Outcomes: A Clinical Intervention Trial

2015 Summer Fellow: Jenissa Gordon

Research Mentor: Dr. Dorothy Hausman, Department of Foods & Nutrition

Background:

Folate is a naturally occurring B vitamin found in dark leafy green vegetables such as spinach, other fruits and vegetables such as oranges and avocados, and nuts and legumes. Folic acid is the synthetic form used to fortify grain products and found in dietary supplements. As folic acid is more bioavailable than natural food folate, folate recommendations are expressed as dietary folate equivalents (DFEs) which account for this difference (1 µg DFE = .6 µg folic acid).

Folate plays a role in one-carbon transfer reactions involved in DNA synthesis, DNA methylation, and amino acid metabolism. Folate is essential for normal development, growth, and maintenance of optimal health. Adequate folate status is especially important during physiological stages of rapid growth.

The current Recommended Dietary Allowance (RDA) set by the Institute of Medicine (IOM) is 400 µg DFEs per day for adult men and women, with higher recommendations for the physiologically demanding periods of pregnancy (600 µg DFE) and lactation (500 µg DFE). These recommendations were established in the late 1990's, based on the best available scientific evidence (IOM, 1998), with the recommendations for pregnancy based on the intake needed to maintain normal folate status in pregnant women (Bailey, 2000). Nonetheless, most commercially available prenatal supplements contain 800 µg or more of folic acid, amounts exceeding the recommended level of intake. The short and long term impact of increased folic acid supplementation on pregnancy and infant growth and development are unknown.

On-Going Intervention Study:

The UGA Folate and Maternal Health Research Team under the direction of Dr. Lynn B. Bailey, is conducting an ongoing double-blind randomized controlled intervention study in collaboration with the Athens Regional Midwifery Clinic (ARMC). The purpose of this study is to determine the effect of two doses of supplemental folic acid throughout the pregnancy on maternal folate status, infant folate status, and other infant outcomes. Healthy pregnant women, recruited through ARMC at their initial prenatal visit were randomly assigned to receive one of two doses of folic acid supplementation, either 400 µg (approximately equivalent to the RDA) or 800 µg as commonly found in commercially available prenatal vitamins. Blood samples are taken at the initial visit, 28 weeks and 36 weeks gestation, and from the mother and cord blood at delivery for measurement of folate biomarkers. Placenta samples are collected at delivery for subsequent determination of gene expression and DNA methylation. Two maternal dietary recalls are performed during pregnancy (during 24 and 32 weeks gestation) to assess folate and folic acid intake. Recruitment into the study began in mid-July 2014, and deliveries are expected from February through August 2015.

Methods:

I have been involved with the Folate Team for the past year through attendance at lab meetings and journal clubs. This summer research fellowship would allow more direct involvement and hands-on experience with the many aspects of clinical research. My specific responsibility for the project would be in preparing folic acid supplement packages, setting up for blood sample collection, and assisting in processing the diet recall data. At delivery, I will assist with the collection, processing,
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and storage of blood and placenta samples. In addition, I will assist in the statistical analysis of maternal and cord blood folate data as well as infant growth outcomes including height, weight, and Apgar score, including adjustment for potential confounders.

Conclusion:

In addition to providing invaluable clinical research experience for students such as myself, it is anticipated that this study will contribute to the evidence on which revised folic acid recommendations and prenatal vitamin folic acid dosages can be based.

References:


The modern American Congress prides itself on being a completely transparent entity, with every piece of legislation, word of debate, and vote cast readily and easily available to those willing to seek it out. What most do not realize is that this transparency allows all actors in the political system, including special interest groups, political action committees, and the representatives themselves a great degree of leverage over the public. Given that Congress was crafted to provide representation to this public, it is logical to assert that the American constituencies should be more aware of this leverage and the means through which it is applied in order to then elect a representative body that is more responsive to public desires.

The roll call voting record provides the clearest window to the inner workings of Congress. From this information one can determine the policy preferences, most controversial issues, and levels of political polarization that exist amongst the members. The decision for members to put themselves on the record with a vote seems to be becoming a more difficult one year after year, with political advertisements unafraid to claim that certain members have voted with an unpopular leader or member of the opposing party hundreds of times.

The aim of this research is to determine how roll call procedures in Congress have changed over time and the implications of these changes – specifically, whether an increase in the number of roll call votes requested is mainly for political purposes in order to force uncomfortable votes for members of the opposing party to utilize in the next election. The proposition of amendments by the minority party, even when those amendments will surely fail, is what I hypothesize to be an indication of voting being requested along partisan lines as opposed to strictly for the purposes of policy.

Utilizing the Congressional Record, I will be compiling voting and procedural data using a coding process on amendments from significant pieces of legislation, combining my own findings with existing research that examines earlier Congresses. The data will then be amassed statistically, and from this I hope to uncover certain trends surrounding a correlation between the party of the sponsoring member of the amendment and the probability that a roll call vote was requested.

It is my hope that these findings will indicate that a change in roll call voting has indeed occurred over time, and that an increase in the request for roll call votes in more recent Congresses demonstrates the larger partisan trends popular in current evaluations of American politics. In an era where polarization amongst political parties is claimed to be at an all-time-high, research that delves into that trend and uncovers statistical evidence regarding it is more valuable than ever.

More knowledge of Congressional procedure will result in a public more aware of the political environment that its representatives operate in, and thus a public perhaps less swayed by misleading data provided by the voting record.
Carbon Encapsulated and Magnesiothermically Reduced Diatoms as a Lithium-Ion Battery Anode

2015 Summer Fellow: Bryan Grommersch
Research Mentor: Dr. Ramaraja Ramasamy, College of Engineering

Lithium-ion batteries are an integral part of the portable electronics industry. Whether they are powering a smartphone or concealed within a cauterizing tool, lithium batteries are the workhorses of a high-tech society. Despite this, the chemical technology inherent in these batteries has not kept pace with the portable electronics and automobiles that depend on them. Simply put, a battery is a collection of electrochemical cells that provides an electronic device with the necessary voltage and capacity. Each cell features a positive and negative electrode, cathode and anode respectively, separated by an electrolyte solution of dissociated salts. During operation, lithium ions and electrons are liberated from the cathode material. The lithium ions travel through an electrolyte and the electrons travel through a circuit before the two are reunited at the anode. Current lithium-ion batteries lose their charge quickly and stop functioning altogether after just a few years. We endeavor to improve lithium-ion battery technology through the synthesis of novel shape and morphology controlled silicon and carbon microparticles.

One of the most important metrics used to quantify a battery’s viability is known as theoretical specific capacity, defined as the idealized amount of electric charge delivered by a battery at a particular voltage per unit mass. Currently, graphite is the anode material of choice because of its affordability and abundance. However, graphite’s capacity is far inferior to that of silicon, the second most abundant element on Earth, which boasts a specific capacity of 4200 mA·h/g, ten times that of graphite. Therefore, developing a novel anode material from silicon will produce more dependable, longer lasting batteries.

Apart from the chemical composition of the anode, the morphology of the material is of equal concern when evaluating battery viability. During battery operation, the insertion and removal of lithium ions leads to expansions and contractions that degrade the anode over time. Unique material shapes can mitigate these deleterious effects by providing intricate pores and channels through which lithium ions can travel. Fossilized silica (SiO$_2$) frustules, or shells, of the fresh-water diatom *Aulacoseira* average only 10 microns and feature just such elaborate shapes, providing the perfect anode template (see figure). The central goal of our research project is to retain the intricacies of these diatom shells while altering their chemical identity to silicon and carbon, thus enriching battery technology.

To accomplish this, fossilized diatom shells will be magnesiothermically reduced at 650°C. A magnesiothermic reduction is a chemical reaction utilizing magnesium to reduce the number of silicon-oxygen bonds. Upon successful silica reduction, hydrochloric and hydrofluoric acid treatments will etch away undesired MgO and unreacted SiO$_2$ from the reduced diatom frustules, leaving silicon microparticles in the shape of diatom shells. The silicon particles will then be encapsulated in a hollow sphere of carbon to increase material surface area and leave room for material expansion and contraction. Upon successful development, this anode material has the potential to transform the field of energy storage, rendering lithium-ion batteries more viable in the automobile, medical, and electronic industries.

Figure. An SEM image of diatom frustules.


Over two thousand years ago, the mathematician Euclid defined a function for what was known as a perfect number: a number whose proper divisors, when added together, constitute that number. The first example, with which Euclid was well acquainted, is six. Its proper divisors are one, two, and three. One plus two plus three is six, making it perfect. His method of constructing them requires a Mersenne prime, or a prime number that can be written as one less than a power of two. The first Mersenne prime is three because two squared is four, one less than that is three, and three is prime. Euclid’s formula says two times three should be a perfect number, and it is. There was a lot his formula could not see though. It was not until about four hundred years ago that anyone even proved Euclid’s method successfully finds all even perfect numbers. This means if a number is both perfect and even, there is a corresponding Mersenne prime that can be multiplied by a power of two to create a perfect number. By that time, René Descartes had already asked whether any of them are odd. This question has proven so stubborn the following centuries have found only shadows of the ultimate answer.

When investigating the issues related to perfect numbers today we usually use a slightly different definition. Euclid considered the proper divisors of a number. A proper divisor of a number can be multiplied by another divisor, resulting in the number, but that number is excluded from being one of its own proper divisors. From the modern perspective, it makes more sense to consider all divisors of a number, including itself. The function which adds together all divisors of a number is called the sum-of-divisors function, often represented with a lowercase sigma. Because we consider all divisors with sigma, the sigma of a number should be twice the number rather than equal to it; sigma of six is twelve, which is twice six. Dividing a number by its sigma results in what is called the abundancy of a number, which is equal to two exactly when the number is perfect.

Defining abundancy in this way gives an extremely convenient property in answering questions about perfect numbers and related topics. It is multiplicative, which means that if two numbers share no divisors (apart from one, the universal divisor), then the abundancy of their product is the product of their abundancies. Because abundancy is multiplicative, we have some hope at drawing a number of conclusions about it. I would like to investigate this property of abundancy to find evidence in the case of the existence of odd perfect numbers using a theoretical approach—pencil, paper, chalkboard, ideas. If any exist, I would like to spend my time adding more conditions that such a number would have to meet, meaning not as many numbers need to be checked. If it does not exist, I would like to add to the number of conditions that it would have to meet, so that the web closes off and we can know for sure.
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Merchants and Empire in the Early English Caribbean
2015 Summer Fellow: Caroline Jackson
Research Mentor: Dr. Daniel Rood, Department of History

This project will examine the economic and political climate in the early years of English settlement in the Caribbean, from the 1580s through the early 18th century. Traditional scholarship has characterized this period as one of “mercantilist consensus” in both domestic and inter-imperial politics, which gradually gave way to modern industrial capitalism. Recently, historians have begun to reexamine the politics of empire in the context of the Atlantic world as a whole, shifting away from a metro-centric view in order to recognize the importance of dialogue across the Atlantic. An important component of this reevaluation has been an exploration of the roles of merchants in the development of commerce and empire, an investigation which this project will continue.

Mercantilism was a policy – traditionally attributed to all major European powers – of government-directed trade, which was used as a method of imperialist expansion. Mercantilism was tightly bound up with imperial expansion; often, colonies were both conquered and controlled by merchant companies. England was prolific in its utilization of crown-chartered merchant companies as colonizers. The companies were granted monopolies, which represented both political and economic tools for the monarchy; since the crown controlled the granting of charters they also, by extension, controlled the land and profits that resulted. “City” merchants, who made up the first generation of merchant companies, often sought short term investments in the export trade, or through the circulation of minerals and spices. However, in the volatile new Caribbean settlements, new merchants were willing to provide the long-term investment colonies needed to survive. These new merchants – some part of chartered companies, others working together informally – challenged the paradigm of government-controlled commerce and were essential to the development of modern industrialized trade.

The early modern Atlantic was composite in a profound sense, “neither a static nor coherent system of interests…but rather an ever changing approach” towards trade, which encompassed the needs of planters, merchants and artisans, as well as politicians. Ultimately, this project will provide a more complete understanding of the development of the English merchant community as it relates to unfolding imperialist policy in the Atlantic world. Conflicts between Parliament and the monarchy, as well as clashes between various political parties, were crucial to the development of free trade. However, this project is primarily concerned with the progress on the ground: how did the merchant community change? Why and how were these changes important to the creation of industrialized capitalist trade? How did participants in Atlantic trade view their own role? Records of colonial and imperial governments, the correspondence, contracts, and account books of merchants, as well as materials concerning the daily life of colonists in the Caribbean will be the most important tools in addressing these questions. Merchants are key components in the larger context of the Atlantic world. The study of their evolution is critical to a more complete understanding of the dialogue between metropole and periphery as it concerns mercantilism, free trade, the role of colonial spaces in imperial policy, and the development of the British Empire.
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References:


Elucidating the genetic component of animal social behavior continues to be a biological holy grail. Eusocial insects, including many species of ants, exist in socially complex, caste-based societies. They are also easy to manipulate in the laboratory, and reproduce quickly, making them ideal subjects for research. The Red Imported Fire Ant, *Solenopsis invicta*, has become a model biological system for eusocial insect behavioral research. Though much is known about *S. invicta* colonies and behavior, it is unknown how relevant their social biology is to other species of their genus and to eusocial insects as a whole.

*Solenopsis invicta* has two social forms that exist in sympatry throughout the American southeast (1). The monogyne form has one reproductive queen per colony, while the polygyne form has multiple reproductive queens per colony, sometimes more than one hundred (1)(2). Social form is under control of a single Mendelian factor in this species, marked by the *Gp-9* gene (1)(2). Monogyne queens are always homozygous for the *b* allele of *Gp-9*, while reproductive polygyne queens are invariably heterozygous. Colonies practice discrimination based on this factor—monogyne colonies will not accept queens with a heterozygous genotype at the locus, and polygyne colonies will not accept homozygotes. In fact, homozygous queens are killed upon reaching maturity in polygyne colonies (1).

This behavior has been well characterized, and the close relatives of *S. invicta* (all of which, like *S. invicta*, are native to South America) exhibit a similar social polymorphism linked to the same Mendelian factor (3). A more distant relative is *Solenopsis geminata* (the Tropical Fire Ant), which also exhibits social polymorphism sympatrically throughout its introduced range in Florida and native range in Central America (4). However, the specific nature of the polymorphism has not been as well studied in *S. geminata* as in *S. invicta*. The genetic basis for colony social form in *S. geminata* remains unknown, although it is known that the two forms do not differ in their DNA sequences at the *Gp-9* gene (4). It is also unknown whether workers from *S. geminata* colonies discriminate among queens based on their social form of origin.

To address this gap in knowledge I will conduct behavioral assays on field-collected colonies of *S. geminata* to determine whether or not colonies discriminate between queens based on social form. These assays will be choice experiments for assay colonies. I will place two queens (one from a polygyne colony and one from a monogyne colony) in the plastic enclosure containing an assay colony. I will hold the assay colony queenless for several days in advance to ensure that they would be willing to accept any foreign queen. The behavior of the colony towards the two introduced queens will be scored using the same scoring system used to determine queen acceptance/rejection in *S. invicta*.

Further study will follow, the form of which depends on the results of these experiments. If the colonies do indeed discriminate this would strongly implicate a genetic component similar to that of *S. invicta*, which would inform further genetic study. This would also lead to investigation of what cues allow them to discriminate. Insects communicate using chemical signals called pheromones, which are often present on the cuticle. Conducting the same assay, but with pieces of paper coated with chemicals extracted from the queens’ cuticles, will reveal if chemical communication is indeed inciting the behavioral response. The results of this study will pave the way for further natural history study on social polymorphism in *S. geminata* and lay the groundwork for studies investigating the genetic basis of social form.
References:


In the year 2010, 2.5 million people suffered from a traumatic brain injury (TBI) [3]. In the United States alone, approximately 50,000 deaths result from TBIs annually, with toddler age children being the most affected demographic [4]. At this time, there is no adequate TBI treatment available. Recently, the West Laboratory developed induced pluripotent stem cell-derived neural stem cells (iPSC-NSCs). These iPSC-NSCs may potentially serve as a regenerative cell replacement therapy, as they are capable of differentiating into neurons, astrocytes, and oligodendrocytes while also producing regenerative factors such as VEGF. These cells have been shown to lead to significant structural and functional improvement in rodent models that have suffered similar neural injuries. However, treatments that have been developed in rodent models have regularly failed in clinical trials and thus, more predictive large animal models are needed. The pig serves as an excellent large animal model, with a large gyrencephalic brain that has gray-white matter composition similar to humans, unlike rodent models.

