CURO
Center for Undergraduate Research Opportunities

2006 Summer Research Fellowships

The University of Georgia Honors Program

Creating a Culture of Undergraduate Inquiry
CURO Summer Research Fellowships

The Center for Undergraduate Research Opportunities (CURO) awards Summer Research Fellowships to academically talented undergraduates who participate in research during the summer term at the University of Georgia. The number of Summer Research Fellowships varies from year to year, based on funding. Successful applicants receive a financial award of $2,500 or $3000 and present their research at the CURO undergraduate research symposium. (Those students who receive $3000 must use $500 toward presenting their research at a regional or national conference.)

In order to be selected for a Summer Research Fellowship, interested students must have at least a 3.4 GPA, along with thirty hours of UGA credit, and must also be willing to commit to the following:

1. Enroll in two sequential Honors undergraduate research courses: HONS 4960H and HONS 4970H or HONS 4970H and HONS 4980H. (Students who wish to complete a thesis during the summer should check with Dr. Kleiber and their faculty research mentor. If approval is granted, the student will register for HONS 4980H and HONS 4990H.) Students who are awarded the fellowship must register for these classes for the regular summer session before they are eligible to receive fellowship monies. If, during the course of the fellowship, the student withdraws from these classes for any reason, the stipend must be returned in full. CURO Fellows must resign from any other UGA employment to be eligible for funding and may not be enrolled in any other courses. If selected, 6-hour Honors courses will be created for the student to register for on OASIS.

2. Submit an abstract of the summer research to Dr. Pamela Kleiber by the last day of finals of the summer semester, for possible presentation at the annual CURO Symposium the following spring. Fellowship recipients are required to attend the upcoming Symposium, even if their abstract is not selected for presentation.

3. Participate in panel discussions with the Associate Director throughout the year to encourage an appreciation for undergraduate research at UGA.

Students who will be using human subjects in their research must be granted human subjects approval by the Institutional Review Board (IRB) at UGA in order to receive the fellowship. The human subjects application may be submitted to the IRB after the student is selected as a Summer Fellow, but the application must be approved before the student can receive the stipend.

Students who will be traveling internationally as part of their research must complete additional paperwork and attend a CURO study abroad orientation before their departure. Travel insurance will be arranged by CURO, and the cost (approximately $2/day for time abroad) will be deducted from the stipend.
2006 Selection Committee

Dr. William Barstow, Biological Sciences
Dr. Karen Bauer, Office of Institutional Research & Institute of Higher Education
Dr. Roxanne Eberle, English
Dr. Leara Rhodes, Journalism
Dr. Scott Shaw, Physics and Astronomy
Dr. Regina Smith, Office of the Vice President for Research
Dr. Katharina Wilson, Comparative Literature
Chair: Dr. Pamela Kleiber, Honors Program

Special thanks to the sponsors of the 2006 Summer Research Fellowships

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UGA Alumni Association
Jane and Bill Young Scholarship
National Science Foundation
School of Public and International Affairs
Interdisciplinary Toxicology Program
Letter from the Directors

June 6, 2006

Dear UGA Faculty and Students:

We are delighted and honored to name 27 CURO Summer Research Fellows for 2006, each of whom is pictured in this handbook with a summary of his or her faculty-mentored research project. The goal of the CURO Summer Research Fellowships is to provide opportunities for intensive, immersive, faculty-guided research experiences for academically talented undergraduates. The program advances the students’ knowledge and abilities to think critically, solve problems, and contribute to greater understanding of the world.

The CURO 2006 Summer Research Fellowships are funded through the Honors Program, the Office of the Senior Vice President for Academic Affairs and Provost, the Office of the Vice President for Research, the Biomedical and Health Sciences Institute, the National Science Foundation, the School of Public and International Affairs, and the Interdisciplinary Toxicology Program. We also welcome funding from the UGA Alumni Association and the Jane & Bill Young Scholarship this year.

We are exceptionally proud of the quality of the contributions of present and past CURO Summer Fellows under the mentorship of faculty researchers and their graduate students. 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 who share their enthusiasm and expertise in a variety of professional forums.

Please join us in congratulating these young scholars on the occasion of being awarded these prestigious fellowships.

Sincerely yours,

David S. Williams
Director, Honors Program, Foundation Fellows, and CURO

Pamela B. Kleiber
Associate Director, Honors Program and CURO

Creating a Culture of Undergraduate Inquiry
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Construction of Three Rce1p Mutant Plasmids to Aid in the Characterization of Rce1p Enzymatic Activity

CURO-BHSI Summer Research Fellow: Sarah Breevoort

Rce1p is a relatively uncharacterized protease that is required for the post-translational processing of proteins containing a CaaX motif. The CaaX motif is composed of cysteine (C), two small aliphatic amino acids (a), and almost any amino acid (X) in the terminal position. CaaX proteins require post-translational modifications to exhibit biological activity. Rce1p cleaves the -aax portion of the CaaX motif of mammalian Ras proteins and the yeast a-factor pheromone in the CaaX modification pathway. Ras proteins play a significant role in signal transduction; however, the hyperactive form of Ras is associated with 30% of human cancer tumors, including more than 90% of pancreatic cancers and 50% of lung cancers. Inhibiting the post-translational modifications of Ras is proposed to disable, or at least moderate, its cancer-causing activity by rendering it biologically inactive. One possible means for Ras inhibition would be to block the activity of Rce1p. In this study, the ultimate goal is to characterize the enzymatic activity of Rce1p and Rce1p mutants through their interactions with inhibitors. Towards this end, three plasmids were constructed containing Rce1p mutants and expressed in yeast. The extracts were isolated, and the plasmids were analyzed for proper Rce1p expression in vivo by yeast patch mating. A second verification was obtained by western blot analysis. These plasmids will be used in conjunction with a larger pool of Rce1p plasmids encoding additional mutants for in vitro inhibitor profile studies. These studies may ultimately yield novel Rce1p inhibitors that may be useful as anti-cancer drugs.

Faculty Research Mentor: Dr. Walter Schmidt, Biochemistry and Molecular Biology
CURO 2006 Summer Research Fellowships

CURO Summer Research Fellow: Lauren Coffey

My study seeks to explain dissident group responses to repressive governments. My study will focus on the repressive State Law and Order Restoration Committee (SLORC) regime of Burma/Myanmar and various dissident groups’ responses to the regime. The SLORC regime took power in 1989 and is known for its harsh repressive policies. Numerous dissident groups including the All Burma Students Democratic Front (ABSDF), the Karen National Union (KNU) and Khun Sa’s Mong Tai Army (MTA) exist in opposition to the regime. I seek to explain the behavioral relationships between the militant groups and the government by focusing on their day to day behavioral exchanges of conflict and cooperation. The project employs several difference of means tests to determine how government repression affects the substitution of tactics by rebels over time. Specifically, the project will compare the mean of each rebel group’s behavior prior to repressive activities of the state and determine whether or not state repression succeeds at decreasing the hostile activities of each group.

I expect to find that different groups will behave differently to repressive activities of the state. Traditional research on militant group responses to repressive regimes may be flawed and their statistical estimates biased since they aggregate all dissident groups’ actions towards the state into a single variable. One of the aims of my research is to determine whether the practice by traditional research approach of aggregating all groups together influences the inferences we draw from statistical studies. Findings from my research could shed light on policy implications as well as future scientific and academic analyses of government-dissident interactions. How the government acts towards one group could also influence another group’s interactions with the state. By taking an in-depth look at multi-group relationships, we may find new policy solutions to conflict management and peace science. By identifying the root of such problems, light will be more readily shed on the solution.

This summer I aim to conduct intensive data collection on Burma/Myanmar, the SLORC regime, and various militant groups within Burma/Myanmar in addition to conducting background research on the topic. I will write the introduction and research design sections of my International Affairs Honors Thesis. I seek to develop theoretical underpinnings and derive hypotheses concerning the relationship between the actions of repressive regimes and militant responses. I will then begin the qualitative analysis section of my thesis. This Fall I will finish collecting my data and begin the quantitative analyses. I will present both my qualitative and quantitative research findings of my Honors Thesis at the 2007 CURO symposium. This project will serve as the foundation of my future research as I pursue graduate education and an academic career.

Faculty Research Mentor: Dr. Stephen Shellman, International Affairs
CURO Summer Research Fellow: Susan Fang

In my research I wish to fuse my interests in contemporary graphic style with art of the Expressionists in a series of large-scale works that will be completed by the end of the fellowship. Simultaneously, I wish to examine the process by which an artist develops a personal style, in hopes that it will help me arrive at my own.

As an artist, I highly admire the work of 19th Century German Expressionists. I strongly identify with the Expressionists’ techniques of distortion, exaggeration, intense color, and agitated brushstrokes in trying to convey an object’s or an event’s emotional and psychological state, rather than the objective reality. But as a graphic design student, I have borne witness to the increasing importance of design and harmony found in contemporary graphic illustrations. Graphic illustrations utilize simplicity, rhythm, patterns, and an overall aesthetic coherence in trying to communicate through a visual language.

