2007 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. CURO will create 6 hours of Honors research courses for the student in 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 through CURO and the Office of International Education and are required to purchase travel insurance (approximately $1 per day) through the Office of International Education for their time abroad.
2007 Selection Committee

Dr. E. M. (Woody) Beck, Professor, Sociology
Dr. Diane Bates Morrow, Associate Professor, History and African-American Studies
Dr. Fran Teague, Meigs Professor, English
Dr. Daniel Promislow, Professor, Genetics
Dr. Jean Martin-Williams, Professor, Brass
Dr. Rodney Mauricio, Associate Professor, Genetics
Dr. Loris Magnani, Professor, Physics & Astronomy
Dr. Regina A. Smith, Associate Vice President for Research
Chair: Dr. Pamela Kleiber, Associate Director, Honors Program and CURO

Special thanks to the sponsors of the 2007 Summer Research Fellowships

Honors Program
Office of the Vice President for Research
Biomedical and Health Sciences Institute
Interdisciplinary Toxicology Program
UGA Alumni Association
Jane and Bill Young Scholarship
Letter from the Directors

June 12, 2007

Dear UGA Faculty and Students:

We are delighted and honored to name 27 CURO Summer Research Fellows for 2007, 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 2007 Summer Research Fellowships are funded through the Honors Program, the Office of the Vice President for Research, the Biomedical and Health Sciences Institute, the Interdisciplinary Toxicology Program, the UGA Alumni Association, and the Jane & Bill Young Scholarship.

We are exceptionally proud of the quality of the contributions of present and past CURO Summer Fellows with 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 on campus as well as at regional, national and international meetings.

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
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A Psychoanalytical Examination of Wolf and Mörike's Peregrina Songs

CURO-OVPR Summer Research Fellow: Caroline M. Anderson

Objective: My summer research project addresses the text-music relationships exhibited in Hugo Wolf’s art song settings of Eduard Mörike’s Peregrina I and Peregrina II. Mörike’s Peregrina texts were a significant milestone in his poetic output; these texts were written in response to his experiences with Maria Meyer, a gypsy woman with whom he had a brief affair. Although it was initially a positive force in his life, the relationship left Mörike shattered and haunted; ultimately he channeled his feelings of loss and emptiness into the Peregrina poems, which are filled with psychological and sexual tension. This literary representation of complex psychology attracted Wolf to Mörike’s texts. An extremely gifted reader of poetry, Wolf’s exposure to the emerging psychoanalytical writings of Sigmund Freud allowed him to discern the underlying conflict between Mörike’s various layers of consciousness and their representation within his poetry. Wolf’s reception of Mörike’s poems led to a new kind of art song—one that interpreted lyrics meticulously and aimed for the extension of musical language in order to communicate the psychoanalytical traits of the Peregrina song texts.

My project will pair psychoanalytical theories with advanced chromatic and harmonic analysis to explore how the competition between Mörike’s consciousness and sub-consciousness manifests in Wolf’s art songs. Specifically, I wish to address the following questions:

- How does Wolf employ more sophisticated techniques to extend musical language?
- How does Wolf use double-tonic complexes, chromatic mediant relationships, directional tonality, and tonicizations?
- How do these techniques relate or reflect the words?
- How are deeper meanings of phrases and specific words transferred into music?
- What impact on form, texture, timbre, and dynamics will the words have?
- How does Wolf represent the mood of the two Peregrina poems?

My project will draw heavily upon my experience as a double major in music theory and German, which enable me to more fully explore the text-music relationships demonstrated in the Wolf-Mörike art songs. Previous scholarship has approached Wolf’s music either from a musicological perspective (lacking sufficient theoretical analysis), or solely from a literary point of view. Dr. John Turci-Escobar, Assistant Professor of Music Theory, and Dr. Max Reinhart, Professor of German, will be guiding my research on this project.

Final Product: An in-depth analysis of Peregrina I and Peregrina II will be submitted to the UGA Student Music Research Symposium and to Music Theory Southeast, a branch of the international Society for Music Theory.

Faculty Research Mentors: Dr. John Turci-Escobar, Music Theory
Dr. Max Reinhart, German
Converting Ferrochelatase into a Cytochrome c Like Protein

CURO Summer Research Fellow: Joseph Burch

Ferrochelatase is the last enzyme in the heme biosynthesis pathway. Ferrochelatase catalyzes the insertion of ferrous iron into protoporphyrin IX. As such, ferrochelatase represents a protein that transiently binds heme. The crystal structure of heme is now known, so contacts between the protein and porphyrin macromolecule can be identified. If there were some way to help the heme bind, the ferrochelatase would be a true heme protein, like a cytochrome. The goal of this project is to form a cytochrome like protein from ferrochelatase. This protein will be a model system for various studies that may provide insight into wild type ferrochelatase. These mutations will give clues to normal ferrochelatase activity and function. Another application of a ferrochelatase cytochrome protein would be using it as an electron carrier for other areas of research.