In this study, we propose to develop a novel piglet concussive TBI and iPSC-NSC treatment module. We have developed a model with four treatment groups; 2 m/s and 4 m/s at 6 mm impact depth, as well as 4 m/s at 12 mm and 15 mm depth. In the study, piglets receiving a cortical impact will develop brain lesions and show changes in inflammatory response, macrophage infiltration, and glial scaring, as well as changes in motor function deficits ranging from mild to severe based on impact speed. We hypothesize that iPSC-NSC engraftment in this model will reduce the effects of both primary and secondary injury listed above, resulting in a reduction of functional deficits.

After the induction of TBIs and the injection of iPSC-NSCs into affected brain tissue of porcine subjects, changes in functional deficits will be quantified through biomechanical analysis of the piglets. Biomechanical data prior to TBI, post-TBI, and post-iPSC-NSC injection will be compiled and analyzed for differences in individual subjects throughout the study, as well as differences between control and test subject treatment groups. Biomechanical analysis will enable the study to verify functional deficits caused by concussive TBI in porcine subjects, as well as the effectiveness of the iPSC-NSC treatment from a behavioral standpoint in the future.

Histological analysis will also be used to determine the severity of primary and secondary injury after TBI in porcine subjects, as well as differences between the control group and the iPSC-NSC treatment group. Lesion size will be measured as an indication of primary injury, such as mechanical tissue deformation and necrotic cell death, and secondary injury, such as edema and brain atrophy. GFAP and Olig2 markers will also be used to count astrocytes and oligodendrocytes, respectively. GFAP will also be utilized to see glial scarring, a product of astrocyte reactivity. These cell markers will enable differences in neuronal cell death to be noted between the control and treatment group, as well as the survival and possible proliferation of iPSC-NSCs. Magnetic Resonance Imaging [2] will also be used to collect data on the subjects’ brain tissue throughout the experiment. Apparent diffusion coefficient [1] and diffusion-weighted imaging (DWI) will be used for the quantification of lesion size and edema after TBI as well as iPSC-NSC injection.

Development of this model and novel iPSC-NSC treatment allows for the testing of efficacy and safety of novel stem cell therapies as well as traditional pharmacological and device approaches. This project has the potential to become an excellent platform for further large animal TBI treatment studies and future clinical trials on stem cell therapy treatments for neuronal injuries.
References:


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Spatial Interactions of Two Ecosystem Engineers across an Estuarine Gradient
2015 Summer Fellow: Lucas Montouchet
Research Mentor: Dr. Jeb Byers, Odum School of Ecology

Introduction:
Ecosystem engineers are species which have large effects on their environment, creating habitat and altering physical properties on which many other species depend. In estuaries of the southeastern USA, two ecosystem engineers are dominant – the reef forming oyster *Crassostrea virginica* and the Smooth Cordgrass *Spartina alterniflora*. These species collectively form the aboveground structure in estuarine ecosystems upon which numerous species depend. How these two species interact spatially is largely unexamined. Their distributions border each other, yet there is little understanding of what mechanisms set the boundary between these species, how these mechanisms may vary over environmental gradients, and how they might change with globally changing climate conditions, including sea level rise.

Methods:
I will quantify spatial relationships between *C. virginica* and *S. alterniflora* and how they vary across estuarine gradients by constructing high resolution maps. These maps will permit analysis of the spatial relationship between the two species and how their borders vary across areas of different flow, salinity, and compass orientation. At each of three regions in Georgia (Savannah, St. Catharine’s Island, and Jekyll Island) I will delineate three estuarine habitat types (tidal creek, brackish water river, and sound). Three 500m² sites will be picked for each habitat at each region. A quad-copter drone will be used to take high resolution aerial images of the coastal marsh at low tide, focused on the border of *C. virginica* and *S. alterniflora*. The drone will take several photographs of the marsh at lower altitude which I will patch together using Photoscan, an imaging software that stitches together images to create an orthophoto. I will use ArcGIS to analyze the images and create a high resolution map of each site. Afterwards I will digitize both species within the images to calculate their area and quantify the size of overlap at their boundary.

Specifically, I will conduct 4 spatial analyses:

- **Analyses 1** will focus on *C. virginica* characteristics as a function of habitat type and latitude.
  - **Analysis 1A** will characterize reef shape by dividing reef perimeter by reef area. I predict reefs in sounds will have the largest value, and river reefs to be slightly smaller. I expect reefs in creek heads to have the smallest value as their shapes are usually circular.
  - **Analysis 1B** will characterize the reef length. I predict that rivers will be longest and sounds to be shorter, and creeks to be the shortest.

- **Analyses 2** will focus on *C. virginica* - *S. alterniflora* patterns and their variations.
  - **Analysis 2A** will examine the distance between reefs and closest *S. alterniflora* patches. I expect to see reefs in sounds to be the farthest away from *S. alterniflora* patches followed by creeks and rivers to be closest to *S. alterniflora* patches.
  - **Analysis 2B** explores area of *S. alterniflora* patches in relation to *C. virginica* reefs. I predict creeks and rivers will have similar size *S. alterniflora* patches and sounds will have patches of smaller area.

Conclusion:
Interactions among ecosystem engineers have the potential to affect entire ecosystems. Thus, understanding the factors that influence their distributions is of key importance, especially as
environmental factors are changing at a global scale. This research project is the first step in understanding how the relationship between *S. alterniflora* and *C. virginica* may change in the future as a result of climate change and sea level rise. It is possible creeks and rivers will become more isolated as a consequence. This project is part of a larger study examining the effects of these natural phenomena in relations to marine ecosystems.

References:


Background:

White matter (WM) supports cognition in the brain. WM structures are composed of densely packed bundles of myelinated axons. These bundles, fiber tracts, serve as conduits for the transmission of neural signals across the brain. Various tracts have been associated with specific cognitive functions, with greater WM integrity (i.e., more densely packed axons) related to higher scores on cognitive tasks (Genova et al., 2013). This proposal focuses on the effects of aging in WM structures controlling a specific subset of cognitive functions, broadly referred to as cognitive control (CC). CC refers to the management of processes including working memory, attention, and task flexibility that guide behavior (Cooper, 2010).

Cognitive control ability varies between people with schizophrenia (SZ) and healthy adults; SZ generally shows lower CC scores than healthy subjects of similar ages (Gómez-Benito et al., 2014). However, some otherwise healthy subsets of the general population show similar CC performance to people with SZ (Luna et al., 2007). As part of my CURO research in neural white matter alterations in schizophrenia, we demonstrated that adults with low cognitive control (LCC) and patients with SZ have comparable structural integrity in the superior longitudinal fasciculus (SLF). While SLF integrity did not differ between LCC and SZ, it was significantly lower in these groups as compared to people with high cognitive control (HCC).

To extend my work on this project, I plan to explore differences in two other CC-related tracts: inferior longitudinal fasciculus (ILF) and uncinate fasciculus (UF). Greater WM integrity in these tracts is related to better performance on CC tasks (Benedetti et al., 2011). Age will be included as an additional factor in the analysis. In adulthood, after the brain is fully developed, CC and structural integrity decrease with age (Kopp et al., 2014). Few studies, however, have compared how these decreasing rates (in both WM integrity and CC) compare between SZ and healthy individuals. My project primarily aims to examine how age-related changes in WM integrity of these tracts differ between HCC, LCC, and SZ.

Hypotheses:

Given the similarities in SLF integrity between LCC and SZ patients identified in our previous project, we expect similar patterns of degradation in LCC and SZ patients, beginning from a point of lower integrity and occurring more progressively than HCC. HCC is expected to maintain an initially greater WM integrity across adulthood (Cabeza et al., 2002).

Method:

This study will examine WM integrity in structures involved in CC (SLF, ILF, and UF) in HCC, LCC, and SZ groups. Participants will be divided into HCC and LCC groups based on their performance on complex span tasks (OSPAN, RST, and SST; Unsworth et al., 2005). Participants will then undergo diffusion tensor imaging (DTI) scans. DTI assesses WM integrity by quantifying the directionality of water diffusion in the brain – water diffuses in a more organized manner (with greater anisotropy) in WM than in other brain tissues. The DTI data will be analyzed using fiber tracing software, allowing for isolation of the CC-related tracts (SLF, ILF, and UF). Values of diffusivity will be compared between groups as a function of age.
Summary:
This study aims to examine how age affects neural WM structure in healthy adults with varied levels of CC and patients with SZ. This study serves to extend the results of my data analysis this past fall by including additional CC-related fiber tracts (ILF and UF) and an additional factor, age. By providing insight into the pattern of WM integrity degeneration in these groups, we may be able to make better distinctions between relationships specific to SZ and those that are associated with cognitive control.

References:


Transcriptional Regulation of Energy Systems That Are Essential to
*Salmonella* Typhimurium Virulence

2015 Summer Fellow: Selin Odman  
Research Mentor: Dr. Anna Karls, Department of Microbiology

Salmonellosis is one of the most prevalent foodborne diseases in the world, with tens of millions of cases and more than one hundred thousand deaths each year.1 *Salmonella enterica subsp. enterica* serovar Typhimurium (*Sal*Ty) is the most common serotype of *Salmonella* associated with gastrointestinal disease in humans and has been extensively studied to reveal the virulence factors that lead to morbidity and mortality. As a model system, *Sal*Ty has led to definition of novel mechanisms of bacterial transmission and virulence,2,3 and identification of new targets for vaccines.4 The emergence of pathogens with resistance to multiple antimicrobials has led to the search for new antimicrobials that have different targets in bacterial cells, including energy systems that are essential for survival in the infected host. In this proposed research, I will employ the *Sal*Ty system to characterize expression regulation of the hydrogenase energy systems Hyb, Hya, Hyd, and Hyc, which allow pathogens of the gastrointestinal system to utilize hydrogen for energy production in the aerobic small intestine or in the anaerobic large intestine of the infected host.5 These systems are potential targets for the development of new antimicrobials.

Initiation of bacterial transcription requires a sigma factor to interact with core RNA polymerase for identification of promoters and opening the double stranded DNA. Sigma54 (encoded by *rpoN*) is a highly conserved, widely distributed sigma factor that interacts with unique promoter sequences and atypically requires the presence of DNA-bound activator capable of hydrolyzing ATP to initiate transcription. Recent microarray and ChIP-chip (Chromatin Immunoprecipitation linked to microarray analysis) assays to detect sigma54-regulated genes and sigma54-holoenzyme DNA binding sites (performed by the Karls laboratory) identified an antisense sigma54-dependent promoter located between two annotated transcription start sites and the translation start site for the *hyb* hydrogenase operon whose activation appears to be associated with decreased transcription of this operon. This sigma54-dependent promoter was identified in the presence of a constitutive, promiscuous activator of sigma54-dependent transcription,6 so the focus of my work in the Karls lab this Spring 2015 semester is to define the physiologically relevant conditions that activate expression of this newly identified sigma54-dependent promoter.

Two of the four hydrogenase operons, *hyc* and *hyd*, are known to be transcribed from sigma54-dependent promoters in *E. coli* and controlled by the activator FhlA. FhlA becomes activated during anaerobic growth in the presence of formate and stimulates transcription from promoters that have an associated DNA binding site for FhlA. I am currently evaluating transcript levels, using quantitative reverse transcriptase polymerase chain reactions (qRT-PCR), of the *hyb* operon, the antisense sigma54-dependent transcript, and *fdhF*, a known FhlA-dependent gene in *Sal*Ty, for cells grown in FhlA-activating and non-activating conditions. This work is predicted to establish the native activation conditions for the antisense sigma54-dependent promoter indicated to interfere with transcription from the sigma70-dependent promoters for the *hyb* operon in assays that have been performed with the constitutive, promiscuous activator.

The goal for my research during the Summer 2015 semester is to see how this sigma54-dependent transcriptional interference of the *hyb* operon is linked to the regulation of the other hydrogenase operons whose activity can determine survival of *Salmonella* in the intestines.7 This provides more insight into the complex mechanisms of regulating expression of bacterial genes. I will compare the expression of all four hydrogenase operons in the absence and presence of sigma54 (we already have a *rpoN* mutant for *Sal*Ty) using qRT-PCR. I will then create a mutation in the antisense...
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sigma54-dependent promoter associated with the hyb operon using the lambda red-recombination system and determine whether the loss of sigma54-regulation of the hyb operon alters expression of the other hydrogenase operons.

References:

1. [http://www.who.int](http://www.who.int)


The necessity to reform intellectual property laws in the international realm in order to accommodate for treatable but expensive diseases in developing countries has recently sparked a global discussion about the intersection of biotechnology and intellectual property. There is international concern that patents should not be used as vehicles for healthcare monopolies. For instance, pharmaceutical patents may risk putting essential medicines beyond the reach of many people in need of treatment (Usha & Annadurai, 2469). Intellectual property policy is a critical component of substantial and continued price reductions. Valuing the human right to lifesaving medicines is vital in saving the lives of the millions of people without access to treatment. India is one such example where millions of citizens do not have access to lifesaving drugs.

One of the most contentious debates in international law in the past decade has been the issue of India safeguarding its intellectual property rights (IPRs) against Western developed nations with strict intellectual property law, particularly the U.S. (Forum, 87). In light of recent improvements in India-U.S. relations, the legal tug-of-war between large pharmaceutical companies in the U.S. and India’s relaxed interpretation of the Trade-Related Aspects of Intellectual Property Law (TRIPS) agreement could have negative impacts on trade between the two countries as well as further implications on international intellectual property law. Access to essential medicines is challenging for developing nations, and in many cases high prices of pharmaceutical drugs tend to be a barrier to distribution of these treatments (Halydier, 1486). The TRIPS agreement was created as a means to standardize IPRs to prevent patent protection from being violated internationally; however, a large part of the current discussion is on how it affects the current barriers to essential medicine access in developing countries. The Doha Declaration was created as an answer to this issue, as it gave priority to public health over private IPRs (Sahu, 189). Still, problems remain in international intellectual property law, and the India-U.S. debate is one of the most controversial. Big Pharma in the United States has been increasingly putting pressure on Congress to impose trade sanctions against India, the perpetrator of what large pharmaceutical companies maintain are violations of international intellectual property standards (Mrudula, 199). Part of the Indian Patents Act sets a much narrower standard for patentability than developed markets such as the U.S. and European nations. This is a growing concern for developed countries, as more developing countries are struggling to meet the needs of the ill and impoverished within their borders. Emerging issues in global health policy and disputes over intellectual property law inform the international legal landscape, including and especially regarding human rights.

This research aims to compare and analyze India’s participation in the World Trade Organization and the signing of the TRIPS agreement with prior international agreements that now influence intellectual property law as it applies to the distribution of and access to essential medicines in developing countries. It also seeks to explore the further implications on the relationship between global development and intellectual property rights based on the current issue of India-U.S. relations as affected by the biotechnical intellectual property rights debate. Using several key documents and sources for international intellectual property law, such as the DOHA Declaration 2001, the WTO General Council Decision 2003, and the TRIPS Agreement 1994, this research aims to answer the question of how past intellectual property concessions on the part of multinational corporations and states have affected access to medication for serious illnesses in developing markets and how those may
affect current and future negotiations, especially between the U.S. and India, about intellectual property law and standardization.