While I admire both Expressionism and graphic illustration as separate creative methods, I believe that the merger of the two could create a new speciation of style. By applying elements of graphic illustration into an Expressionistic painting, I would be injecting a sense of harmony and coherence into an otherwise chaotic and disjointed space, and by suffusing the distortion and agitation found in Expressionism with graphic style, I would be eliminating the stagnancy and flatness prevalent in contemporary graphic design. This new hybrid in style would incorporate varying mediums, diverse techniques, and have subject matters and color pallets that directly reflects contemporary visual culture.

The tentative scheduling that is required to achieve my goal begins with the first couple of weeks researching the technical aspects of Expressionism and the design elements of graphic illustration with the help of books and personal conversations with the professors in the graphic design and painting & drawing departments. Following the research phase would be a period of experimentation. I will try to take what I have researched and apply them to small scale paintings, drawings, and sketches. The purpose of this period is to essentially train my hands and eyes to recognize where the speciation occurs, and to transfer my abstract postulations into something tangible. The final stage will be the longest and most arduous—after the series of preliminary experiments, I would be utilizing the works that were successful as the basis and foundation for my large-scale series while also experimenting with mixing media.

The challenge in the research would be finding the answer to the many questions that will arise, such as—what elements, when put together, will work, and in what way? What techniques and mediums are relevant for the cause? What is the desired effect and how can that be achieved given the skills at hand? And how can I make my works appealing to the masses without eliminating artistic integrity? The only way to answer these questions would be through trial and error.

This research has the potential to examine how art can transcend purposes. While Expressionistic art is esoteric and somewhat elitist, graphic design is meant for visual communication with the masses. I hope to create interaction and a sense of dialog between the world of “high” art and art for the masses. By borrowing freely from both worlds, I would intentionally be blurring the lines of purpose, making my work both impenetrable and inviting to the viewing audience.

Faculty Research Mentor: Prof. Christopher Hocking, Studio Foundations
Botulinum neurotoxin, the most poisonous substance known, is the agent responsible for the fatal paralytic disease botulism. This neuromuscular toxin is produced primarily by Clostridium botulinum, a spore-forming, anaerobic bacterium found ubiquitously in our soil. Environmental exposure to botulinum neurotoxin occurs primarily from ingestion of contaminated food, or less commonly from soil contamination of wounds. Of greater public health concern, however, is the fact that exposure to botulinum neurotoxin can occur through inhalation of aerosolized toxin used as a biological weapon. Unfortunately, effective treatment measures for botulism are severely limited, and death can result from respiratory muscle paralysis. Current efforts in the Coffield Laboratory are aimed at identifying the protein receptors used by the neurotoxin to gain entry into cholinergic nerve terminals, with the ultimate goal of developing therapeutic countermeasures that may be used in the event of toxin exposure. There are seven known serotypes of botulinum neurotoxin, designated alphabetically A-G. Over the last decade it has been well established that the neurotoxin produces paralysis via the enzymatic inactivation of specific proteins that form a core complex which mediates the release of acetylcholine from its vesicular stores. Ironically, botulinum neurotoxin (serotype A, BOTOX™) is also recognized as a highly valued therapeutic agent for the debilitating neuromuscular disorders known collectively as focal dystonias. As an intriguing corollary to studies of the toxin’s therapeutic actions, it was observed that muscles treated with serotype A demonstrated the emergence of active nerve sprouts (neurites) from poisoned nerve endings. We believe that this finding may actually hold the key to the identity of the receptor for this toxin serotype. More specifically, this observation has led us to propose that binding of the neurotoxin to its still unknown receptor mediates the intracellular entry of the toxin, and initiates cytoskeletal rearrangement with subsequent neurogenesis. In support of this, Dr. Coffield’s team has preliminary evidence, obtained through affinity precipitation assays using homogenates of neuromuscular tissue, that neurotoxin serotype A binds a protein receptor known as NgR2 (Nogo Receptor 2). Nogo receptors are known to regulate axonal growth within the central nervous system through the actions of three endogenous ligands. One of these ligands, myelin associated glycoprotein (MAG), is also found in the peripheral nervous system, where its action is not as well understood. The binding of MAG to NgR2 has been reported to activate RhoA, a small GTPase, by increasing the amount of GTP bound RhoA. Activation of RhoA leads to the regulation of downstream effector molecules which ultimately regulate neurogenesis. In the current study, we propose to examine the action of botulinum serotype A on RhoA activity utilizing both tissue homogenates, and already established motor neuronal cultures. Changes in RhoA activation will be measured with the aid of absorbance- and/or luminescence-based ELIZA kits designed to selectively detect activated RhoA. Competition assays using the endogenous ligand MAG will be performed to confirm that any observed effect on RhoA activation is mediated by the selective binding of serotype A to NgR2. The specificity of the interaction between serotype A, NGR2 and RhoA will be tested by parallel assays using a different toxin serotype, serotype B, whose receptor has previously been identified as a different protein (synaptotagmin) and which has not be reported to induce neurogenesis. Collectively, we anticipate that the results of the study proposed herein will have a significant impact on our understanding of how botulinum neurotoxin serotype A binds selectively to cholinergic nerve terminals to produce paralysis, and simultaneously promotes neurogenesis. Further, the results of this study will ultimately advance our pursuit of receptor antagonists that may act as potential countermeasures in the face of botulinum neurotoxin exposure.

Faculty Research Mentor: Dr. Julie Coffield, Physiology and Pharmacology
The parasite Toxoplasma gondii is the causative agent of toxoplasmosis, a widespread disease acquired through ingestion of the parasite via sources such as undercooked infective meat. Toxoplasmosis can cause serious health problems in individuals with severely weakened immune systems (for example, resulting from HIV/AIDS or chemotherapy) and pregnant women, as the concentration of the parasite in fetal tissues may result in congenital defects. As a member of the Apicomplexa, Toxoplasma gondii is also studied for its accessibility and ease in experimental use in combination with its excellence as a model for related parasites like Plasmodium, the causative agent of malaria.

Toxoplasma gondii has an ~65 Mb nuclear genome, a 35 Kb plastid genome and a 6Kb mitochondrial genome, which is linear. The transfer of portions of mitochondrial and chloroplast genomes into nuclear genomes is a common occurrence in the evolution of eukaryotes; however, the process by which this happens is not completely understood. T. gondii presents us with a unique opportunity to study this phenomenon. The nuclear genome has acquired >1000 truncated copies of its mitochondrial genome, which are scattered throughout. The focus of my research is to elucidate the evolutionary mechanism or mechanisms of the process by which these various pieces of the mitochondrial genome became part of the nuclear genome in T. gondii.

We have two testable hypotheses: portions of the mitochondrial genome were transferred to the nuclear genome multiple times, or the transfer occurred once or twice and then the portions subsequently multiplied within the nuclear genome. Either process may have been facilitated by transposable elements or homologous recombination between repeats. My preliminary research on mitochondrial gene fragments located in the nuclear has shown many of the fragments to be flanked by repetitive elements that are also inherently part of the mitochondrial genome. The repetitive elements are part of coding regions, subunits one and three of cytochrome oxidase.

Further research on this project will identify the compositions of the mitochondrial genome portions, particularly the flanking ends, and analyze insert sites in the nuclear genome. Analyses of the flanking ends and insert sites of these fragments will hopefully allow for refinement of our hypotheses as to how the pieces came to be in the nuclear genome. If transposable elements were involved, direct repeats at insert sites should be observed. The completion of this project will increase our understanding of genome evolution in this organism and the process of intracellular gene transfer.

Faculty Research Mentor: Dr. Jessie Kissinger, Genetics
Current research under the direction of Dr. Gregory Robinson, University of Georgia research professor, primarily focuses on the bonding nature of metals and the effects of sterically hindered ligands on these bonds. During the past semester, the research team has been developing a synthesis for an aromatic ring containing a gallium atom – a compound dubbed galepene. While we have not yet obtained this new compound, after several more trials the project should be successfully completed. The purpose of my summer research study would be to further investigate the properties and characteristics of the new compound galepene, adding fundamental knowledge to the growing scientific database.

The uniqueness of galepene can be found in its unusual structure as an aromatic ring. Typically these rings are made of carbon – carbon bonds and do not include metals. In addition, the rings are very stable and avoid interaction with other compounds. For these reasons, a ring exhibiting aromaticity composed of six carbon molecules and one gallium molecule is intellectually interesting and merits further research. While the goal of my study is not to label specific applications of galepene, I hope to supply those investigating the purpose and use of this compound in the future with the necessary facts for their own research.

After the synthesis of galepene is completed, I would need to further analyze the method through repetition to ensure maximum percent yield and superior quality of crystals. Melting point, NMR and IR would be used to characterize galepene. In addition to these tests, Dr. Robinson’s laboratory provides access to an x-ray crystallography machine, which has the ability to create an actual picture of the compounds created. As the chemistry field moves towards this innovative method of identifying compounds, competent use of the crystallographer promises to be a necessary and sought after skill in future research. Aside from the physical characteristics of galepene, I would identify some of the chemical properties such as testing its reactivity with other compounds. Working closely with a graduate student in Dr. Robinson’s laboratory, we hope to publish an article about galepene and the two other intermediate structures which have been made and identified during the synthesis.