In order to create a self-synthesizing cytochrome like protein, eight mutants of ferrochelatase will be engineered to possibly form a covalent bond between the ferrochelatase protein and the newly synthesized heme. In each of these mutants, one amino acid will be mutated into a cysteine residue in an attempt to form a covalent bond with the vinyl group substituents of the protoporphyrin molecule while it is in the active site of ferrochelatase. Mutants will be prepared using the Quik Change site-directed mutagenesis kit (Stratagene, La Jolla, CA). Purified proteins will be used to perform acid-acetone extractions. The acid-acetone extraction will remove any heme that is not tightly bound and will show whether any heme is covalently bound to the ferrochelatase. Crystals will be grown using the hanging drop method in the EasyXtal™ crystallization tool. Using these crystals, protein structures can then be determined via crystal diffraction. These structures can then be used to confirm the presence of a covalent bond to produce a cytochrome c like protein. The physical and chemical properties of the engineered protein will be studied to determine if it can function as an electron carrier, like cytochrome c, or as a peroxidase in catalase type of enzyme.

Faculty Research Mentor: Dr. Harry Dailey, Microbiology and Biochemistry & Molecular Biology
Analysis of the Transcriptional Expression of Arabidopsis GAUT Genes: 15 Proven and Putative Plant Cell Wall Biosynthetic Galacturonosyltransferases

CURO-BHSI Summer Research Fellow: Amy Burrell

Pectin is a family of polysaccharides present in the cell wall of all plants. Since pectin is so abundant in the cell wall, it provides many of the biochemical properties that contribute to the growth and development of the plant. A specific family of enzymes involved in pectin biosynthesis known as Galacturonosyltransferases (GalATs) catalyze the transfer of galactosyrluronic acid (GalA) residues from uridine diphosphate-GalA (UDP-GalA) to the growing pectic polysaccharide chain. The first gene that encodes a pectin GalAT in Arabidopsis thaliana, known as GA lactUronosylTransferase1 (GAUT1), was previously identified through a proteomic approach using partially-purified, detergent-solubilized membrane protein preparations. BLAST analyses indicate the existence of a family of 14 genes with high-sequence similarity to GAUT1. To understand the biological significance of the GAUT genes in pectin synthesis, it is important to understand where within the plant their expression occurs.

For the summer research fellowship, I propose to analyze the expression of each GAUT gene in Arabidopsis through utilization of a β-Glucuronidase (GUS) reporter gene system. First, the sequence of each gene will be examined using bioinformatics to determine the promoter region. The promoter will be amplified from Arabidopsis genomic DNA and inserted into a cloning vector for replication. Using restriction digestion, the promoter region will be removed from the cloning vector and inserted upstream of the GUS gene in the vector pBI101. The pBI101 vector harboring the promoter:GUS construct will be transformed through an Agrobacterium-mediated method into Arabidopsis plants. The transformed plants will be histochemically stained for detection of GUS activity and the tissue and cell-type specific expression of each GAUT gene will be analyzed. GUS expression data will reflect the temporal and spatial regulation of genes in Arabidopsis plants grown under specific environmental conditions and at specific developmental stages. It will also provide detailed resolution, which is an advantage when compared to other expression analyses (e.g., microarray studies) which generally reflect expression in tissues containing multiple cell types. A comparison of GAUT gene expression will provide information about potential GAUT gene redundancy. Such information is useful in the interpretation and design of GAUT mutant studies. In summary, GUS expression of the GAUT genes will provide quantitative data needed to help determine the biological function of the GAUT gene family.