References:


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Approaches to Reducing the Cost of Algal Biomass Production
2015 Summer Fellow: Grace Power
Research Mentor: Dr. K. C. Das, College of Engineering

Algae biofuels offer a sustainable fuel for the future. Large-scale algae production can both lower atmospheric carbon and provide renewable biomass feedstock for biofuel production. The most prominent hurdle facing algae biofuels currently is the cost. These biofuels are currently not economically viable because large-scale algae production is delicate. Because lower-cost cultivation is done in open outdoor raceways, populations are commonly lost or reduced in productivity due to algal grazers such as ciliates and rotifers or environmental factors such as temperature swings. Increasing biomass at a low cost is the primary goal of algae biofuel research. The goal of this work is to determine whether synthetic auxin 1-Naphthaleneacetic acid (NAA), a photosynthetic enhancer, will successfully increase algae biomass in a large scale environment.

Algae populations will be grown in 500-L raceways. Algal growth will be monitored by Total Suspended Solid (mg/L) and Optical Density measurements. Raceway temperature and pH will be measured multiple times daily. Weather data will be used to indicate low periods of photosynthesis due to cloud cover or high rates of photosynthesis due to cloudless days.

The algal strains used in the experiment will be determined after examining results from a current study on seven algal strains grown in 250-mL flasks in three different concentrations of NAA. This experiment will be used to screen for the two or three most productive, optimal algal strains to scale up into a 500-L pond. It will also indicate the optimal concentration of NAA to use in the summer project (2.5, 5, or 10 mg/L).

Literature Review:

NAA, a synthetic phytohormone, increases growth in certain strains of algae. In *Chlorella vulgaris*, treatment with NAA caused increased concentration of photosynthetic pigment, monosaccharides, and soluble protein. The optimum concentration of NAA for growth in *C. vulgaris* was found to be 1µM (Bajguz & Piotrowska-Niczyporuk, 2014). In a study of *Chlorella sorokiniana*, the optimal dosage of NAA was found to be in EtOH (500 mg/L) + NAA (5 mg/L) over a growth period of 10 days. This study predicted that if this process is scalable, it has the potential to lower biofuel production costs significantly (Hunt et al., 2011).

Methods:

Selected strains of algae will be inoculated in separate 250-mL flasks with 90 mL of BG-11 media. A certain concentration of NAA will be solubilized in ethanol and added to the experimental flasks. Control flasks will be given equal volumes of a 50:50 deionized water-ethanol-mixture. Cell density will be measured using Optical Density and Total Suspended Solids tests, and purity of the culture will be monitored with microscopy. When the algae shows satisfactory density, it will be transferred to a 500-mL flask, and media will be added to bring the solution to 300 mL. When this solution reaches satisfactory density, the algae will be transferred to a 2-L flask, and BG-11 media will be added to bring the solution to 1.5 L. The algae will be scaled up in this manner until it reaches proper density in 500-L raceways.

A 20 mL sample of algae will be taken from each raceway daily to test for total suspended solids and optimal density. Temperature and pH will be measured 3 times during the day: morning, afternoon, and late afternoon, to account for changes in algal productivity throughout the day.
Expected Results/Outcome:
Based on previous studies with phyto-hormones, we anticipate the algal productivity relative to controls to increase. This work will quantify the increase and determine the cost-benefit of this approach, along with the impacts of NAA on composition of the algal biomass produced.

References:


Cigarette smoking is the leading cause of preventable death in the United States. Approximately 8.6 million people in the United States suffer from smoking-related illnesses, and smoking accounts for $75 billion of direct medical costs annually. Even so, about 20% of the US population are smokers. More than two thirds (70%) of adult smokers express a desire to quit, and approximately 40% make a serious attempt to quit each year. Relapse rates are exceptionally high, with fewer than 10% of smokers being able to succeed in quitting. Craving is one of the most influential constructs within addiction research, but researchers have found it challenging to consistently define and measure craving. Research on the ability of craving to predict relapse has been mixed and recent clinical models of addiction do not require craving to be present for relapse to occur.

Behavioral economics is a hybrid discipline of operant psychology and microeconomics that attempts to provide a more quantitative and objective approach to evaluating an individual’s motivation to use drugs. Using behavioral economic measures to assess the relative reinforcing value of a substance to an individual, or the amount an individual values a drug relative to other reinforcers, is an alternative to craving that does not rely on an individual’s subjective report of craving. Behavioral economic models of substance dependence consider addiction to be a state in which the relative reinforcing value of the substance is perceived to be higher than other reinforcers available in the individual’s environment, despite the consequences. One behavioral economic measure that is used is the cigarette purchase task (CPT), which is designed to assess the relative reinforcing value of nicotine in smokers by deriving demand curves that model how variability in price influences cigarette purchase patterns and indices of demand that describe that demand curve. These curves can then be translated into indices of demand, which each describe a different aspect of an individual's demand for a substance.

Purchase tasks can be useful in characterizing the progression of drug use and abuse. In smokers greater demand on the cigarette purchase task has been associated with higher levels of smoking and nicotine dependence. However, while a similar purchase task using alcohol was able to predict treatment outcomes in a study examining alcohol dependence in college students, the Cigarette Purchase Task has not yet been studied in relation to smoking cessation treatment outcome. Our population will consist of approximately sixty nicotine dependent smokers (10+ cigarettes a day) who will undergo eight weeks of Cognitive Behavioral Therapy and Nicotine Replacement Therapy in an attempt to help them reach and maintain smoking abstinence. The Cigarette Purchase Task will be administered before treatment begins. In this project, I would examine the following four indices of demand to determine if they are predictive of smoking cessation outcome in and their relationship to treatment outcome in nicotine dependent heavy smokers: (a) breakpoint (i.e., the first price at which consumption is zero), (b) intensity of demand (i.e., consumption at the lowest price), (c) elasticity of demand (i.e., sensitivity of cigarette consumption to increases in cost) (9), and (d) $O_{max}$ (maximum expenditure for cigarettes). We predict that the indices of demand generated in the Cigarette Purchase Task will be significant predictors of treatment outcome. It is our hope that this research will help us understand motivation for nicotine consumption and barriers to abstinence and contribute to the development of more effective prevention and intervention strategies for nicotine dependence.
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Hemorrhagic Disease and Blue Tongue Virus as a Case Study for Traditional and Machine-Learning Modeling Methods

2015 Summer Fellow: John Roquet
Research Mentor: Dr. Andrew Park, Odum School of Ecology

The world of statistical and mathematical modeling is being revolutionized by advances in machine-learning. This approach turns the world of traditional modeling on its head by eliminating the need for parametric assumptions of data and minimal data cleaning. One technique that has been recently adopted into the ecological realm is Boosted Regression Trees, which we have recently applied to an extensive data set concerning the *Culicoides* genus of midges, which vectors many arboviruses including Hemorrhagic Disease (HD) and Blue Tongue Virus (BTV) (Elith et al., 2008). This data set is large enough to serve as a basis for many methods of both traditional and machine-learning modeling techniques.

This project so far has developed predictors for the occurrence of several species of *Culicoides* and, therefore, for the spatially unequal risk of HD and BTV. These maps used 19 environmental, remotely-sensed covariates as predictors for the presence or absence of vector species. These findings provide a proof of concept for the application of machine-learning to infectious disease ecology, as well as an assessment of the impact of individual predictors in statistical models. The fact that there is variance among the models’ most predictive variables warrants an in-depth analysis of both the biology of each species and the models themselves. A study in optimizing the explanatory variables will greatly improve the robustness of models used to predict vector-borne disease outbreaks.

Following an optimization of the BRT model, I will generate alternative models through the traditional methods of logistical regression and $R_0$ mapping (Hartemink et al., 2009). Then, I will utilize machine-learning techniques including neural-networks and random forests to predict disease outbreak probabilities. These techniques have been used in limited bioscience fields but rarely in ecology, and a comparison of all methods will allow insight into which of these new tools performs optimally. In other bioscience disciplines, these machine-learning techniques have been used to generate a variety of outputs (lab paper). This is well suited to studying infectious disease ecology, which employs a wide range of metrics with varying degrees of mathematical merit and, in most cases, extensive assumptions. If a new technique can be used to create a scoring function for disease risk, or a ranking of vector species with sound reasoning, the field could make great strides in the consistency of its metrics and, in a short time, apply the resulting functions and models to a wide variety of diseases (Durrant et al., 2015).

The final stage of my project is to apply the best techniques to new disease data and to confirm that the methods are highly effective and versatile. The Park Lab has extensive data on many diseases and these methods may be sufficient to apply to several existing, large data sets. These methods, while applicable to ecology, need sufficient investigation, testing, and understanding. This project will serve as a stepping stone to the illumination of these techniques as well as a guide to determining which techniques are most applicable to a given project or inquiry.
Proposals

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Immune Defense and Pathogen Resistance of Monarch and Queen Butterflies
2015 Summer Fellow: Hayley Schroeder
Research Mentor: Dr. Sonia Altizer, Odum School of Ecology

Most pathogens are generalists that can infect more than one host species, with host species that are biologically similar and that overlap in range being more likely to share pathogens in common. Yet in some cases, even closely related and ecologically similar hosts can differ in their susceptibility to infection by a shared parasite. Monarch butterflies (*Danaus plexippus*) and their close relatives, queen butterflies (*D. gilippus*), are similar in appearance, overlap in geographic range, and share the same milkweed host plant species. Their caterpillars can even be found feeding side by side on the same plants. Both butterfly species can be infected by the protozoan pathogen *Ophryocystis elektroschirra* (OE), transmitted when caterpillars ingest spores scattered on eggs and leaves by infected adult butterflies. With so much ecological overlap, queens and monarchs likely experience similar levels of exposure to this pathogen, but the prevalence of infection among queens is lower than observed for monarchs when sampled in the field. Past cross-infection studies with pathogens in the Altizer laboratory also showed that queens appear to be more resistant to infection than monarchs. This study will reexamine cross-infection between monarchs and queens by adding measures of butterfly development rate, lifespan, and parasite spore load. I will also measure two measures of immunity to understand if the differences in parasite prevalence between these two species stem from differences in their immune response.

To carry out this study, both infected and uninfected monarchs and queens will be collected from two locations in Savannah, GA. Infection status of adults will be determined non-destructively by examining abdominal scales for the presence of OE spores. Parasite strains from infected monarchs and queens will be propagated in the lab. Butterfly eggs will be collected from uninfected females of both species and caterpillars will be reared on greenhouse-grown milkweed in the lab. I will experimentally infect caterpillars with precise numbers of spores from either their own host species or from the alternate host species in a cross-infection design. A control group of caterpillars will remain healthy. Infected and control animals will be raised to adulthood. I will measure development rate, body size, OE spore load to determine the severity of infection, and adult lifespan. Immune defense metrics will be performed in caterpillars because they have abundant hemolymph (insect blood). I will use standard lab protocols to estimate hemocyte concentrations (insect immune cells), and will measure phenoloxidase activity (an immune enzyme that catalyzes the production of melanin).

I expect that monarchs will show greater tolerance (maintenance of higher fitness metrics for a given spore load) to infection by their native strain of OE than to the queen’s strain of OE. I predict that queens will have significantly higher immune defense measures than monarchs and will be more resistant (have a lower final spore load) to both strains of OE. I predict that caterpillars, in both queens and monarchs, with high hemocyte and phenoloxidase activity will have lower spore loads and greater longevity as adults than individuals with lower levels.

This study expands on knowledge gained from cross-infection experiments by exploring different immune strategies (tolerance vs. resistance) that could have evolved in two closely related butterfly species in response to a shared pathogen. Monarchs are experiencing increasing levels of OE infection in recent years, and understanding the role of immune defense in disease dynamics will provide a broader view of interacting factors affecting monarch population reduction.
References:


As the third leading cause of death in the United States, stroke affects 800,000 people and takes the lives of 140,000 people every year.[1] When a patient suffers from stroke, the brain experiences tissue loss and damage due to inflammation and oxidative stress. Consequently, the patient loses some functions of the brain. Therefore, treatments are being developed to restore neural impulses to stimulate brain function.[2]

Adult stem cells (ASCs) have been used in studies to regenerate neural impulses. However, ASCs cannot survive long enough in such an environment in the brain, and therefore cannot integrate and replace lost cells.[2] Induced pluripotent stem cell derived neural stem cells (iNSC) have been shown to be able to differentiate into neurons, astrocytes, and oligodendrocytes.[3] However, the success of regeneration of new cells from iNSCs varies because of the cytotoxic environment which results from inflammation and high oxidative stress from the brain injury.[4] As a result, it would be advantageous to treat the injured area of the brain with anti-inflammatory drugs, such as aspirin, to reduce the cytotoxic effect caused by inflammation.[5]

The objective of this project is to develop a targeted nanoparticle that can deliver aspirin across the blood brain barrier to reduce inflammation and oxidative stress in the brain so that iNSCs are able to differentiate and integrate into damaged cell tissue more successfully. We are trying to use our biodegradable nanoparticles to specifically target the mitochondria in the white matter of the brain. We want to target the white matter of the brain because inflammation and oxidative stress are diffused in the white matter after injury.[6]

We are synthesizing PLGA (poly(lactic-co-glycolic acid) -b-PEG nanoparticles that are appropriate to deliver substances to the brain because they have controlled drug release times, are easily biodegradable, can travel a variety of routes within the body, and can encapsulate a variety of drugs.[7] We use a combination of polylactic acid polymer and polyglycolic acid polymer (PLGA) to create our nanoparticles because these combined polymers are highly biodegradable and nontoxic.[8] Polyethylene glycol (PEG) is also used to synthesize our nanoparticles because this polymer is hydrophilic in nature to allow the nanoparticle to survive and circulate throughout the body for longer.[9] Additionally, we attach triphenylphosphonium (TPP) cation to the polymer to create a highly lipophilic delocalized positively charged surface on targeted nanoparticles for mitochondria targeting properties.[10] My role in this project is to synthesize non-targeted (PLGA-PEG-OH) and targeted (PLGA-PEG-TPP) polymers that will be used to make the nanoparticles that will deliver the drugs to the brain. After successfully synthesizing these polymers, I will be involved in the process of synthesizing the nanoparticles that will be used to deliver aspirin to the damaged areas of the brain. The nanoparticles will then be used to perform cell studies to monitor the reduction of inflammation and oxidative stress in particular cell lines. Once the data shows that the drug delivery system effectively reduces inflammation and oxidative stress in the injured area of the brain, the iNSCs can be used to regenerate neural stimuli in a patient after a traumatic brain injury or stroke event. The development of this novel drug treatment can be used to save the lives of thousands of people who are affected by stroke each year by renewing brain function.
References:


The Unexplored Evolution and Philosophy of Malcolm X
2015 Summer Fellow: Shaunteri Skinner
Research Mentor: Dr. Carolyn Jones Medine, Department of Religion

Controversial African-American figures made impressions on history that constantly remain overlooked and that are abandoned partly due to racism and fear. As a result, the lives of black leaders who supported radical views become targets of hate and disgrace. Malcolm X stands as one of the most controversial black figures of the 20th century with his fiery style and fearless attitude in confronting white supremacy. His autobiography is an American classic, a guide for many individuals nationally and internationally. Yet, this classic limits our perception of such a complex being. So I ask, can personal written works change the public perception of a complicated black leader? Can Malcolm X be better understood through the unpublished works that contain his personal expressions, particularly his diaries and journals?

With the guidance of Dr. Carolyn Medine, I will explore the remnants of Malcolm X’s life that he chose to write on paper. My research will focus on his journals that remain at the Schomburg Center for Research in Black Culture in New York. I will compare these with The Autobiography of Malcolm X and Manning Marable’s Malcolm X: A Life of Reinvention. I desire to gain more insight into the evolution of his thought in relation to race in order to decipher the new philosophies that he developed. His travels to the Middle East and Africa in the 1960s changed many of his viewpoints, but we cannot fully grasp the impact of his exposure to places other than America. We simply do not have access to the individual that contributed to world history as a self-educated revolutionary (1). He expressed new ideologies concerning race relations along with the progression of society, but the press continued to identify him as a violent hate teacher before his death. His assassination also played a role in stunting a chance for his redemption in the public arena. Indeed, he could not avoid being labeled as a result of his affiliation with the Black Muslims and his powerful demeanor, which commanded much attention. I want to pick up where he left off in telling his story to the world in order to reveal the humanity of a black leader that fought for civil rights for all oppressed people.