Because galepene is a newly discovered compound, the data collected over the summer would be very valuable. Summer research would include further defining and characterizing the new compound as well as compiling the data for future publication. Most importantly, information gathered about galepene would act as a springboard for other research endeavors.

Faculty Research Mentor: Dr. Greg Robinson, Chemistry
Research in Costa Rica

CURO Summer Research Fellow: Celan Hardman

In only six weeks, I have become intertwined with the culture of Costa Rica; one can not help but appreciate the subtle differences of the various regions in both the landscape and the people. Costa Rica is said to be the harmonious meeting of opposites; the meeting of flora, fauna, and bird life from both the northern and southern hemispheres, but also, a harmonious union of the ideas of different groups in Costa Rica. Development in Costa Rica has initiated the merging of cultural beliefs from the indigenous population on the Nicola Peninsula to the more westernized culture such as in San Jose. The population of Costa Rica is an interesting combination of old traditions and new ideas spiraling together to create a group who spends hours preparing gallo pinto for twenty unexpected extended family members, but also those who are fascinated with the microwave and the ipod. Tourism has altered the wants and the values of many ticos. Only a decade ago, fences were made of leafy bushes which neighbors could pass freely; now, however, large brick barriers are placed between neighbors. The sense of family and close relationships has been replaced in many areas with the wants and desires of the individual instead of the community.

In my research, I hope to capture the contrasting beliefs and lifestyles of the ticos in Costa Rica through a series of paintings, sketches, and journals, including interviews with the ticos in the various regions of Costa Rica.

1. The Sketchpad - An artist’s sketchpad is a place of brainstorming, but is also a place of detailed studies to help the artist and others better understand the world around them. I wish to keep sketchbooks full of objects, landscapes, and people, which I can later use in reference to my major paintings. I will also use these sketchbooks as a journal to document the subtle changes in cultural, political, and spiritual beliefs of the people in the various areas of Costa Rica.

2. The Journal – I hope to use a journal as a complement to my sketchpad in recording my experiences and as a manuscript which can be used in my later research to tell the story of the Costa Ricans. I will also conduct interviews with the ticos to help in placing a connection between their experiences in their respective areas and upbringing in relation to the development of their rich country.

3. Paintings – The main result of my intensive study of Costa Rica will be a series of paintings to document the ‘pure lives’ of the ticos and capture the differences of their surrounding world. Through my subject matter, my composition, and my brushstrokes, I hope to project the many changes which are occurring in the magical world that is Costa Rica.

Costa Rica is a canvas waiting to be painted – and I have plenty of paint.

Faculty Research Mentor: Prof. Joe Norman, Drawing and Painting
Alteration of Alpha-Dystroglycan and Cancer Progression
CURO-Jane and Bill Young Scholarship Summer Research Fellow: Sana Hashmi

Alpha-Dystroglycan (aDG) is a key glycoprotein necessary for muscle cell stability and is extensively glycosylated with N- and O-linked sugar molecules necessary for the function of the glycoprotein. Existing data indicate that these attached glycans are necessary for attachments to other structures outside the cell, serving as a bridge between the intercellular cytoskeleton and extracellular matrix. This bridge may be utilized by hostile infective agents, such as viruses, to invade the human cell. Recent findings have illustrated that in human breast cancer cell lines, aDG expression was either reduced or totally absent. Analysis of mRNA levels demonstrate that this decreased expression was the outcome of a posttranscriptional modification. Therefore, the possibility of aDG as a potential tumor suppressor in various cell lines and primary tumors has become highly probable. Using the carbohydrate knowledge and glycan analytic facilities at the Complex Carbohydrate Research Center, we propose to, for the first time, map sites of O-mannosylation on wild-type aDG. Following mapping and characterization of the glycans on aDG from normal cells, aDG glycosylation will be studied on cancer cell lines as well as primary and metastatic tumors. Furthermore, the effect of overexpressing aDG as well as any necessary glycosyltransferases in the cell lines will be monitored in regard to cell growth and mobility. A better understanding of aDG and its O-linked glycosylation may offer unique opportunity in human cancer progression, leading to the cultivation on new therapeutic approaches.

Faculty Research Mentor: Dr. Lance Wells, Complex Carbohydrate Research Center
Courriel—Not Email: Implications for Governmental Regulation of a Social Phenomenon
A Case Study of Language in France

CURO Summer Research Fellow: Brian Levy

Study Rationale: As the country struggles with the maintenance of French culture, it has become common to state that ‘there is no more email in France.’ Email is the latest expulsion from the French lexicon by the Commission on Terminology and Neology, the agency that is the contemporary policy arm of a collection of governmental and non-governmental organizations that have long espoused an ethos of cultural protectionism-isolationism. Advertising, employment practices, public signs, and public entities are just some of the many realms under the growing umbrella of language regulation. While the goal of cultural maintenance is most certainly noble, government regulation of language is regarded as an empirical failure (Wexler 1996). Because such a strong movement nonetheless exists in France, it may have unintended policy consequences.

Research Question: What are the anticipated and unanticipated impacts on the French language of the government’s attempts to regulate the ever-evolving and culturally produced phenomenon of language? Furthermore, what is the nature of such control, and what are its overall positive and negative effects?

Research Design: To effectively examine the nature and consequences of government regulation of language, this study will adopt an ethnographic case study methodology similar to the phenomenological-explanation model described by Yin (1981). Semi-structured interviews of various French Culture Ministry officials and heads of other regulatory agencies, such as leading officials of the Commission on Terminology and Neology, the Académie Française, and other organizations, will be the primary method of data gathering. My faculty mentor, as well as other academic and professional contacts, will enable me to gain access to key informants. Along with these individuals, a comprehensive and robust review of French documents and relevant academic literature will comprise the necessary source material. To accomplish the data gathering only possible outside of the United States, I will spend approximately three weeks in Paris, France; furthermore, these three weeks will afford me an ‘emic view’—the insider’s perspective—of government control of language. The formation of varying explanations of this research question, an integral part of the phenomenological-explanation model, will be accomplished through the constant-comparison method (Glaser and Strauss 1967; Lincoln and Guba 1985). Not only will the use of this method enable organization of divergent data into relevant explanation categories, but it will also then delimit these into a cogent theory. Ultimately, the overall validity of this theory will be tested using Creswell and Miller’s exhaustive schema, which accounts for both researcher bias and paradigm assumptions (2000).

Implications: Analysis of this ethnographic case study will be extended beyond the national level to explore multinational cultural implication. Also, conclusions will be drawn regarding other instances of language regulation, specifically America’s English-only movement.

Faculty Research Mentor: Dr. Larry Nackerud, Social Work
This summer I would like to begin individual research, as well as work on research for Dr. Stephen Shellman. The work for Dr. Shellman would be a continuation of my present CURO research. I would work on creating an actor dictionary for domestic terrorism in Malaysia. The National Science Foundation funds this research, and it needs to be finished. However, because this type of research is very tedious and monotonous, I would also like to begin my own research project.

My research would be something that I could continue to work on during my second year as a CURO apprentice, as well as possibly become my honors thesis. This would be a long research project, which hopefully will be able to be analyzed quantitatively, as well as qualitatively. I am hoping to do a case study analysis on the domestic policies of countries that have multiple terrorists groups residing inside of them. My hopes are to find out whether states treat multiple terrorist groups differently, and how those differing policies could affect the terrorist activities performed by those groups.

After analyzing the domestic policies of these states, I would also like to determine the role of foreign policy in these case studies. Do economic pressures determine how states deal with domestic terrorism? Does foreign pressure from a separate state affect domestic policy more than pressure from an international organization or non-governmental organization? These are questions that I would like to answer after the initial stage of research.

My hopes with this research would be to determine if specific domestic policies have a greater impact on decreasing the number of terrorist attacks by a group, and if so, what are these policies? Do different treatments of different groups affect this as well? If all terrorist groups are dealt with equally, how does this directly or indirectly affect the frequency and severity of terrorist attacks? Not only could this research show how specific policies affect terrorist groups, but also it could possibly show what policies are the most effective in lowering the number of terrorist attacks.

Both of these research projects have real-life applications, especially in this post 9/11 world. The work I would do for Dr. Shellman would not only apply to his individual research, but it could also be used as a data source for other students and academics alike who are doing research in the international affairs field of security and terrorism. My hopes from this summer research apprenticeship is that both Dr. Shellman’s and my research will provide the United States government, as well as non-governmental organizations with new ideas, theories, and solutions for the continuing fight against terrorism. Dr. Shellman’s research will provide one of the first actor dictionaries for domestic terrorism in Southeast Asia, and my upcoming research could hopefully change the way government policies combat terrorism and help all agencies fight terrorism with more efficient and helpful policies.