Faculty Research Mentor: Dr. Debra Mohnen, Biochemistry & Molecular Biology
Ecoregional Conservation Among Indigenous Communities in Cotacachi, Ecuador

CURO-OVPR Summer Research Fellow: Lee Ellen Carter

Study Rationale: Indigenous communities around the world are currently facing tremendous pressure from newly introduced contemporary tourist practices. Cotacachi, Ecuador is one such context. Cotacachi, a biologically rich area in the Northern Andes of Ecuador, is comprised of forty indigenous communities where approximately 18,000 Cotacacheños reside. The Cotacacheños continue to practice their century-old traditions through their textile industry, businesspeople, clothing and use of their native language, Quichua. Because Cotacachi is directly beside the Cotacachi-Cayapas Ecological Reserve, this region has been protected and conserved for many centuries and has become one of the most well known cultural landscapes of Latin America, and is, therefore, currently undergoing a shift from traditional practices toward contemporary tourist industry practices. These new ideas are not only impacting the traditions and cultural practices in the ecoregion, but also the environmental conservation practices that have a great impact on the lives of the Cotacacheños.

Research Question: How do the cultural processes of the Cotacacheños influence the conservation practices being conducted in the Andean highland region where the indigenous communities reside? What impact do these practices have on the ecoknowledge and environmental ethics of the Cotacacheños? Furthermore, how does the increasing ecotourism of Cotacachi impact the indigenous communities, both culturally and ecologically?

Research Design: The research design for the Cotacachi project is qualitative, an ethnographic case study. A variety of data collection methods, all congruent with the use of a qualitative research design, will be used to gain an extensive understanding of this topic. At least thirty in-depth longitudinal interviews, including indigenous community leaders and citizens, heads of nonprofit ecological conservation organizations in Cotacachi and throughout Ecuador, and heads of tourism – including ecotourism – agencies in Cotacachi, will be the primary method of gathering data for the research project. All interviewees will be selected in a non-probability fashion and will be sampled to 1) achieve maximum variety and 2) access persons to be key informants. Access to these interviewees will be obtained through my faculty mentor, Dr. Fausto Sarmiento, as well as other academic and professional contacts. I will also conduct focus groups and standardized surveys among community residents, and I will observe the cultural practices of the indigenous community, some of whose members will be provided open-ended questionnaires. Furthermore, I will perform an extensive review of relevant scientific literature associated with cultural conservation and landscape stewardship with traditional ecological knowledge practices among indigenous communities in the Andean highlands. Prior to my fieldwork in Ecuador, I will prepare for my interviews, surveys, and other methodology through research in the United States. To gather field data, I will spend approximately five weeks in Ecuador. During this time, I will start the ethnographic research by living within an indigenous community to gain a first-hand view of their societal processes and foster acquisition of both Spanish and Quichua. I will also spend this time to obtain the other necessary interviews with leaders of various organizations previously mentioned. Following my fieldwork in Ecuador, I will analyze the data that was collected to prepare a concise and thorough paper to be used in research symposiums, academic publications, and as my senior thesis.

Implications: Ultimately, this research will attempt to understand the ecological and geographical influences on the sociocultural processes of Cotacachi, Ecuador by conducting an ethnographic case study. The research has the potential to provide approaches to further understand the connections between indigenous societies and their environments, including conservation, ecotourism, ecoknowledge, environmental ethics, and their unique traditions. Furthermore, this research has the capability of assisting the indigenous communities further in preserving the land that they have resided on for so many centuries.

Faculty Research Mentor: Dr. Fausto Sarmiento, Geography
Parameters Affecting Fecal Egg Count Data for Determining Drug Resistance in Nematode Parasites of Horses

CURO-BHSI Summer Research Fellow: Kimberly DeLisi

The objective of this project is to establish standards for performing fecal egg count (FEC) reduction tests for determining drug resistance in nematode parasites of horses. More specifically, the effects of sample handling on FEC data will be investigated.

1. Additional trials will be completed to test the effect of storage temperature and time on equine FEC, and to test the length of time a sample can lie on the floor of the stall and still be considered fresh in terms of optimal parasite egg recovery. These trials will be completed by obtaining fecal samples, storing them under the variable conditions, and performing repeated egg counts at specified time intervals.

2. Sources of variation between repeated FEC will be tested. Variation between different samples from the same horse, between different tests on sub-samples of the same fecal sample, and between different tests of the same sample aliquot (only a small percentage of each sample is actually examined for each FEC) will be examined. This protocol will be carried out by collecting five separate daily fecal samples during one week, storing them properly (as previously determined in item #1), and completing a total of 30 egg counts for each of the five fecal samples.

3. A fecal egg count reduction test will be performed after the optimal parameters have been determined. Fecal samples will be taken from ten horses for three days in a row, and FEC will be performed on those samples. Then, the horses will be treated with anthelmintics. Ten days later, fecal collection will occur for three days in a row, and FEC will be performed. The results of the fecal egg count reduction tests will be tested against existing statistical models that have recently been developed by Dr. Kaplan and Dr. Vidyashankar (statistician at Cornell University who is collaborating on this project).