Malcolm X left pieces of his expression of ideas that have yet to be explored through a literary and analytical lens. Indeed, these works may contain truths that must be revealed in order for us to reassess him as a historical American. His autobiography ends with deep regret and hope for his life along with the lives of all people in the world (2). These sentiments may be recorded with ample explanation in his unpublished journals and papers. The thoughts that he could not express in his autobiography may lie within unexplored material that may unveil unknown truths concerning his character.

The CURO Summer Research Fellowship will give me the chance to explore, in depth, dimensions of Malcolm X’s awakening abroad. The world deserves clarification in order to recollect not only the negativity associated with his name, but the enlightening aspects of his philosophy which remain buried within reflective material he authored. Race continues to dictate the paths of lives to this day. The content of Malcolm X’s diaries could reveal ways to recover from its overpowering impact. This fellowship will allow me to contribute to the scholarship on Malcolm X and on his visions of race in America as well as African American consciousness.
References:


Expanding beyond Native Habitats: How Do Mangrove Crab Food Preferences Shift When They Outpace their Associated Habitat?

2015 Summer Fellow: Jessica Story
Research Mentor: Dr. Jeb Byers, Odum School of Ecology

Climate change is driving range expansions of species worldwide [1], and warming temperatures are causing global shifts in species distributions to higher latitudes and elevations [2]. In Florida, mangrove forests are advancing their northern limit in response to declines in the frequency of annual freezes [3]. In this case, climate-driven range expansion is not just changing mangrove distributions, but associated species such as the mangrove tree crab, Aratus pisonii, are also expanding northward. Historically, A. pisonii has been tightly associated with its habitat-provisioning species, the mangrove. However, the crab has recently been observed more than 109km ahead of its associate, as far north as the Little Satilla River in Georgia, where it is found in salt marsh habitat [4]. Because A. pisonii is expanding faster than its associated habitat provisioning species, it is unclear how the crab may be adapting to a completely novel habitat. Specifically, the crab may change its resource acquisition strategies in this new habitat. In its native range, A. aratus has a diet that consists of 84% mangrove leaf tissue [5]; however, when this essential food resource is not available in saltmarsh habitat, how does the crab manage to persist?

The object of this study is to understand the mechanisms that allow differential range expansion by associated species. I will examine how A. pisonii survives in novel saltmarsh habitat without its historically associated food- and habitat-provisioning species. I hypothesize that A. pisonii alters its diet and food preferences as it expands its range out of mangrove habitat. I will perform a mensurative survey and experimental feeding trials to examine how A. pisonii feeding habits vary across mangrove, saltmarsh-mangrove ecotone (range expansion front), and saltmarsh environments. I predict that A. pisonii will feed primarily on mangrove leaves in mangrove and ecotone habitats. A. pisonii from the ecotone will have a slightly more diverse diet than crabs from mangrove habitat, and crabs collected from saltmarsh habitat will be more general in their food preferences. Regardless of habitat source, I hypothesize that A. pisonii will always prefer mangrove leaves in feeding trials relative to saltmarsh vegetation due to the historical association of A. pisonii with its mangrove partner.

For the survey, I will determine crab diets by collecting A. pisonii from 9 sites along the mangrove gradient (3 saltmarsh, 3 saltmarsh-mangrove ecotone, 3 mangrove) from St. Augustine to Fort Pierce, Florida. 15 crabs each will be collected from saltmarsh and mangrove sites, and 30 crabs collected from the ecotone-15 from mangrove and 15 from saltmarsh vegetation. A. pisonii will be dissected to analyze their gut contents. To complement the dissections, muscle tissue from each crab will be processed for stable isotope concentrations. I will also collect vegetation, sediment, and animal samples from each site for isotope analysis so that I can ascertain dietary links for crabs from all potential sources. To experimentally analyze diet choices for crabs from each location, I will conduct feeding trials, with 15 crabs collected from the same sites as the survey (30 from ecotone sites). Feeding trials will be performed at the Whitney Marine Lab in Marineland, Florida. Equal numbers of crabs from each source habitat will be randomly assigned to a food treatment – mangrove leaves, marsh cordgrass, or a choice between mangrove and cordgrass. The experiment will run for two weeks, and I will measure vegetation biomass at the beginning and end of the trial. Biomass loss over time represents the response variable and will quantify crab food preference based on habitat source.
References:


Response of Heterotrophic Biofilms to Urbanization in Athens-Clarke County
2015 Summer Fellow: Rachel Usher
Research Mentor: Dr. Amy Rosemond, Odum School of Ecology

Background:
As urban areas increase globally, it is critical to understand the impact urbanization has on watersheds to inform management and conservation strategies. Termed the urban stream syndrome, aquatic ecosystems frequently experience similar cascading effects of urban land use. These alterations in the natural system are characterized by “flashier hydrograph, elevated concentrations of nutrients and contaminants, altered channel morphology and stability, and reduced biotic richness, with increased dominance of tolerant species” (Walsh et al., 2005). Treated and untreated forms of wastewater also change the water chemistry by increasing available nutrients and toxicants (Wenger et al., 2009).

Biofilm is an active biological surface on stream bottoms comprised of algae, bacteria, fungi, enzymes, and organic matter. With both autotrophic and heterotrophic components, biofilm forms the base of aquatic food webs and plays a role in primary production, organic matter decomposition, and nutrient spiraling. Heterotrophic biofilms specifically use carbon inputs, such as leaf litter and woody detritus, for growth and biosynthesis (Johnson et al., 2009). These biofilms make up the carbon base of streams and are extremely important for stream function by taking up pollutants and providing a basis for productive organisms (Webster et al., 2000; Wallace et al., 1997). My study will examine how the processing rates of these materials change with urbanization.

Research Description:
I will test how processing rates of particulate carbon are affected by watershed urbanization by conducting a study across several streams in Athens-Clarke County that differ in impervious surface cover in their watersheds.

Research Plan:
This project will assess the respiration rates of heterotrophic biofilms in six urbanized streams in Athens-Clarke County. Since the growth of heterotrophic biofilms is regulated by the substrate it adheres to, wood veneers will be placed in each stream and left for a period of time to allow for biofilm growth on the wood surface. These veneers will be contained within apparatuses that allow for water flow and exclude invertebrates. Once biofilm has established on the veneers, the heterotrophic biofilm will be analyzed in the lab for respiration and breakdown rates. There are two primary objectives for this study: 1) examine if urbanized areas are stimulating the respiration rates of heterotrophic biofilms; 2) analyze the data collected in conjunction with previous and ongoing watershed studies in Athens-Clarke County. This summer, a researcher in UGA’s River Basin Center will be collecting abiotic and invertebrate diversity data at the same experimental sites as my project. This will allow for collaboration both during and after the summer to create a more complete prospective on the health of local streams. The samples collected during the course of the project will be analyzed in the Odum School of Ecology and the Odum School of Ecology Analytical Chemistry Lab.

Ultimately, this project will contribute to ongoing research in a partnership between Athens-Clarke County and the Rosemond Laboratory with the goal of assessing the state of local streams in order to inform management decisions in the county.
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2015 Summer Fellow: Jacob Young
Research Mentor: Dr. Michelle vanDellen, Department of Psychology

Research has shown that when people are exposed to weapons, their behavior changes significantly; specifically, they tend to become more aggressive (Berkowitz & LePage, 1967). Whether the stimulus is a gun or a club, physically present or represented by a picture, this tendency towards increased aggressiveness remains (Anderson et al., 2003). Referred to as the weapons effect, such findings have very real and dangerous implications, particularly with the increase in violence in the media (Bushman et al., 2013). Though the link between weapons priming and aggression has been studied extensively, the link between weapons priming and cognition has been a peripheral locus of study until recently. When cognition and weapons have been studied explicitly in the past, it was typically to show the effect of pre-existing racial bias on whether or not a person was perceived to have a weapon (Payne, 2001). A more generalized view on the effect of weapons priming on cognition is needed.

Dr. Michelle vanDellen’s lab, which I am a part of, ran a study in the fall of 2014 investigating whether being primed by a weapon (i.e., pictures of handguns) increased participants’ belief that the world is threatening. Our line of thinking was that if a person thought the world was more threatening, they would be more predisposed to acting aggressively, ostensibly in defense against the dangerous world they perceived themselves to be living in. Though seeing handguns did not increase belief in a threatening world overall, we found that participants who identified as politically liberal viewed the world as more threatening when they were primed to think of guns while those who identified as politically conservative viewed the world as less threatening, compared to not being primed to think of guns. We speculate that this is because conservatives, being more likely to own a gun, were more likely to think of the gun as one they might have while liberals, being less likely to own a gun, were more likely to think of this gun as one someone else might have. It is also possible that conservatives might feel more competent with a gun and liberals feel ill-equipped to use a gun in self-defense. With these results, we are planning to run another study in the fall in an attempt to determine the reason differences were found between these two groups. This will involve a replication of the previous study with the addition of questions about gun ownership, gun use competency, and interest in guns.

In addition to preparing this study, during the summer I will conduct a meta-analysis on studies relating weapons priming and cognition. Though meta-analyses have been conducted relating weapons priming and aggression, as well as racial bias and weapons perception, no meta-analysis has directly looked at the effect of weapons priming on cognition generally. The closest is a meta-analysis on studies investigating the “weapon focus effect,” which is unrelated to aggression (Steblay, 1992). The present study will begin with a review of the extant literature relating weapons to changes in cognition over the last 50 years. With the studies that are found, I will conduct a meta-analysis to determine whether there are regional differences in the effect of weapons priming on cognition, or if this effect has changed over time. Then, I will analyze the data and prepare a manuscript for publication on the results. Additionally, we will conduct our second study in the fall of 2015 to investigate whether familiarity and interest in guns results in a similar effect as our initial study on weapons priming and political beliefs.
References:

http://dx.doi.org/10.1111/j.1529-1006.2003.pspi_1433.x


http://dx.doi.org/10.1037/0022-3514.81.2.181

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Appendix A
2014 CURO Summer Research Fellows

Kaitlyn Beck
Dr. Jonathan Evans, Department of English
Proposal for Research on the Old English Poem “Elene” by Cynewulf, with a Focus on the Figure and Propaganda of Constantine the Great

Brett Bennett
Dr. Brian Drake, Department of History
The Forgotten Radical: Southern Women and the New Left Student Protests of the 1960s

Michael Biddle
Dr. Susanne Ullrich, Department of Physics & Astronomy
Photophysics of a Eumelanin Chromophore – Indole

Charles Bond
Dr. Sudhagar Mani, College of Engineering
Techno-economic Assessment of Co-producing Bioplastics with Algae Biofuels

Jerica Bornstein
Dr. Michelle vanDellen, Department of Psychology
Health Behavior Change in Romantic Couples

Jiacheng Chen
Prof. Eileen Wallace, Lamar Dodd School of Art
Contemporary Artistic Approach toward Ancient Chinese Papermaking

Blair Christensen
Dr. Patricia Moore, Department of Entomology
Influence of Mating Behavior on Germline Stem Cell Reproduction in Three Species of *Drosophila*

Aaron Conley
Dr. Barry Hollander, Grady College of Journalism & Mass Communication
The Politicization of Soccer and the Effects of the 2014 World Cup on Brazilian Politics

Lydia Denison
Dr. Brian Haas, Department of Psychology
Exploring the Relationship between Oxytocin and the Tendency to Trust

Sarah Evans
Dr. Michael Pierce, Department of Biochemistry & Molecular Biology
Production of a Monoclonal Antibody Epitope Expressed on Pancreatic Adenocarcinoma

Emily Francis
Dr. Jennifer Palmer, Department of History
The Reign of Terror through the Lens of Revolutionary Culture

Delmarias González
Dr. Changying Li, College of Engineering
Development of Robots for Weed Control in Organic Farming
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Patrick Griffin  
Dr. Robert Schmitz, Department of Genetics  
Natural Epigenetic Variation of the SVP Locus in Arabidopsis thaliana is Associated with an Early-flowering Phenotype

Connor Hamm  
Dr. Amitabh Verma, College of Environment & Design  
Digital Cities: How Technology Is Building Parametric Structures and Societies

Andrew Jarnagin  
Dr. Shane Hamilton, Department of History  
The “Sublimated Essence of America” and the History of Coca-Cola in the Middle East

Thomas Johnston  
Dr. Dorothy Fragaszy, Department of Psychology  
Factors Influencing the Development of Extractive Foraging Skills in Juvenile Bearded Capuchins

Mugdha Joshi  
Dr. Shelley Hooks, Department of Pharmaceutical & Biomedical Sciences  
Determining the Role of RGS10 in Microglia, Neuroinflammation, and the Progression of Multiple Sclerosis

Megha Kalia  
Dr. Robert Sabatini, Department of Biochemistry & Molecular Biology  
Mechanism of Developmental Regulation of Base J Synthesis in Trypanosoma brucei

Danny Kanso  
Dr. Charles Bullock, Department of Political Science  
From Strom Thurmond to Lindsey Graham: Republicanism in the American South

Joshua Lukemire  
Dr. Lawrence Sweet, Department of Psychology  
Use of a Breath-hold Paradigm to Remove FMRI Variability Due to Vascular Factors in Older Adults with Cardiovascular Disease

Jason Moraczewski  
Dr. Carl Bergmann, Department of Biochemistry & Molecular Biology  
Assessment of Proteomic and Glycomic Profiling of Medaka (Oryzias latipes) to further the Understanding of the Physiological Response to Low-level Ionizing Radiation

Laura Nelson  
Dr. Christopher Lawton, Department of History  
“What It Is to Be Free:” Freedom and Black Community Development in Reconstruction Athens

Ijeoma Okoye  
Dr. Neale Chumbler, Department of Health Policy & Management  
Pregnant and Parenting Adolescents’ Use of Space for Stress Relief

Meredith Osborne  
Dr. Lisa Renzi, Department of Psychology  
The Effects of Lutein and Zeaxanthin on Cognitive Function and Neural Efficiency in Older Adults with and without Cognitive Impairment
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**Joel Owen**
Dr. Dorothy Fragaszy, Department of Psychology  
Vocal Repertoire and Call Structure of Red-and-Green Macaws (*Ara chloropterus*)

**Sora Park**
Dr. Richard Steet, Department of Biochemistry & Molecular Biology  
Using the Chemical Reporter Strategy to Analyze Glycoproteins in Pompe Disease

**Hiral Patel**
Dr. Lisa Donovan, Department of Plant Biology  
Understanding Floral Trait Evolution in Wild Sunflowers

**Paola Rivera**
Dr. Laura German, Department of Anthropology  
A Study of the Lamu-South Sudan-Ethiopia Transport (LAPSSET) Corridor on the Northern Rangelands Communities in Laikipia, Kenya

**Yimeng Shi**
Dr. Christof Meile, Department of Marine Sciences  
Investigation of Intermediate Species with Different Geometry Settings between ANME Archaea and Sulfate Reducing Bacteria by Process-based Modeling

**Danish Singh**
Dr. Lance Wells, Department of Biochemistry & Molecular Biology  
Investigating Genotype-phenotype Correlations in *POMGnT1* Gene
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Appendix B
2013 CURO Summer Research Fellows

Meg Adams
Dr. William Miller, Department of Marine Sciences
Photochemical Production of Reactive Oxygen Species in the North Pacific

Tiffany Brown
Dr. Nicolás Lucero, Department of Romance Languages
The Importance of Local Grassroots Organizations in the Reshaping of Afro-Argentine Consciousness

Stanislav Bushik
Dr. Debra Mohnen, Department of Biochemistry & Molecular Biology
Exploring the Content and Structure of Proteoglycans in Rice Suspension Culture Cells

Anne Chen
Dr. Christopher Cornwell, Department of Economics
Sex Ratio and Risky Behavior on College Campuses in the United States

Megan Chesne
Drs. Michael and Rebecca Terns, Department of Biochemistry & Molecular Biology
Investigation of CRISPR/Cas Viral Defense System in Streptococcus thermophiles

Mary Douthit
Dr. Allen Moore, Department of Genetics
Influence of Octopamine in Parental Behaviors of Nicrophorus vespilloides

Allison Doyle
Dr. Julie Moore, Department of Infectious Disease
Exploring the Clinical Association between Placental Malaria and Preeclampsia: Assessing the Possibility of a Parasite-induced Imbalance in Tissue Factor and Angioregulatory Protein Production

Jane Egbosiuba
Dr. Zheng-Hua Ye, Department of Plant Biology
The Preliminary Investigation of Whether Switchgrass SND1 Orthologs Can Activate the Secondary Wall Biosynthesis

Barry Ervin
Dr. Jennifer Smith, Department of Telecommunications
The Use of Motion Picture Narrative to Capture the Relationship between Gender Identity and Expression

Seth Euster
Christopher Lawton, Department of History
The Heritage of Slavery on the Shields-Ethridge Farm

Emily Fawcett
Dr. Kelly Dyer, Department of Genetics
Investigating Female Re-mating Rates in Wild Drosophila neotestacea and Their Association with Sex-ratio Drive
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Austin Garner  
Dr. Andrea Sweigart, Department of Genetics  
Investigating the Genetic Factors Responsible for Postzygotic Isolation between Two *Mimulus* Species

Elizabeth Guarisco  
Dr. Carl Bergmann, Department of Biochemistry & Molecular Biology  
The Connection between Glycosaminoglycans and Pectins

Joseph Hopkins  
Dr. Alexander Sager, Department of Germanic and Slavic Studies  
Norse Mythology in Modern Popular Culture

Courtland Hyatt  
Dr. Amos Zeichner, Department of Psychology  
Effects of Music on Male Aggression: Do Lyrics Really Matter?