Faculty Research Mentor: Dr. Stephen Shellman, International Affairs
**Neurochemical Basis of Social Defeat in Syrian Hamsters: Role of Endogenous Cannabinoids**

**CURO-BHSI Summer Research Fellow: Anna-Marieta Moise**

My independent research project has focused on understanding the biological roles of neurotransmitters known as endocannabinoids in an animal model of social anxiety, a phenomenon known as social defeat. Social defeat induces psychological and physiological changes that are detrimental to subjects experiencing it. Defeated animals avoid social interaction and display increased submissive and defensive behaviors when approached by another (Jasnow et al., 2001). Once defeated, the defeated hamsters are virtually unable to reverse their subordinate status. Previous studies in Dr. Hohmann’s lab have shown that exposure to environmental stressors triggers the release of endocannabinoids (Hohmann et al., 2005). Endocannabinoids are brain chemicals that share the same target as the active ingredient in cannabis. Endocannabinoids serve naturally to suppress anxiety because inhibition of endocannabinoid degradation elevates levels of endogenous cannabinoids and suppresses anxiety-related behaviors in animal models (Kathuria et al., 2003). Moreover, endogenous cannabinoids also inhibit extinction of aversive memories in rodent models, in part through actions in the amygdala (Marsicano et al., 2002), a limbic region that is also implicated in social defeat (Jasnow et al., 2001).

My research uses male Syrian golden hamsters as experimental subjects to study the neurochemical basis of social defeat. This model is a highly naturalistic model of social stress with strong ecological validity. Experimental hamsters are readily defeated when placed in the cage of a larger dominant hamster. Defeat behavior is characterized by the appearance of submissive and defensive behavior by the experimental subject (evaluated on day 1), and persists in the presence of a smaller nonaggressive stimulus hamster (evaluated on day 2). My project evaluates the consequences of blockade and enhancement of endocannabinoid signaling on social defeat in hamsters using a pharmacological approach. Hamsters will receive pharmacological injections on either day 1 or day 2 to evaluate the role of endocannabinoid signaling in the acquisition or expression of conditioned defeat, respectively. Hamsters will receive, under blinded conditions, either vehicle, cannabinoid antagonists (SR141716A, AM251), or inhibitors of endocannabinoid deactivation (URB597, URB602) either systemically or locally in the amygdala on either day 1 or day 2. To determine pharmacological specificity, separate groups will receive the endocannabinoid deactivation inhibitors coadministered with the cannabinoid antagonist. I will use a computer-controlled data acquisition system that I tested and helped develop to measure the impact of these pharmacological manipulations on the duration of submissive/defensive, aggressive, social and nonsocial behavior in the experimental subjects. Experimental sessions are recorded on videotape to permit reliability checking of behavioral coding. Local injections will be administered through surgically implanted cannulae. Injection sites will be verified microscopically in brain sections derived from experimental subjects. My experiments will therefore identify the impact of blockade and enhancement of endocannabinoid signaling on the acquisition and expression of social defeat in hamsters. Identifying a role for endogenous cannabinoids in this phenomenon holds promise for the development of novel therapeutic interventions for treating stress-related disorders. An understanding of how the brain processes information about social stress is critical for understanding the neurobiological basis for neuropsychological disorders. The efficacy of cannabinoids in this model may provide useful information regarding the etiology and treatment of psychological disorders including social anxiety.

**Faculty Research Mentor:** Dr. Andrea Hohmann, Psychology


Magnaporthe grisea is a filamentous Ascomycete fungus and is the causal agent of rice blast disease, which is responsible for the annual loss of about 200 million tons of rice output worldwide. The genome of M. grisea has been sequenced, and many genome characteristics have been described.

Under various growth conditions, M. grisea secretes a large number of extracellular proteins (ECPs), presumably required for growth, development, pathogenicity, and molecular signaling. Among these secreted proteins are many hydrolytic enzymes that macerate the host plant cell walls, thus causing disease. About 800 ECPs have been previously identified using bioinformatics and proteomic techniques. An estimated 25% of these ECPs are enzymes that are responsible for degrading host plant cell walls. In Aspergillus niger, an industrial fungus, production of some cell wall degrading enzymes (xylanases) is regulated by a transcription factor, XlnR1. In the M. grisea genome, there are two predicted genes, MgXlnR1 and MgXlnR2, each of which encodes a protein structurally similar to XlnR1. Because our lab has experimental evidence that at least three of the approximately 20 xylanases putatively secreted by M. grisea are pathogenicity factors, a positive regulator of xylanase expression could be required for pathogenicity. Therefore, MgXlnR1 and MgXlnR2 are potential anti-fungal targets for controlling the devastating rice blast disease.

Targeted gene mutagenesis, or gene knockout, is the replacement in vitro of part or all of the coding region of a native gene with a selection marker, in this case an antibiotic- or herbicide-resistance gene. This specifically inactivates the native gene, thus allowing for tests to determine the effects of the native gene on the phenotype and pathogenicity of the disease.

Previously, gene knockout has been performed on both MgXlnR1 and MgXlnR2 by Tsz Ying Liu and myself. Preliminary results indicated that each of the Δmgxlnr1::Hyg and Δmgxlnr2::Bar grew as normally as their wild-type parent of rich media. Also, the mutants appeared to display only slight reduction in pathogenicity. These results do not agree with our experimental model and evidence that xylanases are pathogenicity factors. It is possible that both MgXlnR1 and MgXlnR2 are functional in M. grisea, and the effect of the deletion of one gene is compensated by the presence of the other gene. To test this thought, I am currently generating a double gene knockout mutation in which both the R1 and R2 genes are deleted. In addition to PCR screening as previously shown (Liu 2005, Moree 2005), I will perform Southern and Northern blot analyses to verify the presence of the Δ(r1 r2) double knockout mutant.

After obtaining of the double mutant, the phenotypes of the Δr1, Δr2, and Δ(r1 r2) will be assigned under the various growth conditions, including growth on defined carbon sources of mono-, oligo-, and polysaccharides. Pathogenicity of these mutants will also be quantified by infection assay using standard procedures (Wu et al. 2006).

I will monitor gene expression by assaying total xylanase activities in the culture filtrate. Production of individual xylanases may also be quantified by Western blot analysis using antibodies raised previously against XYL-1 and XYL-2. At the transcription level, Northern blot analysis and/or real-time PCR will be performed on total RNA samples isolated from M. grisea mycelia grown under the conditions outlined above.

Through the above experiments, I wish to answer the following questions:
(1) Do MgXlnR1 and MgXlnR2 regulate transcription of xylanase genes in M. grisea?
(2) Are MgXlnR1 and MgXlnR2 required for pathogenicity?
(3) Do the results support evidence that at least some xylanases are pathogenicity factors?
(4) What are the implications the research brings about fungal disease control and food security in general?

Faculty Research Mentor: Dr. Alan Darvill, Complex Carbohydrate Research Center
Economic Incentives for Private Land Conservation and Sustainable Development: Research into Environmental Policy in Costa Rica and Georgia

CURO Summer Research Fellow: Jesse Oakley

Every society has an ecological footprint that affects the environment. The duty of the society is to minimize that impact and understand how to improve its current condition. This is especially true for the United States and Costa Rica. Applying aspects of Costa Rican Law and Environmental policy into Georgia law and federal law can promote a future of economic and ecological security. The emphasis will be in the private land conservation sector, developing research methods concerning economic incentives and programs to help foster private land conservation. The study will evaluate tax incentives, tax certificate programs, rights of possession, and environmental services and their impact on ecological protection and preservation.

The research project will travel to Costa Rica to visualize and comprehend the material firsthand. Costa Rica protects 25% of its natural environment, and has more biodiversity than the United States and Canada combined. The heart of the research will be involved in interview sessions with leaders, dignitaries, and individuals who implemented and benefited from the Costa Rican policies. In addition, a comparative assessment of biodiversity and natural capital will be included in creating the comparative study of land conservation. The research will detail a holistic picture of the relationship between the society and resource use and the characteristics of the environment affected by the legislation.

Key questions needing answers will concern how to provide incentive to private landowners for keeping their land either unspoiled or sustained in a beneficial manner. In Georgia, there is little incentive to private owners for sustainable development or conservation. Most of the research will be in scanning articles and detailing policies of Georgia law, United States federal law, and Costa Rican law. Library and online research will provide further insight into the incorporation of Costa Rican law into Georgia governmental policy. This comparative policy research will detail strategies in watershed protection, conservation easements, citizen participation, and environmental justice. It is not enough to research the policies, it is important to study the enforcement of the laws in the communities with private land usage. Scientific studies and statistical analysis of the environment will be consulted to ascertain the effectiveness and performance of the implemented policies.

The possibility of ecological sustainability and development can improve the quality of life for people, while maintaining a harmonious balance between natural resource use and conservation.

Faculty Research Mentor: Dr. Laurie Fowler, Ecology
Throughout this proposal I will use the word “development” within quotations because of its lack of a clear and appropriate definition. My research project will investigate the multiple meanings and connotations of “development” in the specific context of low-income neighborhoods in Athens, GA. Primarily I will examine two “development” concepts from the perspective of a variety of community actors. The first “development” trend is gentrification, which includes the notions of beautification, revitalization, and the often resultant displacement of residents due to increases in rent and property taxes. The second concept is that of community-led development, which necessitates the participation of actual community members in the processes of development that directly affect their neighborhoods and lives, thus taking into account their specific aspirations, needs, and priorities. Within community-led development I will look at issues including but not limited to affordable housing, improved housing conditions, neighborhood safety, police misconduct, fair immigration policies, small-scale job development and job training, education reform and youth services, and city government accountability. While all of these issues may not seem to fit into the popular conception of “development,” in reality they deeply affect a community’s growth in a myriad of both quantitative and qualitative ways, a subject I will expand upon in my research.