4. An Honors thesis will be written.

Faculty Research Mentor: Dr. Ray Kaplan, Infectious Diseases
I plan to work with a team from the UGA Linguistics Department, which includes my faculty mentor Dr. William Kretzschmar, on an ongoing project called Roswell Voices. In short, the objective of the Roswell Voices program is to gather linguistic data from interviews with the different generational groups in the city of Roswell, and to use this data to examine how language relates to social identity. As the team describes the process, the collected data will be able to show a correlation between language change across generations and the town of Roswell’s progression from being a settlement for mill workers, to being a suburb of Atlanta, to now being an “edge city,” with a separate identity from the metropolis of Atlanta. The question to answer, then, is: How do the phonetics, lexicon, and syntax of a speaker contribute to his or her cultural identity of considering Roswell his or her home?

This summer, I will assist Roswell Voices by gathering data from the youngest generation in question, those aged 18 to 35. As most of their work has focused on older members of the community, I propose to sample an independent cluster of four to six interviews with this younger generation in order to augment the work done by the team so far. Following the same procedures as in earlier interviews, the subjects will be approached through personal acquaintances, and will be balanced between the white and African American population of the town. I will follow the basic format of interviews previously conducted with older subjects. The interviews will combine a conversation of life in Roswell with both a question-and-answer session and fixed-format elicitation in which the subjects will read words from note cards. By processing the data collected in the interviews I hope to qualitatively determine what makes the young subject a citizen of Roswell, drawing upon the content and language use of the subject’s speech. In addition to conducting the interviews, I propose to transcribe the words of the interview in normal spelling, with acoustical phonetic analysis of selected words as identified in the transcript. The audio of the interview, recorded directly onto CD stock, will be preserved in .wav format. When the data is properly archived, I can then work to interpret it, and try to determine how the youth specifically associate with the city of Roswell in their speech.

I will be able to work with experienced members of the team to learn the proper way of archiving data in linguistic research. Through my research I will learn how to use the recording equipment and transcription and encoding techniques used in the Roswell Voices project, which in turn I can use to further my own linguistic research in the future. As a resident of the same North Fulton area which contains the city of Roswell, I view this research opportunity as a platform to perform future research in the other communities of North Fulton. The recent incorporations of the cities of Johns Creek, Milton, and Sandy Springs present an interesting question to whether these areas, too, can be characterized with their own linguistic identity. Another interesting question to explore might be to interview Hispanic subjects, as there has been a large influx of Spanish speaking people in recent years. Performing research with Roswell Voices would then not only be a valuable experience in itself, with my contribution to research in the 18-35 age bracket, but also a way to establish a method which I could apply to future research among the other suburbs and “edge cities” of Atlanta.

Faculty Research Mentor: Dr. William Kretzschmar, Linguistics
Recycling of monosaccharides released from storage polysaccharides, cell walls and glycoproteins that are degraded during cell wall reconstruction is an important pathway for generating rapid building blocks to facilitate growth of tissues. In this salvage pathway, each monosaccharide is phosphorylated by kinase activity to a sugar-1-phosphate. The sugar-1-phosphate is then converted to the appropriate nucleotide (NDP)-sugar by NDP-sugar pyrophosphorylase activity. It is then the NDP-sugar that serves as the activated sugar donor for the biosynthesis of polysaccharides and glycoproteins, which facilitates tissue growth.

Arabinose is an essential sugar residue of cell wall polysaccharides. A gene encoding a putative arabinose kinase (Ara1) was identified by genetic screen, and its ara1 plant mutant lacks the ability to convert in vivo arabinose to arabinose-1-phosphate. The encoded Ara1 consists of three domains: a galactokinase-like domain, speculated to carry arabinose kinase function; a potential transmembrane domain; and a large N-terminus domain for which the function is unknown. There are discrepancies regarding the biochemical properties of the kinase, its subcellular localization, and its biological function, which must be resolved in order to further understanding of the salvage pathway.

The goal of my proposed research is (1) to identify the functional domain(s) of recombinant arabinose kinase and its enzyme sugar specificity (2) to identify if the GFP tagged kinase is cytosolic or membrane bound and its specific subcellular localization.

Participating in undergraduate research in the past 6 months has allowed me to become proficient in the laboratory techniques necessary for my proposed CURO research project. The CURO fellowship will allow me to continue my research with the added ability to contribute my entire time to the success of the research along with providing me the opportunity to present my findings among fellow undergraduate researchers. Such an opportunity will be invaluable in preparing me for my future career in the scientific field.