Mathew Joseph  
Dr. Julie Moore, Department of Infectious Diseases  
The Effects of Autophagy and Necroptosis in the Murine Model of Placental Malaria

Lara Mengak  
Dr. Nathan Nibbelink, Warnell School of Forestry and Natural Resources  
Assessing Potential Range Shifts of the American Alligator with Sea Level Rise

Kelly Murray  
Dr. Catherine Pringle, Odum School of Ecology  

Anish Narayanan  
Dr. Natarajan Kannan, Department of Biochemistry & Molecular Biology  
Analysis of Cancer Mutations in Protein Kinases using Semantic Web Technologies

Jennifer Pallansch  
Dr. David Hall, Department of Genetics  
Characterization of the Light Signaling System in Fireflies

Katie Partrick  
Dr. Laurie Reitsema, Department of Anthropology  
Exploring Effects of Stress and Dominance on the Weaning Strategies of Female Rhesus Macaques

Anthony Sadler  
Dr. Brian Drake, Department of History  
Lester Moody: A Man, a River, and a Quest for Industry in the Twentieth Century South

Will Saunders  
Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology  
Structure-Function Investigations of the Ste24p: A Metalloprotease Associated with Progeroid Disease

Natalie Schwob  
Dr. Dorothy Fragaszy, Department of Psychology  
Social Behavior and Vocal Repertoire of Wild Red and Green Macaws
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**Scarlett Sumner**  
Dr. Michael Yabsley, Department of Wildlife Disease Ecology  
Ecology and Genetic Characteristics of Haemogregarines in Fresh Water Turtles

**Brian Underwood**  
Dr. Jennifer Palmer, Department of History  
Jean-Jacques Rousseau and the Development of the Counter-Enlightenment

**Stephanie Wilding**  
Dr. Brian Cummings, Department of Pharmaceutical & Biomedical Sciences  
The Role of Cytochrome P450 Monooxygenase 2E1 in Bile Acid-induced Prostate Cancer Cell Death

**Elizabeth Wilkins**  
Dr. Steve Stice, Department of Animal & Dairy Science  
The Role of PAX6 in the Formation of Neural Rosettes in Induced Pluripotent Stem Cells

**Travis Williams**  
Dr. Joy Doran Peterson, Department of Microbiology  
Using Metabolically Engineered *E. coli* to Better Ferment Highly Industrially Processed Pectin-Rich Biomass

**Leigh Anna Young**  
Dr. Marguerite Madden, Department of Geography  
A Geospatial Analysis of Fission-Fusion Dynamics in Bearded Capuchin Monkeys
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Appendix C
2012 CURO Summer Research Fellows

William Austin
Dr. William Kisaalita, College of Engineering
Studies of Water Availability and Use in Tanzania

Conner Blackwell
Dr. Boris Striepen, Department of Cellular Biology
Striated Fiber Assemblin Protein Function in *Tetrahymena*

Stephen Bocarro
Dr. Jacek Gaertig, Department of Cellular Biology
The Characterization of Long Flagella Protein 4 in *Tetrahymena thermophila*

Hope Foskey
Dr. James Lauderdale, Department of Cellular Biology
Identification of GABA-Responsive Neurons in the Zebrafish Brain

Terese Gagnon
Dr. Virginia Nazarea, Department of Anthropology
Landscapes of the Interior: Ethnobotany and Senses of Palace among Karen Refugees

Devon Humphreys
Dr. Kelly Dyer, Department of Genetics
A Phylogenetic Approach to Investigating the Evolutionary History of the Quinaria Species Group of Drosophila

Emily Kopp
Dr. Chris Cornwell, Department of Economics
Immigration Law Reform and the Georgia Labor Market

Brittany McGrue
Prof. Sarah Zenti, Department of Furnishings and Interiors
The Need for Universal Design: An Environmental Assessment of Residential Interior Spaces and the Built Environment

Tuan Nguyen
Dr. Natrajan Kannan, Department of Biochemistry & Molecular Biology
Ca\(^{2+}\)/Calmodulin Dependent Protein Kinase (CAMK) Group: Evolution of Dynamic Regulatory Modules

Phillip Ogea
Dr. Arthur Roberts, Department of Pharmaceutical & Biomedical Sciences
Classification of the Transport Protein MDR3 and Its Effects on Multi-Drug Resistance

Ronke Olowojesiku
Dr. Nicole Gottdenker, Department of Pathology
Effects of Anthropogenic Land Use on Reservoir Host Potential of the Common Opossum *Didelphis marsupialis* in Panama
Babajide Oluwadare  
Dr. Duncan Krause, Department of Infectious Diseases  
Analysis of P1 Function in *Mycoplasma pneumoniae* Adherence and Gliding

Elliot Outland  
Dr. William Dennis, Department of Physics and Astronomy  
Finite-Difference Time-Domain Investigations of Metamaterials

David Parker  
Dr. Jennifer McDowell, Department of Psychology  
Neural-mechanisms Underlying the Gap Effect: Why is 200 the Magic Number?

Anakela Popp  
Dr. Dorothy Fragaszy, Department of Psychology  
Development of Nut Cracking Skills in Young Bearded Capuchin Monkeys

Cameron Prybol  
Dr. John Pickering, Odum School of Ecology  
Lepidoptera Survey of San Luis Valley, Monteverde, Costa Rica

Nicholas Richwagen  
Dr. K.C. Das, College of Engineering  
Comparative Study of Chemical Flocculation vs. Autoflocculation for Microalgae Harvesting, *Scenedesmus bijuga*, *Chlorella minutissima* and *C. sorokiniana*

John Rodriguez  
Dr. Donald Nelson, Department of Anthropology  
Changing Food Security Strategies in Northeast Brazil: Fifteen Years of Development Policies on Household Ability to Buffer Drought Impacts

Cole Skinner  
Dr. Michael Terns & Dr. Rebecca Terns, Department of Biochemistry & Molecular Biology  
Characterization of the Tneap Complex in the CRISPR-Cas Viral Defense System of Prokaryotes

Brittany Truitt  
Dr. Michael Tiemeyer, Department of Biochemistry & Molecular Biology  
Pharmacologic Rescue of Mutations That Affect Tissue-Specific Glycan Expression in *Drosophila melanogaster*

Stephanie Wilding  
Dr. Brian Cummings, Department of Pharmaceutical & Biomedical Sciences  
The Role of Secretory Phospholipase A2 in Bile Acid-Induced Prostate Cancer Cell Death

Anna Wilson  
Dr. William Kretschmar, Department of English  
Defining the Latino Experience in Roswell, GA: A Study in Sociolinguistics
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Appendix D
2011 CURO Summer Research Fellows

Lauren Anderson
Dr. Amy Ross, Department of Geography
The Legacy of Truth Analyzing the Impact of the Truth and Reconciliation Commission on South Africa’s Millennial Generation

Joshua Trey Barnett
Dr. Corey W. Johnson, Department of Recreation & Leisure Studies
Drag’s Not a Drag: Narrative Inquiry of Serious Drag Performers

Brooke Bauer
Dr. Robert Vandenberg, Department of Management
Organizational Commitment in the Workplace

Melissa Brown
Dr. Kecia Thomas, Department of Psychology
Black Stereotypes in Reality Television and the Reinforcement of Prejudiced Attitudes

William Costanzo
Dr. K.C. Das, Department of Biological & Agricultural Engineering
Algae Biofuel Development Growth Efficiency

Dervin Cunningham
Dr. Kelley Moremen, Department of Biochemistry & Molecular Biology
The Recombinant Expression of Proteins in the Glycosylation of Mammalian Cells

Abid Fazal
Dr. Joy Peterson, Department of Microbiology
Characterization of Enzymes Produced by Genetically Engineered Hypocrea jecorina and Their Use in Fermentation by Recombinant E. coli.

Melanie Fratto
Dr. Vanessa Ezenwa, Odum School of Ecology
Testing Bacteria-Killing Ability in Songbirds with Two Approaches Before and After Acute Stress

Nisha George
Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology
The Role of Cysteine Residues in the Function of the Ras Converting Enzyme (Rcelp)

Erin Giglio
Dr. Kelly Dyer, Department of Genetics
Sensory Systems at Play in Drosophila Courtship

Osama Hashmi
Dr. Monica Gaughan, Department of Health Policy & Management
From Malpractice to Medicare: Addressing the Legal Needs of Primary Care Physicians
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Anna Beth Havenar
Dr. Dawn Robinson, Department of Sociology
Religion and Impression Change Dynamics: An Affect Control Theory Analysis of Christianity and Islam

Ransom Jackson
Dr. John C. Inscoe, Department of History
A Comparative Study of Feminism in Southern Literature: Uncle Tom, Beulah and Aunt Phillis's Cabin

Elena James
Dr. Russell Karls, Department of Infectious Diseases
Detection of Mycobacterial Genes Involved in Vitamin 1B12 Uptake

Kellie Laity
Dr. Dorothy Fragazy, Department of Psychology
Development of Nut Cracking Skills in Young Bearded Capuchin Monkeys

Marianne Ligon
Dr. Michael Terns, Department of Biochemistry & Molecular Biology, and Dr. Rebecca Terns, Department of Biochemistry & Molecular Biology
Characterization of the Tneap Complex in the CRISPR-Cas Viral Defense System of Prokaryotes

Katherine Manrodt
Dr. Steven Lewis, Department of Physics & Astronomy
The Molecular Dynamics of Atomic Sticking Coefficients

Lindsey Megow
Dr. Kaori Sakamoto, Department of Pathology
Intestinal Nematode Infection’s Inhibitory Effect on M. bovis

Tuiumkan Nishanova
Dr. Stephen Hajduk, Department of Biochemistry & Molecular Biology
Assembly of High Density Lipoproteins via Retained N-terminal Signal Peptides

Farres Obeidin
Dr. David Hall, Department of Genetics
Modeling Subtelomeric Growth and the Adaptive Telomere Failure Hypothesis

Joshua Parker
Dr. Richard Steet, Department of Biochemistry & Molecular Biology
Identification and Characterization of a Novel Beta-Galactosidase Enzyme in Brain

Lea Rackley
Dr. Katarzyna Jerzak, Department of Comparative Literature
Finding the Child in Children’s Literature

Luben Raytchev
Dr. Michael Yabsley, Department of Wildlife Disease Ecology
Intracellular Blood Parasites of Common Freshwater Turtle Species in Georgia: Prevalence and Burden
Mark Rolfsen
Dr. Jessica Muilenburg, Department of Health Promotion & Behavior
The Implementation of Effective Smoking Cessation Intervention for Drug and Alcohol Addicts in Substance Abuse Treatment

Dana Schroeder
Dr. Quint Newcomer, Director, UGA Costa Rica
An Applied Research Examination of Progress Toward Sustainability Goals at UGA's Costa Rica Campus in San Luis de Monteverde, Costa Rica

Daniel Sharbel
Dr. Timothy Dore, Department of Chemistry, and Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology
Assessing Reel-Protease Inhibition in a Cell-Based Fluorescence Ras Localization Assay

Daniel Smith
Dr. Michael Marshall, Lamar Dodd School of Art
Contemporary Interpretation of Dante Alighieri's Inferno Through Photographic Illustration

Justin Smith
Dr. Michael Terns, Department of Biochemistry & Molecular Biology, and Dr. Rebecca Terns, Department of Biochemistry & Molecular Biology
Characterization of a Putative Endonuclease-RNA Complex Involved in CRISPR-Mediated Viral Defense

Theresa Stratmann
Dr. John Maerz, Warnell School of Forestry & Natural Resources
The Science of Monitoring Rare Species Developing Methods for Surveying and Monitoring Bog Turtles

Christopher Sudduth
Dr. Cathleen Brown, Department of Kinesiology
Establishing Clear Cut-Off Scores to Develop Classification Criteria for Subgroups of Individuals with CAI

Connor Sweetnam
Dr. Marcus Fechheimer, Department of Cellular Biology, and Dr. Ruth Furukawa, Department of Cellular Biology
The Involvement of Coenzyme Q (50) and Tau in the Formation of Hirano Bodies

Nakul Talathi
Dr. Natarajan Kannan, Department of Biochemistry & Molecular Biology
Determining the Effect of Oncogenic Mutations on EGFR Protein Kinase Activation and Phosphorylation

Korry Tauber
Dr. Michael Tiemeyer, Department of Biochemistry & Molecular Biology, and Dr. Lance Wells, Department of Biochemistry & Molecular Biology
Examining the Function of O-GlcNAc in Drosophila to Analyze Intercellular Signaling Pathways

Nathan Usselman
Dr. Jason Locklin, Department of Chemistry
Synthesis of Enzyme Functionalized Conjugated Polymers for Implantable Power Sources
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Star Ye
Dr. Jason Zastre, Department of Pharmaceutical & Biomedical Sciences
Measuring Lactate Production to Understand Transketolase and Its Isoforms in Breast Cancer Cells
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Appendix E
2010 CURO Summer Research Fellows

Jessica Alcorn
Dr. Audrey Haynes, Department of Political Science
The Validity of the News Marketing Hypothesis

Amarachi Anukam
Dr. Pamela Orpinas, Department of Health Promotion & Behavior
Healthy Teens: A Longitudinal Study of ‘At Risk’ Secondary Students

Thomas Bailey
Dr. William Kretzschmar, Department of English
Six Bodies: A Quantitative Analysis of Japanese Discourse Features

Michael Bray
Dr. Kelly Dyer, Department of Genetics
Genetic Analysis of Pigmentation in Drosophila tennebrosa

Ebony Caldwell
Dr. Monica Gaughan, Department of Health Policy & Management
Influences on the Outlook of the Post-college Educational Opportunities and Choices of Undergraduate Science Majors

Caitlin Cassidy
Dr. William Kretzschmar, Department of English
The Art of Persuasion: How Small Business Owners Use Speech to Market Products in Roswell, GA

Meagan Cauble
Dr. Mike Adams, Department of Biochemistry & Molecular Biology
Mechanism of Plant Biomass Conversion Without Pre-treatment by Anaerobic Thermophilic Bacterium Caldicellulosiruptor bescii

Daniel Celluci
Dr. Steven Lewis, Department of Physics & Astronomy
Applications of Molecular Dynamics Simulations to Models of Gas-Grain Interactions in the Interstellar Medium

Jessica Fazio
Dr. Richard Hubbard, Department of Chemistry
Carvone Luche Reduction Followed by Optical Activity Determination