The issues on the list will be prioritized and added to during my research by working closely with women of low-income neighborhoods. I am specifically targeting women due to the issue of high African-American male incarceration rates, which leads to the burden of community development in low-income neighborhoods being disproportionately shouldered by women. My approach to the research will be actor-oriented, meaning research based on the daily, lived realities of women and their families. The importance of this method is in getting “behind the myths, models, and poses of development policy and institutions, as well as the reifications of local culture and knowledge, to uncover the particulars of people’s ‘lived-in worlds.’” To achieve this I will be conducting extensive formal and informal semi-structured interviews with 1) women within low-income neighborhoods, 2) past and present private developers, 3) local politicians, 4) and local organizations based in issues of development in Athens including People of Hope, Athens Poverty Commission, Athens Land Trust, and Partners for a Prosperous Athens. I will also be taking extensive field notes on the visible “development” patterns and effects in Athens.

I have two primary research objectives. The first is examining and deconstructing the multiple perspectives on “development” in Athens including both a community-based definition and a gentrification-oriented trend. The second aim is determining which view is currently dominating and what the implications of this are on communities. Importantly, before the process I will define my variable of community and narrow my research to specific neighborhoods in Athens. I hope to use my research data towards the formation of an organized network based in community residents and workers who could conduct focus groups if they were determined to be appropriate. The idea of the focus groups would be to create space for community members to coordinate around topics that are important to and determined by the community. Such groups may help in the process of communities empowering themselves to mobilize around critical issues that affect their lives, including determining their own definition of “development”. The intent is for residents and workers of communities to create opportunities to participate in the ownership of, control over, and decision-making processes of the places in which they live and work. But before this right to self-development can begin, the current perspectives on the issue of “development” must be laid out and deconstructed.

Faculty Research Mentor: Dr. Patricia Richards, Sociology

Description: Since it declared its independence from the former Yugoslavia in 1991, Croatia has made significant social and institutional advances toward building a truly democratic polity. Nevertheless, a 2001 study conducted by the International Institute for Democracy and Electoral Assistance revealed that Croats remained highly distrustful of their political parties and the news media. These findings reflect the fact that the need for freedom and legitimacy of the press pose a continuing challenge to Croatia’s democratic aspirations, even as it conducts accession negotiations with the European Union today. An analysis of the current state of press freedom and control of the news media in Croatia will yield important insights into the democratic development of the Balkans, and could provide a program of action for achieving Croatia’s democratic goals.

Objectives and Methodology: The objective of this research project will be to examine the sources and causes of constraints on press freedom in Croatia. Sources used will include translations of news stories and articles from Croatian print and broadcast media, as well as data on the ownership and political affiliation of various media sources. This study will also utilize researcher-conducted interviews with Croatian journalists associated with a variety of print and broadcast media news sources. Bibliographic readings will draw from my previous coursework in post-Communist political systems, government and the mass media, and the culture and history of the Balkans, as well as readings for classes to be taken during the Maymester in Croatia program. Findings will be analyzed in the historical context of Croatian media and democracy since 1991, and compared to the standards set forth by the European Union and relevant international authorities on freedom of the press.

Final Product and Timeline: The final product of this research will consist of a thesis paper analyzing the impact of these restraints on press freedom on Croatia’s potential accession to the European Union and its future as a democratic state. The paper’s goal will be to identify a set of specific policy options to improve the state of press freedom and legitimacy in Croatia. The results of this research will interest scholars and policymakers in fields including media studies, democratic, post-Communist and post-conflict development, and contemporary Balkan politics and society. Research for this project will be conducted over summer 2006, with interviews taking place during the Maymester in Croatia program, 16 May – 7 June. During this time I will meet daily with my thesis advisor. Research will be completed at UGA over the remainder of the summer term, with the completion of the thesis scheduled for December 2006.
CURO Summer Research Fellow: Daniel Perry

In hard drive read heads there is one specific component that needs the property that its magnetization is unaffected by the alternating magnetizations of the bytes on the hard drive itself. The bytes are actually clusters of material with alternating magnetization, corresponding to the ones and zeros that make up binary language. The component that is unaffected by the magnetization of the bytes is a ferro-antiferromagnet bilayer film. The hysteresis loop of a ferromagnet is centered about a zero-field. Macroscopic lab studies have shown that this system has a hysteresis loop that is shifted from a loop given by a ferromagnet alone. This property is what prevents a change in magnetization even in the presence of fairly strong fields.

The microscopic interactions involved are not fully understood, however. The purpose of this research is to simulate, examine and understand these microscopic interactions through the use of Monte-Carlo simulations. The code used for the simulations will be written in Fortran, compiled and run either on the p-cluster supercomputer here on campus or at the Oakridge National Laboratory, and examined and analyzed on the computers at the Center for Simulational Physics here on campus.

The system examined will be a Body Centered Cubic Lattice for both the ferromagnet layer and the antiferromagnet layer. In the code, different interactions will be included and excluded until a comparable effect is measured in simulation as measured in the lab. The surface between the layers will be examined for a random interface, a flat uniform interface, a step interface, and perhaps other structured interfaces. Different lattice sizes of both layers will be examined to determine the effects of size and thickness on the hysteresis. From there, an examination of the interactions should reveal the mechanisms that cause the hysteresis shift.

Faculty Research Mentor: Dr. David Landau, Physics and Astronomy
On of the most significant areas of study in the social sciences is the study of social capital. Loosely defined, social capital is the capabilities or benefits a person gains through social interaction. A supposed recent decline in social capital has been used to explain increasing crime rates, poorer school quality, and a general increase in separation and mistrust amongst American communities. Robert Putnam, in his Bowling Alone: The Collapse and Revival of American Community, conducts a thorough, statistical exploration of social capital in the United States. He notes the benefit of social capital in a democratic society as it applies to a greater distribution and tolerance of varying attitudes. He cites Alexis de Tocqueville’s claim that increased social connectedness enlarges the heart and creates greater understanding. He also cites William Kornhauser’s work in political psychology, The Politics of Mass Society, which concludes that people isolated from their community are those most likely to support political extremism. Putnam argues from these works that political extremist organizations target those individuals with low social capital, because those with little social ties are most willing to break away from society. When one considers recent extremism in the Middle East and applies Putnam’s assertion, one would assume that there is little social capital in the Middle East. However, there ought to be a large amount of social capital based on the preponderance of religious institutions and strong ethnic ties. Putnam identified both religious involvement and ethnic bonding as indicators of high levels of social capital. Thus, the evidence seems to contradict itself.

In my research, I plan to further explore the link between social capital and political extremism on a macro level. Using social capital indicators such as education, reported trust levels, organizational involvement, and ethnic and religious ties, I will test the correlation between social capital and political extremism. Also, I will base my measurement of social capital upon previous social capital research at the macro level. I plan on using statistical abstracts of different communities compared against memberships in politically extreme organizations. I will need to control for other factors which influence political extremism, such as recent wars or economic factors. Though there may be a strong correlation between social capital and political extremism on an individual level, I expect to find that the relationship between social capital and political extremism is very weak at a macro level. The relevance of this research can be seen as it applies to the formation of new democracies in the Middle East. If there is a strong correlation between social capital and political extremism, then policies which foster social capital ought to be pursued to promote political stabilization in the area. If the relation shows to be spurious, then social capital policies can be ignored as avenues to democratization. Of course, my research is a very modest exploration of this topic meant merely to advance the dialogue about social capital and political extremism.

Faculty Research Mentor: Dr. Thomas McNulty, Sociology
New medical research has attributed elevated levels of the non-protein amino acid homocysteine as an independent risk factor for arteriosclerosis. This has opened new horizons for research into preventing heart disease. Homocysteine is removed from human blood by three enzymes: cystathionine γ-lyase (CGL), cystathionine β-synthase (CBS), and Betaine:homocysteine S-methyltransferase (BHMT). Of the three, only BHMT has a fully solved structure. The research I have been conducting with Dr. Cory Momany to date has focused on the expression of the enzyme CGL for X-ray crystallography. Attempts to date have failed at the crystallization stage, but strides have been taken resulting in notable quantitative improvements.

Through the implementation of new techniques and the optimization of previously employed techniques, both yield and purity have improved greatly, though there is definite room for improvement. An example of progress is the new technique of bursting cells through a high pressure machine as opposed to the previous method of sonication which led to protein degradation. Also, a solution is used which was developed as an optimized method to yield large amounts of protein through something known as auto-induction media. Problems still exist in the current protocol in the concentrating stage. It seems that CGL is precipitating at over 10mg/mL which is problematic as a higher concentration is desired to induce crystallization.

The Hauptman-Woodward Medical Research Institute was commissioned to run the purified CGL through their high-throughput facility for crystallization attempts. Although no crystals formed in any of the over 1,500 conditions at the institute, much data was gathered about the behavior of CGL with various precipitants. Since the institute receives my samples in solution, different conditions produced in our lab can affect the behavior in the various conditions.