JoyEllen Freeman
Dr. Barbara McCaskill, Department of English
Georgia Slaves in Transatlantic Culture: Blind Tom and William and Ellen Craft

Debashis Ghose
Dr. Joy Doran-Peterson, Department of Microbiology
Engineering Saccharomyces Yeast Strains to Better Ferment Pine Wood Biomass to Ethanol
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Camille Gregory  
Drs. Marcus Fechheimer and Ruth Furukawa, Department of Cellular Biology  
Creating a Transgenic Mouse to Study the Physiological Role of Hirano Bodies in the Progression of Alzheimer’s Disease

Shanterian Hester  
Dr. Michael Pierce, Department of Biochemistry & Molecular Biology  
Exercising Glycoproteomics Analyses to Discover New Breast Cancer

Georgianna Mann  
Dr. Sonia Hernandez, Warnell School of Forestry and Natural Resources  
Bufo marinus Pathogen and Parasite Analysis as a Model for Ecosystem Change

Krelin Naidu  
Dr. Brian Cummings, Department of Pharmaceutical & Biomedical Sciences  
Epigenetic Effects of Bromate on p21 and Histone-2AX Expression in HEK293 Cells

Rebecca Parker  
Dr. Kevin McCully, Department of Kinesiology  
Effects on Blood Flow Velocity and Arterial Diameter Produced by Compression Therapy in SCI Individuals

Jay Patel  
Dr. Boris Striepen, Department of Cellular Biology  
Characterization of Striated Fiber Assemblin Proteins in T. gondii

Rachel Perez  
Dr. J. Peter Brosius, Department of Anthropology  
Oil Palm Proliferation in Peru

Ryan Prior  
Dr. Katarzyna Jerzak, Department of Comparative Literature  
Foundations of Medical Philosophy in Ancient Civilizations

Malavika Rajeev  
Dr. Sonia Altizer, Odum School of Ecology  
The Effect of Parasite Infection on Monarch Butterfly Mating Behavior

Hope Rogers  
Dr. Jonathan Evans, Department of English  
Real-World Applications of Tolkien’s Races and Cultures

Carla Rutherford  
Dr. Stephen Hajduk, Department of Biochemistry & Molecular Biology  
Human Resistance to Infection by African Trypanosomes

Laura Smart  
Dr. Rheeda Walker-Obasi, Department of Psychology  
Dialectical Behavior Therapy and Distraction: Using the Cold Pressor Test to Determine Efficacy
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Stephen Thompson
Dr. George Majetich, Department of Chemistry
Application of Friedel-Crafts Annulations to Conjugated Dienones and Silyl Substituted Arene Rings for the Synthesis of Complex Tricycles

Jake Young
Professor George Contini, Department of Theatre & Film Studies
A Study of the Psycho-Physical Performance Technique of Michael Chekhov
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Appendix F
2009 CURO Summer Research Fellows

Christine Akoh, CURO-OVPR Summer Research Fellow
Dr. Joseph Frank, Department of Foods & Nutrition
Effect of Mono and Divalent Cations on Biofilm Formation in a Prolific Biofilm Forming Strain of Listeria Monocytogenes Cultured in a Chemically Defined Medium

Sambita Basu, CURO-Jane and Bill Young Scholarship Summer Fellow
Dr. Gerardo Alvarez-Manilla, Department of Biochemistry & Molecular Biology
Protein-linked Glycoconjugates as Biomarkers for Cancer of Other Physiological Processes

Chip Blackburn, CURO-OVPI Summer Fellow
Dr. Hugh Ruppersburg, Department of English
Harry Crews and the Tradition of Southern Fiction-Writing

Corbin Busby, CURO Research Fellow
Dr. Isabelle Wallace, Lamar Dodd School of Art
Imaging Masculinity in Contemporary Fashion Photography

Kelly Cummings, CURO-OVPR Summer Fellow
Dr. Scott Schatzberg, College of Veterinary Medicine
Differentiation of Natural and Post-vaccinal Canine Distemper Virus Encephalomyelitis

Charles Ginn, CURO Research Fellow
Dr. Hugh Ruppersburg, Department of English
Charting the Oppression of Minority Groups through Southern Gothic Literature

Erin Hansen, CURO Research Fellow
Dr. Jennifer McDowell, Department of Psychology
Effects of Daily Saccade Practice on Behavioral and Neural Plasticity in Schizophrenics

Dillon Horne, CURO-OVPI Summer Fellow
Dr. Thomas Cerbu, Department of Comparative Literature
The Development and Implications of Predictive Modes of Thought from the Renaissance to Modernity

Tiffany Hu, CURO Research Fellow
Dr. Stephen Hajduk, Department of Biochemistry & Molecular Biology
Re-examine Alternative Editing and Understanding the Protein Diversity in T. brucei

Whitney Ingram, CURO-OVPI Summer Fellow
Dr. Yiping Zhao, Department of Physics & Astronomy
Optimization and Analysis of Titanium Dioxide Nanorod Photodegradation

Daniel Jordan, CURO Research Fellow
Dr. Betty Jean Craigie, Department of Comparative Literature
German Sustainable Farming as a Model for Resource Stewardship

Fahad Khan, CURO-ITP Summer Fellow
Dr. Jason Zastre, Department of Pharmaceutical & Biomedical Science
Highly Active Antiretroviral Therapy
Max Klein, CURO-UGA Alumni Association Summer Fellow
Dr. Richard Steet, Department of Biochemistry & Molecular Biology
Gauging the Developmental Impact of Impaired Glycoprotein Breakdown in Zebrafish

Susan Klodnicki, CURO-OVPR Summer Fellow
Dr. Jim Lauderdale, Department of Cellular Biology, and Dr. Andrew Sornborger, Department of Mathematics and Engineering
PTZ and Other Chemoconvulsant Effects on Adult Zebrafish

Bridget Mailey, CURO Research Fellow
Dr. Amy Ross, Department of Geography
The ICC and the US: How Have the Actions of the US Affected the ICC in the Past and How Will They Affect the ICC in the Future?

Francisco Marrero, CURO Research Fellow
Dr. Leidong Mao, Department of Engineering
Development of Ferrofluid Based Platform for Particles and Cellular Manipulation

Amar Mirza, CURO Research Fellow
Dr. Natarajan Kannan, Department of Biochemistry & Molecular Biology
A Computational Study of the Crystalline Structure of Tyrosine Kinase Mutants

Cody Nichol, OVPR Research Fellow
Dr. Cynthia Suveg, Department of Psychology
Empirical Examination of Child Emotion Assessments: A Comparison of Child, Parent and Behavioral Observation Methods

Emily Pierce, CURO Summer Fellow
Dr. Wayne Parrot, Department of Crop & Soil Sciences
Genetic Alteration of the Soybean to Promote Astaxanthin Production

Akanksha Rajeurs, CURO Research Fellow
Dr. Russell Karls, Department of Infectious Diseases
Develop an Efficient Method to Create Marked and Unmarked Mutations in the Human Genome

Al Ray, III, OVPI Research Fellow
Dr. Susan Sanchez, Department of Infectious Diseases
Relationship between Epidemiology of Salmonella in Non-Domestic Avian Species and Humans in the Southeastern United States

Joe Reynolds, CURO Research Fellow
Dr. Frank Harrison, Department of Philosophy
Analysis of the Nature of the Individual and the Notion of His Happiness

Matthew Sellers, CURO Research Fellow
Dr. Hugh Ruppersburg, Department of English
Finding God in the Poetry of Robert Penn Warren

Michael Slade, CURO Research Fellow
Dr. Frank Harrison, Department of Philosophy
Implicit System of Rational Thought Analogous to Modern First-Order and Modal Logics in Plato’s Late Dialogues
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**Alex Walker**, OVPR Research Fellow
Dr. Timothy Dore, Department of Chemistry
Synthesis of BHQ-dithiol as a Photoremovable Protecting Group for Mifepristone

**Shuyan Wei**
Dr. Scott Schatzberg, College of Veterinary Medicine
Development of Consensus-Degenerate Hybrid Oligonucleotide Primers (CODEHOPs) for Retroviral Discovery

**2009 Howard Hughes Medical Institute EXROP Student**

**Valeriya Spektor**
Dr. Sue Wessler, Department of Plant Biology
Designing Teaching Modules for Genome Analysis
Appendices A-N

Appendix G
2008 CURO Summer Research Fellows

Zachary Anderson, CURO Summer Research Fellow
Dr. Peter Brosius, Department of Anthropology
Multicultural Perspectives on Landscape Change

Matthew Belcher, CURO-BHSI Summer Research Fellow
Dr. Michael Terns, Department of Biochemistry & Molecular Biology, and Dr. Rebecca Terns, Department of Biochemistry & Molecular Biology
Determinants in the Localization of Telomerase to Telomeres

Mary Elizabeth Blume, CURO-OVPR Summer Research Fellow
Dr. Stefaan Van Liefferinge, Department of Art History
Uncovering Traditions of the Gothic Style in the Architectural Plans of Saint Germain-des-Pres and Saint Martin-des-Champ in Paris, France

Melissa Brody, CURO-OVPR Summer Research Fellow
Dr. Ron Carroll, Odum School of Ecology
Interactions of Bees and Hummingbirds with Hamelia patens

Carolyn Crist, CURO-UGA Summer Research Fellow
Dr. John Greenman, Grady College of Journalism & Mass Communications
News in the Black Belt: Teaching Journalists How to Cover Poverty in Persistently Poor Counties

M. Logan Davis, CURO-BHSI Summer Fellow
Dr. James Franklin, Department of Pharmaceutical & Biomedical Sciences
Long-Range Retrograde Transduction of Trophic and Survival Signals in Mouse Sympathetic Neurons

Marcus Hines, CURO-BHSI Summer Research Fellow
Dr. Michael Tiemeyer, Department of Biochemistry & Molecular Biology, and Dr. Lance Wells, Department of Biochemistry & Molecular Biology
Analyzing the Function of O-GlcNAc in Drosophila

Haylee Humes, CURO Summer Research Fellow
Dr. Marcus Fechheimer, Department of Cellular Biology
How AICD and Fe65 Are Recruited to Hirano Bodies

Lindsay Jones, CURO Summer Research Fellow
Drs. Michael Terns and Rebecca Terns, Department of Biochemistry & Molecular Biology
Identification and Characterization of a Nuclease That Functions in an RNA-Mediated Viral Defense Pathway (RNAi) in Prokaryotes

Tyler Kelly, CURO Summer Research Fellow
Dr. Elham Izadi, Department of Mathematics
Usage of Linear Subspaces with Varieties

Jung Woong Kim, CURO Summer Research Fellow
Dr. Andrew Sorenborger, Department of Mathematics, and Dr. James Lauderdale, Department of Cellular Biology
Imaging of Endogenous Ca2+ Waves in Developing Zebrafish
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Jennifer Lee, CURO-BHSI Summer Research Fellow
Dr. Ronald Blount, Department of Psychology
Understanding Pediatric Symptoms

Sharon McCoy, CURO-OVPR Summer Research Fellow
Dr. Chad Howe, Department of Romance Languages
Dialect Perceptions of Spanish Speakers in Georgia

Katherine McGlamry, CURO-Jane and Bill Young Scholarship Summer Research Fellow
Dr. Michael Tiemeyer, Department of Biochemistry & Molecular Biology
Glycan Interactions and the Development and Spread of Cancer Cells

Alice Meagher, CURO-BHSI Summer Research Fellow
Dr. Michael Adams, Department of Biochemistry & Molecular Biology
Expression and Characterization of the Heterologously Expressed Soluble Hydrogenase I from Pyrococcus furiosus

Madison Moore, CURO-BHSI Summer Research Fellow
Dr. Jennifer McDowell, Department of Psychology
Behavioral and Neural Plasticity Following Daily Practice of Saccade Tasks in Schizophrenia

Emily Meyers, CURO-OVPR Summer Research Fellow
Dr. Patricia Sullivan, Department of International Affairs
The Advantage of Weakness: How Weak States Can Overcome Military Might of Strong States

Kelly Nielsen, CURO-OVPR Summer Research Fellow
Prof. George Contini, Department of Theatre & Film Studies
Augusto Boal’s Invisible Theatre: Political Play with an Unassuming Audience

Sean O’Rourke, CURO Summer Research Fellow
Dr. Kathy Simpson, Department of Kinesiology
Neuromuscular Activation and Movement Kinematics Exhibited During the Sit-to-Stand by Multiple Sclerosis Individuals

Julie Patel, CURO Summer Research Fellow
Dr. Patricia Sullivan, Department of International Affairs
Military Interventions by Powerful States

Neil Pfister, CURO-BHSI Summer Research Fellow
Dr. Michael Terns, Department of Biochemistry & Molecular Biology, and Dr. Rebecca Terns, Department of Biochemistry & Molecular Biology
Interactions That Define the Organization of RNA-Protein Complexes Involved in Prokaryotic RNA Interference

Stefann Plishka, CURO-Franklin College of Arts and Sciences Summer Research Fellow
Dr. Asen Kirin, Department of Art History
Imagining Constantinople: Imperial Houses of Worship as Symbols of State Ideology

Katie Pyne, CURO Summer Research Fellow
Dr. Jerome Legge, Department of International Affairs
Refugees and Internally Displaced People: How Effective Are the United Nations, Nongovernmental Organizations, and Subsequent Initiatives in Pacifying This Complex Humanitarian Crisis?
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Joseph Rimando, CURO-Interdisciplinary Toxicology Program Summer Research Fellow  
Dr. Ralph Tripp, Department of Infectious Diseases  
Understanding and Preventing the Interaction between RSV’s G Protein and the CX3CR1 Cell Receptor

Aalok Sanjanwala, CURO Summer Research Fellow  
Dr. Marcus Fechheimer, Department of Cellular Biology, and Dr. Ruth Furukawa, Department of Cellular Biology  
The Effect of Hirano Bodies on Mutated Tau Protein

Neeraj Sriram, CURO Summer Research Fellow  
Dr. Mark Eiteman, Department of Biological & Agricultural Engineering  
Solving the World’s Energy Crisis – Not One Sugar at a Time

Giridhar Subramanian, CURO Summer Research Fellow  
Dr. Brock Tessman, Department of International Affairs  
Power and Influence in Southeast Asia: A Study of the Methods Used by India, China, and the United States

Aileen Thomas, CURO Summer Research Fellow  
Dr. Nicole Lazar, Department of Statistics  
How Random is Pseudorandom

Kathryn Turner, CURO Summer Research Fellow  
Dr. Shelley Hooks, Department of Pharmaceutical & Biomedical Sciences  
Comparison of RGS Regulation of LPA Signaling in Prostate Cancer and Ovarian Cancer

Manouela Valtcheva, CURO Summer Research Fellow  
Dr. Jennifer McDowell, Department of Psychology  
Antisaccade Performance and Deficit Characteristics in a Normal Population

Hunter Wilson, CURO Summer Research Fellow  
Dr. Timothy Dore, Department of Chemistry  
8-Chloro-7-hydroxyquinoline as a Biologically Useful Photoremovable Protecting Group

Laura Wynn, CURO-OVPR Summer Research Fellow  
Dr. Martin Kagel, Department of Germanic & Slavic Languages  
Issues in Current Turkish-German Literature
Appendices A-N

Appendix H
2007 CURO Summer Research Fellows

Caroline M. Anderson, CURO-OVPR Summer Research Fellow
Dr. John Turci-Escobar, Department of Music Theory, and Dr. Max Reinhart, Department of German
A Psychoanalytical Examination of Wolf and Mörike's Peregrina Songs

Joseph Burch, CURO Summer Research Fellow
Dr. Harry Dailey, Department of Microbiology and Biochemistry & Molecular Biology
Converting Ferrochelatase into a Cytochrome c-like Protein

Amy Burrell, CURO-BHSI Summer Research Fellow
Dr. Debra Mohnen, Department of Biochemistry & Molecular Biology
Analysis of the Transcriptional Expression of Arabidopsis GAUT Genes: 15 Proven and Putative Plant Cell Wall Biosynthetic Galacturonosyltransferases