During the summer I will send several more samples to this institute in various solutions and I will try to improve the concentration of the samples sent. I will also begin to attempt expression of CBS for X-ray crystallography. Although CBS’s structure has been partially solved, it is believed that the truncated published structure does not explain certain characteristics of this enzyme and a fully solved structure will further explain its activity.

*Faculty Research Mentor: Dr. Cory Momany, Pharmaceutical and Biomedical Sciences*
Understanding Public Space in a New Urbanist Development

CURO Summer Research Fellow: Emily Powers

Situated on the site of the former Atlantic Steel Mill in midtown Atlanta, Atlantic Station is an example of a new urbanist “mixed-use” development. New urbanist designers look to the idea of community and neighborhood while creating their projects as a step toward repairing dysfunctional city growth patterns. The ‘live, work, play’ design of Atlantic Station is certainly a worthy replacement to a polluted and abandoned industrial eyesore, and it has indeed benefited the city and state with its new jobs and favorable press. At the same time, questions remain as to what kind of community Atlantic Station fosters. The central question guiding this research asks what kinds of democratic spaces are produced in new urbanist developments. Subquestions include:

- How are public spaces considered or regulated by the developers of Atlantic Station?
- How are the spaces of Atlantic Station used by residents and others?
- In what ways are the public and private spaces of Atlantic Station distinguishable?
- What is the relationship between Atlanta’s public spaces and the presence of privately-developed Atlantic Station?
- Is Atlantic Station ultimately a (sub)urbanist project?

Through qualitative investigation that involves interviews with Atlantic Station residents and developers in addition to participant observation, this research will investigate both the intended and the realized spaces that are produced by Atlantic Station. Participants will be asked who utilizes the spaces of Atlantic Station; what the positive and negative qualities of the spaces are; what programs (e.g. youth recreation) are in place to encourage the use of common spaces; and what public-private partnerships exist (e.g. schools, libraries, etc.). Answers to these questions will shed light on the kinds of spaces available in the Atlantic Station development.

An important aspect of the research will be the way in which some of the data are collected and presented: the research process and results will be filmed. I will create a documentary to visually display the ways in which different spaces of Atlantic Station are utilized and understood. By incorporating clips from the interviews, footage from the development, and my observations and results with voiceovers, I will be able to bridge both the visual and textual representations of public space in new urbanism.

Faculty Research Mentor: Dr. Steven Holloway, Geography
Introduction: Breast and prostate tumors represent the leading sites of cancer-related occurrences in the United States for women and men respectively (1). While many chemotherapeutic agents have been developed to combat the effects of malignant cell growth, these treatments fail often because of heterogeneous drug exposure and variations in dosage and scheduling due to patient toxicity. Drug effectiveness can be limited further by inadequate intratumor distribution and poor or non-uniform drug release, resulting in the incomplete eradication of tumors. Over time, tumors can develop resistance to drugs, and continue to grow and spread, resulting in metastatic disease and death. Effective delivery systems for chemotherapeutic agents that provide uniform drug exposure, increased dosage, and sustained-release of effective agents at the site of the tumor, have the potential to provide sufficient drug exposure to completely eradicate or control tumor growth and limit drug toxicity.

Drug delivery systems can alter the pharmacokinetics (circulating half-life, tissue distribution, clearance) of drugs, resulting in increased extravasation through the leaky vasculature of tumors and improved antitumor activity and reduced toxicity. Nanoparticulate drug carriers, such as small sterically-stabilized liposomes (SSLs), have been shown to encapsulate drugs stably (2,3). Recently it was shown that repetitive administration of doxorubicin encapsulated in liposomes mediates an antivascular effect that enhances tumor vascular permeability and drug deposition (3).

Statement of the Problem: Camptothecins (e.g., topotecan) are clinically important anticancer agents that are potent and have broad anticancer activity (e.g., breast and prostate tumors), and have recently been shown to possess some tumor antivascular activity (2). However, they are poorly soluble and undergo rapid, reversible pH-dependent metabolism to an inactive carboxylate-ion, resulting in limited tumor exposure to drug. Efforts to encapsulate camptothecins within liposomes have been successful, but active drug (lactone) is released rapidly and metabolized limiting their clinical utility.

Goals: The primary objective of this grant is to exploit SSLs and the acidic tumor microenvironment to enhance the activity of topotecan. Specifically, the aim is to encapsulate the inactive, water soluble form of topotecan in SSLs so that drug retention and sustained release at the tumor site are maximized. The hypothesis is that encapsulation of topotecan in liposomes can increase tumor drug deposition and a sufficient pH differential exists within the tumor to reversibly metabolize the inactive form back to the active lactone. Different liposome compositions will be prepared and the effect of different drug concentrations, pH, and lipid composition on the in vivo stability, rate of drug release, and efficacy against human breast cancer cells (MCF-7) and prostate cancer cells (PC-3) will be determined. Stable liposome formulations containing primarily the inactive carboxylate-form of topotecan will be developed and the physicochemical properties of topotecan will be matched to the delivery system. Biophysical studies utilizing differential scanning calorimetry, circular dichroism, and fluorescence will be used to examine drug-lipid interactions, and the release/stability of drug in various formations. In vitro and ex vitro stability and release studies will be utilized to select lipid compositions that maximize drug retention and provide sustained release.

Summary: We propose to exploit SSLs and doxorubicin to alter the tissue distribution and improve conventional antitumor activity of topotecan and enhance its anti-vascular potential. The use of delivery systems is expected to alter tissue distribution and increase tumor exposure, mediate an antivascular effect, and achieve sustained delivery of low concentration of active drug systemically.

Conclusion: Opportunities exist to improve the treatment of breast and prostate cancer by developing particulate drug delivery carriers that exploit properties unique to both tumors and drugs. This strategy is expected to improve antitumor activity and facilitate antivascular and antiangiogenic effects mediated by perivascular accumulation of long-circulating nanoparticles.

Faculty Research Mentor: Dr. Robert Arnold, Pharmaceutical and Biomedical Sciences

This summer I hope to work with Dr. Ronald Blount, a pediatric psychologist, on a treatment intervention program for adolescent girls with Irritable Bowel Syndrome (IBS) and Inflammatory Bowel Disease (IBD). Inflammatory bowel disease includes Ulcerative Colitis (UC) and Crohn’s Disease (CD), both of which are organic and chronic gastrointestinal (GI) diseases. Although they differ in course and treatment, UC and CD share symptoms of abdominal pain, diarrhea, urgency to defecate, intestinal or rectal bleeding, and weight loss. IBS, a similar gastrointestinal disorder, is a chronic, functional disease. The disease is described as functional due the lack of organic pathology that can describe the symptoms of chronic diarrhea, abdominal pain, bloating, and altered bowel functioning (Ali, Toner, Stuckless, Gallop, Diamant, Gould, & Vidins, 2000). While IBS lacks the organic etiology of IBD, the similar symptomology between the two diseases, particularly abdominal pain, allows for logical comparison and grouping for a behavioral intervention.

Studies have investigated the psychological health of children and adolescents with IBD. In general, they demonstrate higher levels of psychological problems than do healthy controls (Engstrom & Lindquist, 1991; Engstrom, 1992). The most prevalent psychological problems among this population are internalizing symptoms such as depression and anxiety (Engstrom, 1992; Ondersma, Lumley, Corlis, & Tojek, 1997; Wood, Watkins, Boyle, Nogueira, Zimland, & Carroll, 1987). Studies have also demonstrated that children and adolescents with IBD have higher rates of school absences and feel a lower sense of achievement at school due to their illnesses (Moody et al., 1999), feel more restricted in social activities (Moody, Edan, & Mayberry, 1999), report lower levels of self-esteem (Engstrom, 1992), and experience higher levels of family dysfunction (Engstrom, 1999).

Due to the common symptoms shared by IBS and IBD, the psychosocial difficulties related to the disorders are analogous. As adolescents in general struggle with feelings of self-consciousness and self-worth, the difficulties of having and treating a chronic GI disorder may exacerbate the stresses of normal adolescence. These stressors can worsen the GI symptoms, therefore continuing the pattern of interaction between heightened stress and symptomology.

There is no treatment protocol that healthcare professionals can use to effectively address the psychological needs of adolescent patients with IBD or IBS. To fill this void, the study I will be co-facilitating this summer will provide numerous skills to adolescents to decrease their symptoms and improve their quality-of-life. The proposed study is a skills-based, psychological intervention aimed at reducing pain and teaching skills such as communication, relaxation, and problem solving. This intervention will be conducted in collaboration with Children’s Center for Digestive Health Care, the Southeast’s largest center for the care of adolescents with GI disorders.

It is hypothesized that the skills learned during the program will facilitate reductions in the disease symptoms of IBD and IBS, as well as improvements in the patients’ quality of life. Throughout the summer, I will be working with Dr. Blount to develop the treatment intervention and implement the program with the adolescent participants. I will be responsible for continuing to read relevant research, for writing the treatment manual with the help of other lab members, and for screening potential participants using psychological measures. Once the intervention is ready to be implemented, I will be co-facilitating the program and collecting data from the participants to judge the effectiveness of the program. After completing the current proposal, my future goal is to adapt the program to smaller modules that can be used in pediatric gastroenterologists’ offices around the country in order to reach more adolescents in need.

Faculty Research Mentor: Dr. Ronald Blount, Psychology
CURO-Toxicology Summer Research Fellow: Lisa Rivard

This summer I plan to work under Dr. Fisher, the director of the Toxicology graduate program. Since my undergraduate degree is Environmental Health Science and I have pre-medicine intentions, Dr. Fisher has allowed me to work under him on a project that combines both of these areas. We will be examining the effects of the chemical perchlorate on the thyroid hormones in rats in order to better understand if perchlorate’s effects can be passed from mother to fetus, and if perchlorate produces adverse effects on the fetus.

Perchlorate is both a natural and a man-made anion found in the form of a salt; its chemical formula is ClO₄⁻. In the United States, perchlorate is used as the primary ingredient of solid rocket propellant because it is an oxidizer that allows the fuel to burn (EPA website).

Perchlorate is extremely stable when dissolved in water and thus can be hazardous when present in drinking water (Council on Water Quality website). In February 2005, the U.S. Environmental Protection Agency established perchlorate’s reference dose at 0.0007 milligrams per kilogram per day; this can be translated to a Drinking Water Equivalent Level of 24.5 parts per billion (ppb). Levels of perchlorate below 245 ppb have not yet been found to have a measurable effect on human health (EPA website).

The thyroid hormones include thyroxine (T₄) and triiodothyronine (T₃). The thyroid gland synthesizes thyroid hormones by adding iodide to the amino acid tyrosine. The thyroid gland then releases thyroid hormones into the body. These hormones increase the rate of cellular respiration as well as protein and fatty acid synthesis and degradation. They are needed for growth and neurological development in children. Perchlorate interferes with iodide uptake in the thyroid gland. Iodide deficiency, if iodide is not taken up by the thyroid gland, could result in behavioral changes, delayed development, and decreased learning abilities (The American Thyroid Association website).

Under Dr. Fisher, we will be looking for neural developmental changes in the offspring of maternal rats that have been exposed to perchlorate. We will be testing for these changes in two ways. First, we will measure fetal and pup serum levels of the thyroid hormones and thyroid stimulating hormone (TSH). We will compare thyroid hormone levels found in maternal rat serum exposed to perchlorate to the offspring’s serum levels in addition to the control rats that have not been exposed to perchlorate. Second, we will also be testing the neurological development of the offspring’s hippocampus using electrophysiological measurements of the CA1 region of hippocampus in the brain that controls learning and memory and comparing the electrical responses to control pup responses. Dr. Fisher is collaborating with Drs. Ferguson and Wagner in Veterinary Medicine on this EPA funded research grant.

This semester, I have been able to shadow and assist a Ph.D. student working under Dr. Fisher in the Environmental Health Science laboratory. She was developing an analytical method to measure perchlorate in serum. This is the project that I will work on this summer. Serum, thyroid, brain, and milk samples are ready for analysis once the method is up and running. I have learned a few laboratory and research techniques during this time, such as centrifugation and understanding graphical representations of data. This experience has allowed me to have a better understanding for the research I plan to do under Dr. Fisher this summer.

Faculty Research Mentor: Dr. Jeff Fisher, Toxicology


Effectiveness of Ca2+-Independent Phospholipase A2 Inhibitors in the Induction of Chemotherapeutic-Induced Cancer Cell Death.

CURO-OVPR Summer Research Fellow: Sonia Talathi

Synopsis: This research tests the hypothesis that inhibitors of Ca2+-independent phospholipase A2 (iPLA2) increase lung and prostate cancer cell death induced by the chemotherapeutics cisplatin and vincristine. In addition, the effect of iPLA2 inhibitors on inhibition of cancer cell growth will also be studied. Successful completion of work proposed in this study will identify a novel combinatorial treatment strategy that may be used to increase the effectiveness of chemotherapeutics used to eradicate prostate and lung cancers.

Rationale: Lung and prostate cancer account for two of the highest incidence cancers in the United States. Current treatments for these cancers include administration of chemotherapeutics, including cisplatin and vincristine. While these chemotherapeutics are somewhat effective, current strategies have focused on increasing the therapeutic-windows of these drugs using strategies such as metronome dosing (administration of multiple doses of less potency over greater amounts of time) and combinatorial dosing (administration of mixtures, or cocktails, of drugs, in order to get additives effects).

When a cell divides, it not only duplicates its DNA, but also its lipids. The duplication of lipids involves several enzymes, including phospholipase A2 (PLA2). Recent data suggest that a specific class of PLA2, iPLA2, are key in controlling the synthesis of phospholipids. Further, work from Dr. Cummings laboratory demonstrates that inhibition of iPLA2 decreases cancer cell growth. However, the ability of iPLA2 inhibition to potentiate chemotherapeutic-induced cancer cell death has never been determined. This study will test the hypothesis that iPLA2 inhibition increases lung and prostate cancer cell death induced by the chemotherapeutics cisplatin and vincristine.

Study Design: Cell cultures of A549 human lung cancer cells and PC-3 human prostate cancer cells will be seeded into 96 well plates at a concentration of 250,000 cell/ml, allowed to grow for 24 hr, exposed to the iPLA2 inhibitor bromenol lactone (BEL, 0 to 5 µM), or solvent control, for 30 minutes, prior to exposure to cisplatin (0 to 50 µM) or vincristine (0 to 2 µM) for 48 hr. Following treatment cells will be isolated and cell death measured by assessment of annexin V and propidium iodide (PI) staining using flow cytometry, as well as assessment of MTT staining and cell number. The amount of cell death in chemotherapeutic only exposed cells will be compared to cells exposed to both BEL and chemotherapeutics. Increases in annexin V and PI staining, or decrease in MTT and cell number, in cells exposed to both BEL and chemotherapeutics will support the hypothesis that inhibition of iPLA2 increases chemotherapeutic-induced cell death.

To assess the effect of iPLA2 inhibition on chemotherapeutic-inhibition of cell growth, cells will be seeded at 32,500 cell/ml in 96 well plates, allowed to grow for 2 hr, and then exposed to either solvent control of BEL for 30 minutes prior to exposure to cisplatin or vincristine. Cells will be allowed to growth for 72 hr and cell growth will be determined by assessment of MTT staining. Reduction in MTT staining in the presence of BEL and chemotherapeutics, beyond that seen in cells exposed to chemotherapeutics alone, will support the hypothesis that inhibition of iPLA2 enhances the ability of chemotherapeutics to decrease cancer cell growth.

Faculty Research Mentor: Dr. Brian Cummings, Pharmaceutical and Biomedical Sciences
CURO Summer Research Fellow: Erika Vinson

Objective: To investigate and evaluate the methods and techniques used by the ArtReach Foundation to instruct teachers and community leaders of new ways to encourage youths to express themselves and cope after facing personal trauma.

Description: My personal focus is on the effects of visual journaling, or sketchbooking, on individuals who use journals to record words and images describing their experiences. ArtReach utilizes both art (drawing) and drama therapy (including writing exercises) in their workshops; each has its own set of strengths, but combined could be even more valuable for gaining insight into people. I would like for the workshop participants to keep visual journals and work in them throughout the day, documenting what they are learning and how they really feel about the activities and events surrounding them. After the workshop I would interview participants who chose to adopt visual journaling to their classrooms and community centers and ask how effectual they feel the journals and workshops are.

I have also been extended an invitation to attend the Train the Trainers follow-up conference in Arkansas geared toward treating Hurricane Katrina evacuees in June. During this week ArtReach selects previous participants for more intense training so they may begin to teach others based on theories in Art Therapy. This may also be an opportunity to introduce visual journaling. I would be working closely with Susan Anderson and Art Therapist Stefani Weeden on the best way to implement this activity into the ArtReach method. I would also like to interview these participants about their first ArtReach program and whether and in what ways they have seen changes in their students since adopting art and drama therapy techniques.

Final Product: I will complete an oral and/or poster presentation for participation in the 2007 CURO Symposium and will publish my research for my Honors Interdisciplinary Studies Thesis. I also feel that this research would be ideal for the first CURO International and Interdisciplinary Symposium in Costa Rica in Maymester 2007.

Faculty Research Mentor: Dr. Richard Siegesmund, Art Education
The proposed research project centers on the way in which national leaders form pre-war expectations concerning the human and material costs of attaining a state's foreign policy objectives through the use of military force abroad. The recent literature in political science, in particular "rationalist" explanations for war, maintains that incomplete information about an adversary's military capabilities and resolve makes it difficult for leaders to determine accurate predictions about the likely cost and outcome of military operations. In as much, decision-makers in a fog of uncertainty lead their nations into ill-fated wars because they underestimate the cost and/or overestimate the likelihood of victory. Contemporary theories predict an increase in the probability of war and a decrease in the probability of success when leaders underestimate the human and material costs of attaining their war aims vis-à-vis an adversary. The contemporary literature, however, says little about the conditions under which leaders are likely to miscalculate the cost of achieving their political goals through the use of force. There has been no attempt to collect systematic data on leaders' pre-war expectations about the duration, casualty rates, or troop and resource requirements of military operations.