Lee Ellen Carter, CURO-OVPR Summer Research Fellow
Dr. Fausto Sarmiento, Department of Geography
Ecoregional Conservation among Indigenous Communities in Cotacachi, Ecuador

Kimberly DeLisi, CURO-BHSI Summer Research Fellow
Dr. Ray Kaplan, Department of Infectious Diseases
Parameters Affecting Fecal Egg Count Data for Determining Drug Resistance in Nematode Parasites of Horses

Joshua Dunn, CURO-OVPR Summer Research Fellow
Dr. William Kretzschmar, Department of English
The Youth of Roswell Voices: A Linguistic Analysis

Katie Flake, CURO-BHSI Summer Research Fellow
Dr. Maor Bar-Peled, Complex Carbohydrate Research Center
The Arabinose Kinase Project

James Gordy, CURO Summer Research Fellow
Dr. Michael Adams, Department of Biochemistry & Molecular Biology
Developing Methodologies for the Study of Small ORFs in P. furiosus

Jana Hanchett, CURO Summer Research Fellow
Dr. David Schiller, Department of Musicology/Ethnomusicology
Latino and Hispanic Musical Influences on Athens-Clarke County

Laura Harrison, CURO-BHSI Summer Research Fellow
Dr. Corrie Brown, Department of Pathology
Campylobacter in the Crypts

Clare Hatfield, CURO-OVPR Summer Research Fellow
Dr. Stephen Shellman, Department of International Affairs
Democracy and the Choice of Law: The Intersections of Shari'a, Domestic and International Law
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Anna Hudson, CURO Summer Research Fellow
Dr. Richard Dluhy, Department of Chemistry
Using Surface Enhanced Raman Spectroscopy for the Detection of Pathogens

Andy Kragor, CURO-Jane & Bill Young Scholarship Summer Research Fellow
Dr. Lance Wells, Complex Carbohydrate Research Center, and Dr. Carl Bergmann, Complex Carbohydrate Research Center
Unbiased Isolation and Carbohydrate Mapping of Alpha-Dystroglycan

Brian Laughlin, CURO-BHSI Summer Research Fellow
Dr. Alan Darvill, Complex Carbohydrate Research Center
Functional Analysis of the Magnaporthe grisea Secretome

James MacNamara, CURO Summer Research Fellow
Dr. Timothy Dore, Department of Biochemistry & Molecular Biology
Synthesis of Quinolinol-Based Inhibitors of Rce1p

Prashant Monian, CURO-Interdisciplinary Toxicology Program Summer Research Fellow
Dr. Brian Cummings, Pharmaceutical & Biomedical Sciences
Molecular Inhibition of Independent Phospholipase A2 and its Effect on Prostate Cancer Growth

Neil Naik, CURO-OVPR Summer Research Fellow
Dr. Ruth Harris, Department of Food & Nutrition
The Effect of Antagonizing Stress Receptors in Rats During Repeated Exposure to Restraint Stress

Natalie Nesmith, CURO-BHSI Summer Research Fellow
Dr. Mary Bedell, Department of Genetics
Genetic Studies on the Roles of KITL in Regulating the Proliferation and Apoptosis of Primordial Germ Cells in Mice

Victor Orellana, CURO Summer Research Fellow
Dr. Nicolás Lucero, Department of Romance Languages
Unsung Hero: A Literary and Historical Study of Lautaro

Tulsi Patel, CURO Summer Research Fellow
Dr. Scott Gold, Department of Plant Pathology
Developing a Biocontrol Agent for Chinese Privet, Ligustrum sinense

Tomas Pickering, CURO-OVPR Summer Research Fellow
Dr. Dorothy Fragaszy, Department of Psychology
Manner of Hammer Stone Use in Wild Capuchin Monkeys

Cleveland Piggott, CURO-BHSI Summer Research Fellow
Dr. Marcus Fechheimer, Department of Cellular Biology
The Formation of Hirano Bodies

Purvi Sheth, CURO Summer Research Fellow
Dr. Russell Karls, Department of Infectious Disease
Characterization of Mycobacterium shottsi
Appendices A-N

**Traci Tucker**, CURO Summer Research Fellow  
Dr. Dawn Robinson, Department of Sociology  
Gender and Role Meanings: A Cross-Cultural Comparison

**Jessica Van Parys**, CURO-UGA Alumni Association Summer Research Fellow  
Dr. David Mustard, Department of Economics  
Does Writing Ability Signal Academic Excellence?: Evidence from the New Scholastic Aptitude Writing Section (SATW)

**Delila Wilburn**, CURO Summer Research Fellow  
Dr. Barbara McCaskill, Departments of African American Studies and English  
Beauty Imposed

**Karen Wong**, CURO Summer Research Fellow  
Dr. Andrew Whitford, Department of Political Science  
Political and Social Foundations for Environmental Sustainability, Transfer Pricing, and Social Entrepreneurship
Appendix I
2006 CURO Summer Research Fellows

Sarah Breevoort, CURO-BHSI Summer Research Fellow
Dr. Walter Schmidt, Department of Biochemistry and Molecular Biology
Construction of Three Reelp Mutant Plasmids to Aid in the Characterization of Reelp Enzymatic Activity

Lauren Coffey, CURO Summer Research Fellow
Dr. Stephen Shellman, Department of International Affairs

Susan Fang, CURO Summer Research Fellow
Prof. Christopher Hocking, Studio Foundations

Courtney Grant, CURO-BHSI Summer Research Fellow
Dr. Julie Coffield, Department of Physiology and Pharmacology
An Investigation of Botulinum Neurotoxin Interactions on RhoA Activity Using In Vitro Assays

Erica Hall, CURO-BHSI Summer Research Fellow
Dr. Jessie Kissinger, Department of Genetics

Adele Handy, CURO-UGA Alumni Association Summer Research Fellow
Dr. Greg Robinson, Department of Chemistry

Celan Hardman, CURO Summer Research Fellow
Prof. Joe Norman, Drawing and Painting

Sana Hashmi, CURO-Jane and Bill Young Scholarship Summer Research Fellow
Dr. Lance Wells, Complex Carbohydrate Research Center
Alteration of Alpha-Dystroglycan and Cancer Progression

Brian Levy, CURO Summer Research Fellow
Dr. Larry Nackerud, School of Social Work
Courrie – Not Email: Implications for Government Regulation of a Social Phenomenon. A Case Study of Language in France

Maggie Mills, CURO-NSF/SPIA Summer Research Fellow
Dr. Stephen Shellman, Department of International Affairs

Anna-Marieta Moise, CURO-BHSI Summer Research Fellow
Dr. Andrea Hohmann, Department of Psychology
Neurochemical Basis of Social Defeat in Syrian Hamsters: Role of Endogenous Cannabinoids

Lamar Moree, CURO-BHSI Summer Research Fellow
Dr. Alan Darvill, Complex Carbohydrate Research Center

Jesse Oakley, CURO Summer Research Fellow
Dr. Laurie Fowler, Department of Ecology
Economic Incentives for Private Land Conservation and Sustainable Development: Research into Environmental Policy in Costa Rica and Georgia
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Katie Orlemanski, CURO-OVPR Summer Research Fellow
Dr. Patricia Richards, Department of Sociology
Reclaiming “Development” within the Context of Low-Income Neighborhoods

Danielle Pearl, CURO-OVPR Summer Research Fellow
Dr. Keith Langston, Germanic and Slavic Languages
Press Freedom, E.U. Accession, and Democracy in Croatia

Daniel Perry, CURO Summer Research Fellow
Dr. David Landau, Department of Physics and Astronomy

Andrew Pierce, CURO Summer Research Fellow
Dr. Thomas McNulty, Department of Sociology

Richard Piercy, CURO-OVPR Summer Research Fellow
Dr. Cory Momany, Department of Pharmaceutical and Biomedical Sciences

Kurinji Pandiyan, CURO Summer Research Fellow
Dr. Steven Holloway, Department of Geography
Understanding Public Space in a New Urbanist Development

Mandy Redden, CURO-BHSI Summer Research Fellow
Dr. Robert Arnold, Department of Pharmaceutical and Biomedical Sciences
Towards a More Effective Delivery System for Anti-Cancer Drugs

Eva Bonney Reed, CURO-BHSI Summer Research Fellow
Dr. Ronald Blount, Department of Psychology

Lisa Rivard, CURO-Toxicology Summer Research Fellow
Dr. Jeff Fisher, Toxicology

Sonia Talathi, CURO-OVPR Summer Research Fellow
Dr. Brian Cummings, Department of Pharmaceutical and Biomedical Sciences
Effectiveness of Ca2+-Independent Phospholipase A2 Inhibitors in the Induction of Chemotherapeutic-Induced Cancer Cell Death

Erika Vinson, CURO Summer Research Fellow
Dr. Richard Siegesmund, Art Education

Joshua Watkins, CURO Summer Research Fellow
Dr. Patricia Sullivan, Department of International Affairs
The Price of Victory: When Leaders Underestimate the Cost of War

Daniel Weitz, CURO-OVPR Summer Research Fellow
Dr. Gary Bertsch, Department of International Affairs
The Impact of a European Union Nuclear Weapons Free Zone on the International Non-Proliferation Regime

Shannon Yu, CURO-BHSI Summer Research Fellow
Dr. Nancy Manley, Department of Genetics
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Appendix J

2005 CURO Summer Research Fellows

**Grace Anglin**, CURO-OVPR Summer Research Fellow  
Dr. Kimberly Shipman, Department of Psychology  
Family Focused Emotion Communication Training

**Ashley Beebe**, CURO Summer Research Fellow  
Dr. James R. Holmes, Center for International Trade and Security  
The Influence of Media on Economic Policy in Brazil and Argentina

**Ingrid Bloom**, CURO-BHSI Summer Research Fellow  
Dr. Steven Stice, Department of Animal and Dairy Science  
Differentiation of Human Embryonic Stem Cells into Endothelial Progenitors

**Ian Lewis Campbell**, CURO Summer Research Fellow  
Dr. Glenn Wallis, Department of Religion  
Theories of Mythology and the Way That Myths Have Affected Social and Political Formation

**Kimberly Coveney**, CURO-CIT Summer Research Fellow  
Dr. Brian Cummings, Department of Pharmaceutical and Biomedical Sciences  
Role of iPLA2 in Phospholipid Metabolism in Chemotherapeutic-Induced Cancer Cell Death

**William Collier**, CURO-OVPR Summer Research Fellow  
Dr. Amy D. Rosemond, Institute of Ecology  
Analysis of an Exotic Species’ Interactions with Native Aquatic Trophic Dynamics: Quantifying the Effects of the North American Beaver (Castor canadensis) on Sub-antarctic Stream Food Webs in the Cape Horn Archipelago, Chile

**John Crowe**, CURO Summer Research Fellow  
Prof. Mark Callahan, Ideas for Creative Exploration  
AUX Launch: Art, Representation, and Commerce on the Web

**Katie Griffith**, CURO Summer Research Fellow  
Dr. Diana Ranson, Department of Romance Languages, and Dr. Judith Preissle, College of Education  
Assessing Cultural Values and Political Beliefs in a Nicaraguan Classroom: A Participant Observation

**Matthew Haney**, CURO-CTEGD Summer Research Fellow  
Dr. Rick Tarleton, Department of Cellular Biology  
Antibody Depletion of Highly Abundant Proteins in *Trypanosoma cruzi* for the Fine-tuning of Proteomic Analysis

**Ned Hembree**, CURO Summer Research Fellow  
Dr. Timothy Dore, Department of Chemistry  
Rce1 and Ste24 Inhibition by Dipeptidyl Acyloxymethyl Ketones: A Potential Target for Cancer Therapeutics

**Alicia Higginbotham**, CURO Summer Research Fellow  
Dr. Thomas Cerbu, Department of Comparative Literature  
Christopher Logue's *Iliad*: A Work in Translation
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Scott Jacques, CURO Summer Research Fellow
Dr. Mark Cooney, Department of Sociology
The Social Reality of Young, Middle Class Drug Dealers

Lisa Jordan, CURO Summer Research Fellow
Dr. Ruth Harris, Department of Food and Nutrition
The Effect of Leptin on Sympathetic Nerve Activity in White Adipose Tissue

Carey Kirk, CURO-OVPR Summer Research Fellow
Dr. David Z. Saltz, Department of Theatre and Film Studies
The Effectiveness of Drama Techniques in Treating People Suffering from Trauma

Andrew Leidner, CURO-CTEGD Summer Research Fellow
Dr. Pejman Rohani, Institute of Ecology
Coevolutionary Behavior and Interference between Fatal Diseases

Jon McGough, CURO-BHSI Summer Research Fellow
Dr. Wyatt Anderson, Department of Genetics
The Role of Female Choice in Sexual Selection of Drosophila pseudoobscura

Tatyana Nienow, CURO-BHSI Summer Research Fellow
Dr. Walter K. Schmidt, Department of Genetics
Adapting Yeast for the Study of Pitrilysin and Other M16A Enzymes

Erika Porter, CURO-BHSI Summer Research Fellow
Dr. Charles H. Keith, Department of Cellular Biology
Intrinsic Fluorimetric Imaging of Neural Activation in Cultured Cells and Zebrafish

Kurinji Pandiyan, CURO-CAES Summer Research Fellow
Dr. Raj Rao, Department of Animal and Dairy Science, and Dr. Steven Stice, Department of Animal and Dairy Science
Genomic Instability of Human Embryonic Stem Cells

Kelly Proctor, CURO-OVPR Summer Research Fellow
Dr. Lee B. Becker, College of Journalism and Mass Communication
Differences in Environmental Reporting: China and the United States

Rebecca Trupe, CURO Summer Research Fellow
Dr. Kimberly Shipman, Department of Psychology
Family Focused Emotion Communication Training

Russ Richardson, CURO Summer Research Fellow
Dr. Ron Carroll, Institute of Ecology
Sugarcane Processing Waste as a Soil Amendment on Organic, Shade-Grown Coffee under Simulated Drought Conditions for Control of Plant-Parasitic Nematodes

Dustin Williams, CURO-BHSI Summer Research Fellow
Dr. Scott T. Dougan, Department of Cellular Biology
Development of Transgenic Zebrafish to Understand How Activation of Hyal-2 Leads to Tumor Formation
Fei Yang, CURO Summer Research Fellow
Dr. Janet Westpheling, Department of Genetics
Regulation of Branched-Chain Amino Acid Catabolism in Streptomyces coelicor: Applications for Metabolic Engineering of Polyketide Antibiotic Biosynthesis

Stephanie Yarnell, CURO Summer Research Fellow
Dr. Carl Bergmann, Complex Carbohydrate Research Center
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Appendix K
2004 CURO Summer Research Fellows

**Cara Altimus**, CURO Summer Research Fellow
Dr. Jonathan Arnold, Department of Genetics
Isolation of a Light Receptor in the Biological Clock of *N. crassa*

**Westin Amberge**, CURO-BHSI Summer Research Fellow
Dr. Steven Stice, Department of Animal and Dairy Science
Guided Differentiation of Human Embryonic Stem Cells into Endothelial Cells: Focusing on the *Ulex Europaeus Agglutin I Lectin*

**Namrata Asuri**, CURO Summer Research Fellow
Dr. Sidney Kushner, Department of Genetics
Analysis of the Role of Ribosomal S1 in the Polyadenylation Pathway of *Eschericia coli*

**Erin Bohan**, CURO-OVPR Summer Research Fellow
Dr. Katarzyna Jerzak, Department of Comparative Literature
The Reconciliation of Selves: The Emigrant Experience in America

**Rebecca Brantley**, CURO-OVPR Summer Research Fellow
Ms. Ashley Callahan, Georgia Museum of Art
The Early Fashion Design of Mariska Karasz and the Influence of Her Native Hungary

**Josef Broder**, CURO Summer Research Fellow
Dr. Andrew Sornborger, Department of Mathematics
Techniques in High Noise Image Analysis

**Beau Bryan**, CURO-BHSI Summer Research Fellow
Dr. Michael Pierce, Department of Biochemistry and Molecular Biology
N-Cadherin Gl