Data will be collected regarding pre-war expectations about the human and material costs of all 89 British, French, and U.S. military interventions since World War II. Dr. Sullivan will use these data in conjunction with previously collected data to test hypotheses about the effects of multiple factors on the accuracy of leaders' expectations about war costs prior to the decision to use force. Military records, government documents, archival material, newspaper articles, secondary historical accounts, and chronologies of international events will be used to collect data on both anticipated and actual troop deployments, conflict escalation, casualty rates, and duration in the assigned cases.

My responsibilities will include collecting, coding, and documenting data on the expectations about the number of troops to be deployed, casualties, war duration, modes of force to be employed, assistance from allies, and enemy capabilities. The expected workload is 40 hours a week, for a period of eight weeks. Dr. Sullivan is to be responsible for identifying appropriate data sources, developing coding rules for each of the variables to be included in the dataset, designing a template for data entry and documentation, creating a codebook, collecting and coding data for randomly selected cases, and insuring coding reliability.

While the compiled data will be used in the further development of Dr. Sullivan's own research proposal(s), I will use the summated data that I have collected to produce a written product to serve as a submission for an Honors thesis. It is my intent to incorporate current psychological theory regarding expectation costs along with statistical data from the 89 military interventions that would allow for a better understanding concerning the conditions under which leaders are likely to miscalculate the cost of achieving their political goals through the use of force.

In addition to allowing for an Honors thesis, I will submit an abstract of the summer research to the CURO office by the last day of finals of summer 2006 semester, for possible presentation at the annual CURO Symposium in April 2007. I will be required to attend the Symposium even if my abstract is not accepted for presentation. I will also participate in panel discussions with CURO faculty throughout the academic year in order to contribute to creating a culture of inquiry at the University of Georgia.

Faculty Research Mentor: Dr. Patricia Sullivan, International Affairs
The dawn of the nuclear age, the subsequent arms race between the Union of Soviet Socialist Republics and the United States, and the vigorous pursuit of weapons of mass destruction (WMD) programs by state and non-state actors have collectively exposed the dangers of vertical and horizontal proliferation of nuclear weapons. While many conduits have been pursued in an attempt to meet and resolve this challenge, the establishment of nuclear weapons free zones (NWFZ) has become an increasingly attractive option whose implementation is currently being entertained by many national and regional entities. NWFZ, which prohibit the use, transfer, and deployment of nuclear weapons, have recently been proposed and enacted in large numbers around the globe, yet many countries remain skeptical of their efficacy and thus stymie the successful implementation of NWFZ as a comprehensive solution to nuclear weapons proliferation.

Of the entities ripe for NWFZ consideration, none offer such tremendous potential for success as well as such significant implications for the global nuclear non-proliferation regime as does the European Union (EU). Through rigorous research guided both by faculty members and by Center for International Trade and Security (CITS) researchers, I intend to establish a comprehensive case as to the potential global impact of an EU NWFZ within three essential areas.

Primarily, I will explore how the implementation of a NWFZ within the EU would immediately impact the proliferation community and also yield long-term implications for the future of the global non-proliferation regime by considering both established theories of international relations as well as case studies of regions that have successfully undertaken NWFZ projects in the past. Through exploring different theoretical models as to why actors attempt to secure nuclear weapons and related materials, in addition to deducting the far-reaching effects of NWFZ establishment from previous efforts, I will attempt to construct practical and realistic global implications of NWFZ establishment within the EU.

Secondarily, I intend to explore how a EU NWFZ would directly impact the global non-proliferation regime by virtue of its emphasis on collective welfare through sacrifice. The establishment of this zone would require two states recognized by the nuclear Non-Proliferation Treaty (NPT) as nuclear weapons possessors—Great Britain and France—to relinquish control of their nuclear weapons capabilities, while other EU member states would underline their already-existing pledges as nuclear weapons-free states. Such assurances within the economically, politically, and technologically prominent EU to restrain from pursuing or maintaining nuclear weapons programs and related materials would undoubtedly create ripple effects throughout the rest of the weapons-seeking community which would resonate in influencing and encouraging future non-proliferation efforts.

Thirdly, I intend to research the implications of the EU NWFZ enactment process. Despite longstanding and seemingly costly commitments related to this undertaking, previous attempts at NWFZ implementation have demonstrated the project’s feasibility. I will thus explore the process of developing a NWFZ, including implementation of safeguards and enforcement measures, and illustrate how its establishment within the EU will broaden NWFZ support on a global level.

The ever-increasing repercussions of nuclear proliferation and the relative dearth of research corresponding to this particular domain motivated this research proposal. While understudied, NWFZ may provide a critical boost to the global non-proliferation regime. Through research and presentation, I hope to inform the general public as well as national decision-makers of the importance and plausibility of this proposal with the ultimate goal of influencing both national and international public policy towards strengthening of the global non-proliferation regime.

Faculty Research Mentor: Dr. Gary Bertsch, International Affairs
Creating a Culture of Undergraduate Inquiry

CURO 2006 Summer Research Fellowships

CURO-BHSI Summer Research Fellow: Shannon Yu

Literature Review: From my own previous research and published data, it is already known that the thymus and parathyroids arise from a common primordia in the third pharyngeal pouch. The transcription factor Gcm2 is the earliest parathyroid-specific marker. Gcm2, a homologue of the Drosophila gene Gcm, is required for the development of the parathyroid and is expressed in a highly specific region on the endoderm around the pouch. It is relegated to the most dorsal and anterior portion of the primordia, creating a domain for the future parathyroid within the third pouch. The mutation of Gcm2 results in parathyroid development failure, as well as a lack of parathyroid hormone expression. To extend this project, it is now important to look upstream of Gcm2, in order to determine what “turns on” Gcm2 expression in the pouch. There are currently two candidates for this role. In my research, I will be primarily focusing on one—the Sonic Hedgehog (Shh) pathway. Shh is a secreted, diffusible protein morphogen and is known to act with two membrane proteins—Patched (Ptc) and Smoothened (Smo). Ptc acts as a membrane receptor and binds Shh. When Shh is not present, Ptc has an inhibitory effect on Smo, which in turn, inhibits genes inside the cell that act as transcription factors. When Shh is present, it binds to Ptc, which releases Smo and allows Smo to activated genes that will act as transcription factors, perhaps affecting Gcm2 expression directly or indirectly.

Specific Aims: First – to use a Shh Flx mouse to determine if there is any change in Gcm2 expression in the third pharyngeal pouch. The Shh Flx protein is truncated protein, which may not be able to travel far enough to affect the necessary cells to turn on Gcm2 transcription. This model is expected to show either no expression or downregulated expression. Second – to use a endoderm-specific Cre knockout mouse to observe phenotypic changes to the third pouch. Two knockout constructs will be used—a Ptc KO and a Smo KO.

Final Product: Preliminary research has already been done on the first aim (Fall 2005 as a lab volunteer). No information of consequence was found from the research, indicating that the Shh Flx mouse is a poor model for Shh mutation. (Shh mutants are not typically used due to the severe phenotype of the mouse, making it nearly impossible to use.) Research on later stage Shh Flx mice is needed to completely rule out the Shh Flx mouse model. From the second portion of my project, we hope to learn more about the Shh pathway in regulating Gcm2 expression.

Timeline: Short term – During the Summer semester, I expect to complete work with the Shh Flx mouse model. As I have already stated, some work has been done with early stage embryos. I will continue work with E15.5 mice. If the data is still inconclusive, as I believe it will be, my research will switch focus to the Ptc KO and Smo KO mice. Also, in preparation for the second goal of my project, I will need to continue work in the mouse room, mating mice in order to “make” the knockout phenotypes. Long term – Once I have been able to construct the knockout mice models, I can begin work on the second goal of my project. Unfortunately, this part of my research is constrained by luck and the timeline of the gestation cycle in mice. As soon as possible, I will begin to analyze the phenotype in the receptor mutants (Ptc KO) and the signaling mutants (Smo KO).

Faculty Research Mentor: Dr. Nancy Manley, Genetics
Appendix A

CURO 2005 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
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
*Rce1and Ste24 Inhibition by Dipeptidyl Acyloxyethyl 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*
CURO 2006 Summer Research Fellowships

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
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
Appendix B

CURO 2004 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”*
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 Lymphoctes During Early Experimental Schistosomiasis Mansonii

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 Psudohermaphorditism, 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
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*
Appendix C

CURO 2003 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 Bodie*

**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*
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 Streptomyces 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*
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*
Appendix D

CURO 2002 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
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  
*Evolutionary Contributions of Retrotransposon Elements in the Genome of D. melanogaster*

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 Pandiyann  
Dr. Jacek Gaertig, Department of Cellular Biology  
*Study of Ciliary 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  
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  
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*
Appendix E

CURO 2001 Summer Research Fellows

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

Lorina Naci
Professor William Paul, Jr., School of Art
Each morning I get up with one word in mind: plastik...
CURO 2006 Summer Research Fellowships

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
   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
2006 Summer Research Fellowships

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