**Susannah Chapman**, CURO Summer Research Fellow
Dr. Virginia Nazarea, Department of Anthropology
Designing Sui Generis Systems for Traditional Plants and Associated Local Knowledge

**Clayton Griffith**, CURO-OVPR Summer Research Fellow
Dr. Amy Rosemond, Institute of Ecology
The Effect of the North American Beaver (*Castor Canadensis*), an Exotic Herbivore, on the Composition, Structure, and Regeneration of the Riparian Vegetation of Sub-Antarctic Forested Streams in Chile

**Christopher Hale**, CURO-BHSI Summer Research Fellow
Dr. Thomas F. Murray, Department of Physiology and Pharmacology
Adolescence as a Distinct Period of Vulnerability to Nicotine Addiction

**Catherine Hudson**, CURO-BHSI Summer Research Fellow
Dr. Harry Dailey, Department of Microbiology and Biochemistry and Microbiology
Negatively Affecting the Heme Biosynthetic Pathway in “*Escherichia coli*”
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**Douglas Jackson**, CURO Summer Research Fellow  
Dr. Nigel Adams, Department of Chemistry  
Reactions of Protonated Carboxylic Acid Ions with Amines in the Interstellar Medium

**Andrew Leidner**, CURO-BHSI Summer Research Fellow  
Dr. Pejman Rohani, Institute of Ecology  
Parasitoid Behavior and Evolutionary Dynamics

**Janel Long**, CURO-OVPR Summer Research Fellow  
Dr. Jean Martin-Williams, School of Music  
The Partitas of Franz Krommer and Natural Horn Technique

**John McWhorter**, CURO-BHSI Summer Research Fellow  
Dr. Daniel Colley, Department of Microbiology  
Induction of the Regulatory Ligand PD-L2 and the Co-regulatory Receptor PD-1 on CD4 Lymphocytes During Early Experimental Schistosomiasis Mansoni

**William Parker**, CURO Summer Research Fellow  
Dr. Marly Eidsness, Department of Chemistry  
Trigger Factor

**Gehres Paschal**, CURO-OVPR Summer Research Fellow  
Dr. J. David Puett, Department of Biochemistry and Molecular Biology  
Activating Mutations of the Lutropin/Choriogonadotropin Receptor Associated with Familial Precocious Puberty, Male Pseudohermaphroditism, Hypogonadism, Amenorrhea, Leydig cell Hyperplasia, and Metastatic Thyroid Carcinoma

**Kevin Patrick**, CURO Summer Research Fellow  
Dr. James Anderson, Department of Classics  
Cicero and the Foundations of a Legal Education at Rome

**Katherine Price**, CURO Summer Research Fellow  
Dr. Janet Westpheling, Department of Genetics  
Site Specific Chromosomal Integration Mediated by Bacteriophage Integrase

**Matthew Rudy**, CURO Summer Research Fellow  
Dr. Marly Eidsness, Department of Chemistry  
Analysis of Cotranslational Protein Folding in E-coli and Determination of the Role of the Trigger Factor Gene in the Folding Process

**Desiree Smith**, CURO Summer Research Fellow  
Dr. Roberta Fernandez, Department of Romance Languages  
Projecting a Positive Educational Experience for Latina/os in the South

**Christopher Stokes**, CURO-OVPR Summer Research Fellow  
Dr. Randy Kamphaus, School of Professional Studies  
Family Health and Classroom Behavior: A Pilot Study

**Shana Strickland**, CURO-BHSI Summer Research Fellow  
Dr. Kimberly Shipman, Department of Psychology  
Emotional Regulation and Coping Skills in Maltreated Children
Appendices A-N

Adam Stroupe, CURO Summer Research Fellow  
Dr. Boris Striepen, Department of Cellular Biology  
Drug and Nutrient Trafficking in the Human Pathogen Cryptosporidium parvum

Teerawit Supakorndej, CURO-BHSI Summer Research Fellow  
Dr. Michael Terns, Department of Biochemistry and Molecular Biology  

Tendoh Timoh, CURO Summer Research Fellow  
Dr. Marly Eidsness, Department of Chemistry  
Fluorophore-modified Nascent Polypeptides

Jora Vaso, CURO-OVPR Summer Research Fellow  
Dr. Katarzyna Jerzak, Department of Comparative Literature  
The Effect of Communism on the Works of Andric, Kadare, and Szymborska

Leslie Wolcott, CURO-OVPR Summer Research Fellow  
Dr. Betty Jean Craige, Center for Humanities and Arts  
The Environment in Georgia’s Literature, Past and Present
Appendices A-N

Appendix L
2003 CURO Summer Research Fellows

Anthony Anfuso, CURO Summer Research Fellow
Dr. Maor Bar-Peled, Department of Biochemistry and Molecular Biology
Developing a Fast Plant Expression System to Identify Biosynthetic Genes Involved in Pectin Synthesis

Tiffany Beal, CURO-BHSI Summer Research Fellow
Dr. Debra Mohnen, Department of Biochemistry and Molecular Biology
Determining How Pectins Inhibit Cancer Growth and Metastasis

Robert Brady, CURO Summer Research Fellow
Dr. Nader Amir, Department of Psychology
Malleability of Interpretation Bias in Social Anxiety and General Anxiety

Josef Broder, CURO Summer Research Fellow
Dr. Chi N. Thai, Department of Biological and Agricultural Engineering
Operational Characteristics of a Mobile Spectral Imaging System for Plant Health Detection

Martha Rose Calamaras, CURO Summer Research Fellow
Dr. Kim Shipman, Department of Psychology
Emotional Understanding in Abused and Neglectful African-American Families

Daniel del Portal, CURO-BHSI Summer Research Fellow
Dr. Marcus Fechheimer, Department of Cellular Biology
The Physiological Role of Hirano Bodies

Dustin Dyer, CURO Summer Research Fellow
Dr. Guigen Zang, Department of Biological and Agricultural Engineering
Dr. Michael Geller, Department of Physics and Astronomy
Energy Dissipation in Nanomechanical Resonators

Sarah Fritts, CURO Summer Research Fellow
Dr. John P. Carroll, School of Forest Resources
An Inventory and Assessment of Medicinal Plants and Animals Used by Makuleke Traditional Healers on the Northern Boundary of the Kruger National Park, South Africa

Betsy Goodwin, CURO-BHSI Summer Research Fellow
Dr. Ronald Blount, Department of Psychology
A Study of the Psychology of Pediatric Pain and Chronic Illness

Patrick Gosnell, CURO Summer Research Fellow
Prof. Ben Reynolds, Department of Photography
The Beautiful and the Absurd

Paulette Andrea Greene, CURO-BHSI Summer Research Fellow
Dr. Wyatt Anderson, Department of Genetics
Conspecific Sperm Precedence and Speciation in Drosophila pseudoobscura
Appendices A-N

Andrea Haltiner, CURO-BHSI Summer Research Fellow
Dr. Ruth Harris, Department of Foods and Nutrition
The Effects of Leptin on Leptin Receptor Expression in High-Fat Fed Mice

Luke Hoagland, CURO-BHSI Summer Research Fellow
Dr. Marcus Fechheimer, Department of Medical Cellular Biology
The Role of Myosin II in Hirano Body Development and the Impact of Hirano Bodies on Cell Viability

Christopher “Kit” Hughes, CURO Summer Research Fellow
Prof. Mark Callahan, School of Art
Tagging

Steven Jocoy, CURO Summer Research Fellow
Dr. Michael Bender, Department of Genetics

Leena Kukkarni, CURO Summer Research Fellow
Dr. Maor Bar-Peled, Department of Biochemistry and Molecular Biology
Identification Characterization of Enzymes and Gene Products Involved in the Synthesis of Pectic Polymers Using Mucilage as Acceptors

Valerie Marshall
Dr. Ben Blount, Department of Anthropology

Ashley Neary
Dr. Susan Sanchez, Department of Medical Microbiology and Parasitology
Sensitive and Specific Detection of Fungal Keratitis in Horses

Ngozi Ogbuehi, CURO Summer Research Fellow
Dr. Mary Alice Smith, Department of Environmental Health Science
Comparing Apoptosis During Different Stages of Limb Development in Chick Embryos

Melissa Payton, CURO Summer Research Fellow
Dr. Lillian Eby, Department of Psychology
Antecedents and Consequences of Networking Behavior for Individuals Seeking Reemployment

John Drew Prosser, CURO Summer Research Fellow
Dr. Wyatt Anderson, Department of Genetics
Kin Recognition in Drosophila paulistorum

Ryan Rhome, CURO Summer Research Fellow
Dr. Jan Westpheling, Department of Genetics
Analysis of bkdR Protein Function in Steptomyces coelicolor and S. avermitilis

Susan Ritger, CURO-BHSI Summer Research Fellow
Dr. Duncan C. Ferguson, Department of Physiology and Pharmacology
Immunoreactivity and Bioactivity of Recombinant Thyrotropins (TSH)

Ben Solomon, CURO Summer Research Fellow
Dr. Kevin McCully, Department of Exercise Science
Measuring Age Related Changes in Muscle Compliance Using Ultrasound
Appendices A-N

**Mary Tolcher**, CURO Summer Research Fellow
Dr. Tim Hoover, Department of Microbiology
Identification of Developmentally Regulated Proteins in the Budding Bacterium *Hyphomonas neptunium*

**Meghan Wilson**, CURO-BHSI Summer Research Fellow
Dr. James Lauderdale, Department of Cellular Biology
Pax 6b

**Ryan Wilson**, CURO Summer Research Fellow
Roger Moore, Department of Landscape Architecture

**Thomas Wood**, CURO Summer Research Fellow
Dr. Walter Schmidt, Department of Biochemistry and Molecular Biology
Analysis and Characterization of CAAX Proteases
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Appendix M
2002 CURO Summer Research Fellows

Nadia Behizadeh
Dr. Tricia Lootens, Department of English

Ashley D. Chadha
Dr. Michael McEachern, Department of Genetics
Characterization of stn-1 M1 mutant in K. lactis

Emily DeCrescenzo
Dr. Susan Sanchez, Department of Biochemistry and Molecular Biology
Development of a Detection Method for TSST-1 exotoxin from Staphylococcus aureus Associated with Toxic Shock Syndrome in Horses Directly from Clinical Samples

Ivy Forkner
Dr. Debra Mohnen, Department of Biochemistry and Molecular Biology
Functional Expression of Putative Biosynthetic Genes for Pectin: A Plant Polysaccharide with Anti-Cancer Activity

Cory S. Gresham
Dr. James B. Stanton, Department of Pathology, and Dr. Corrie C. Brown, Department of Pathology
Development of a Reverse Transcriptase-Polymerase Chain Reaction Based Assay for the Detection and Differentiation of Dolphin Morbillivirus and Porpoise Morbillivirus

Nowell Hesse
Dr. Maor Bar-Peled, Department of Plant Biology
Identification of Nucleotide-Sugar Biosynthetic Genes Involved in Glycoconjugate Synthesis

Matt Hoffman
Dr. Will York, Department of Biochemistry and Molecular Biology
Comparative Structural Analysis of Xyloglucans from Plants in the Subclass Asteridea

Parker Hudson III
Dr. Mary Bedell, Department of Genetics

Britt Johnson
Dr. Janet Westpheling, Department of Genetics
The Use of Generalized Transduction for Combinatorial Biosynthesis of Novel Antibiotics

LeeAnn Jones
Dr. Massimo Palmarini, Department of Medical Microbiology
Mechanisms of JSRV-Induced Cell Transformation InVivo

Jenna Lee
Dr. Andrew Herod, Department of Geography
A Study of Sustainable Economic Development in Croatia

Judson A. Lewis
Dr. John F. McDonald, Department of Genetics
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Cheryl L. Maier
Dr. Scott Pratt, Department of Animal and Dairy Science
Comparative Analysis of Nuclear Proteins Present in Donor Cells Used for the Nuclear Transfer Process and Cloning

Julie Orlemanski
Dr. Jed Rasula, Department of English
Sounding and Silencing: Suspended States in the Works of Thomas Pynchon

Gautham Pandiyan
Dr. Jacek Gaertig, Department of Cellular Biology
Study of Cilial Growth Suppression Mechanism in Tetrahymena Thermophila

Joanne Shinpoch
Dr. Daniel Dervartanian, Department of Biological Sciences
Purification and Characterization of Nickel Protein(s) from Bovine Heart and Their Relationship to Heart Disease

John Stark
Dr. Scott Atkinson, Department of Economics, and Dr. Michael Rauscher, Department of International Economics, Rostock University
An Economic Labor Supply Analysis of Poland’s Planned Entry into the European Union with Regard to the German Economy

Joshua Striker
Dr. Thomas Cerbu, Department of Comparative Literature
The Human Experience of Time: Literary and Philosophical Accounts/Representations

Nwakaso Umejiego
Dr. Boris Striepen, Department of Cellular Biology
IMPDH as a Potential Target of Drugs to Treat Cryptosporidiosis

Ben Walters
Dr. Elizabeth Brient, Department of Philosophy
The Aestheticization of Text

Lauren Watson
Dr. Jeffery Berejikian, Department of Political Science

Katherine Williams
Dr. Kojo Mensa-Wilmot, Department of Cellular Biology, and Dr. Anne Clark, Oxford University

Brad Wright
Dr. Larry Nackerud, School of Social Work
A Comparative Healthcare Policy Analysis of the United States and Sweden
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Siobahn Beaton
Dr. Debra Mohnen, Complex Carbohydrate Research Center
Progress toward the Partial Purification of a Pectin Biosynthetic Gene

David Cureton
Dr. Janet Westpheling, Department of Genetics
Development of an In Vitro Packaging System for a Streptomyces Bacteriophage

Jon E. Davis
Dr. Gary Bertsch, Department of Political Science
Identifying the Risks of China’s Nuclear Weapons Command-and-Control System in the Event of Political Crisis

Sayan De
Dr. Max Reinhart, Department of Germanic and Slavic Languages
The Progress and Modernization of Former East German Healthcare after Communism

Lawrence Dougherty
Dr. Daniel Promislow, Department of Genetics
Exploring Olfactory Response in Drosophila melanogaster and Evolutionary Theory of Aging

Matt Edwards
Dr. Gary Bertsch, Department of Political Science
Evaluating the Moscow Center for Export Control’s Role as a Non-Proliferation Epistemic Community Member

Ben Emanuel
Dr. Frances Teague, Department of English
Shakespeare on Screen: Henry in Hollywood

Jeff Halley
Dr. Sheng Cheng Wu, Department of Biochemistry and Molecular Biology
Cell Wall-degrading Enzymes from the Fungus That Causes the Devastating Rice Blast Disease

Peter Harri
Dr. Kojo Mensa-Wilcot, Department of Cellular Biology
Gene Expression in Leishmania: Control of Protein Synthesis in Leishmania 5' Untranslated Regions

Amanda Hudson
Dr. Michael Terns, Department of Biochemistry and Molecular Biology
Screening Mutant Yeast Strains for Abnormalities in the Localization of snoRNA

Kenneth Miller
Dr. Timothy Dore, Department of Chemistry
Synthesis and Use of Caged Compounds to Explore Cellular Processes
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Lorina Naci
Professor William Paul, Jr., School of Art
Each morning I get up with one word in mind: plastik…

Lynn Nguyen
Dr. Mark Wheeler, Department of Dance
Chinese Classical Dance

Cori Pelletier
Dr. Roy Grant, Department of Music Therapy
Music Therapy with Premature Infants

Kate Smith
Dr. Kenneth S. Latimer, Department of Pathology
Immunohistochemical (IHC) Detection of Natural Killer Cells in Fish

Buudoan V. Tran
Dr. Karl N. Kirschner, Complex Carbohydrate Research Center, and Dr. Robert J. Woods, Complex Carbohydrate Research Center
Parameter Development and Application of the Glycam Force Field for Sialic Acid Derivatives

John Woodruff
Dr. Harry Dailey, Department of Microbiology
The Generation of Mutations in the n-Terminal Region of the Protoporphyrinogen Oxidase of Bacillus subtilis to Create a Protein Capable of Mitochondrial Targeting in Mammalian Cells
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