Faculty Research Mentor: Dr. Maor Bar-Peled, Complex Carbohydrate Research Center
The organism *Pyrococcus furiosus* is an anaerobic hyperthermophile within the domain Archaea. In nature, it lives at an optimal temperature of 100°C in underwater solfatarics – volcanic regions emitting sulfurous gases. Since the genome’s sequencing in 2001, *P. furiosus* has become almost like the *E. coli* of archaeons, with many genomic and proteomic studies bent on discovering how this organism functions under such stressful conditions. Much has been learned, but for this organism far more is left to find.

One problem is that the discovery of new ORFs (open reading frames) of the genome is based purely on contrived computer algorithms. Each ORF represents a possible protein coding sequence, but the computer algorithms aren’t perfect, and many ORFs, especially the smaller ones, get skipped over and are therefore not annotated in the genomic databases. Dr. Adams’s lab a few years ago created a new algorithm able to pick up the smaller ORFs that fell through the cracks of previous programs, but nothing is known about the ORFs or about their possible coded proteins. The current standard technique for finding transcriptionally active sections of the genome involve microarrays, but it is close to impossible to retrieve conclusive data from a microarray for a small ORF. That is where I come in.

The focus of my research has been and will continue to be on developing efficient methods for finding, studying, and characterizing transcriptionally active small ORFs and the proteins they code for. The main component of my research revolves around the QPCR machine (quantitative polymerase chain reaction), which quantifies the relative amount of DNA present in a sample. Last semester, I used QPCR to prove the existence of transcription products from small ORFs that database information showed to be good protein-coding candidates. This semester, with the ORFs I proved to have gene products, I will be using strand specific primers to prove whether or not the protein comes from the section of the genome as it is annotated. The next step will be to use the process of primer extension to find the exact location and lengths of the genes.

This summer, I will want to progress this research in two ways. First, I will use processes such as mass spectroscopy, gel electrophoresis, and others to isolate, characterize, and sequence the proteins to discover their functions and to ensure that their peptide sequences match their respective mRNA sequences. Secondly, I will develop the QPCR methods further so that they can be performed on a larger scale, instead of just a few ORFs at a time. Along those lines, I would also be working with the computing sector of our lab to figure out how to use these methods in conjunction with our current bioinformatics projects such as making a more efficient database system for the genome and proteome of *P. furiosus*. In summary, I am working on developing a system of methodologies to properly study small ORFs and their transcripts. So far, no one else has bothered to do so, because most proteins are large. However, some very important proteins such as rubedoxin and insulin are quite small, so we think that ORFs should not be overlooked because of their size. The smaller ones could be just as biologically active.

*Faculty Research Mentor: Dr. Michael Adams, Biochemistry & Molecular Biology*
This ethnomusicology project proposes the first scholarly documentation of the intercultural music synthesis occurring between the Athens music community and the Athens Latino and Hispanic community. While no one has researched the music of Athens’ Latino and Hispanic people, those already researching and assisting these populations in Athens-Clarke County include Dr. Paul Matthews (Co-Director of CLASE) and Dr. Paul Duncan (Assistant Director of LACSI) of the University of Georgia, Partners for Prosperous Athens, Eco Latino Magazine, and Mexican American Business Chamber. Additionally, Dr. Roy Kennedy, professor of music therapy at the Hugh Hodgson School of Music, has begun working with the Oasis Catolico at Pinewoods, using music to foster communication between the university and the Latino community. According to my principal informant, Sister Margarita, the Pinewoods estate community includes a diverse population of Peruvians, Colombians, Salvadorians, Guatemalans, Mexicans, Cubans, Argentinians, and Venezuelans. Evidence of the musical tastes, creativity and influence of this community can be seen and heard in the Spanish masses conducted at St. Joseph’s Catholic Church, Spanish-language Protestant church services, and local grocery stores, music stores, and restaurants such as Los Compadres and La Jalisco Supermercado.

This study of Latino and Hispanic musical contributions to Athens-Clarke County will result in an increased awareness that the “vast collective pool of human creativity [is] an enormous ecosystem where the traits of one type of being are complementary to and symbiotic with those of another.” 1 Questions that will be targeted are the following: To what extent is the musical participation of the Latin and Hispanic communities already enriching Athens-Clarke County? How are the Latino and Hispanic cultures using music to maintain identities? How are they using music to integrate into the larger Athens-Clarke communities?

Employing a methodology used effectively by Art Rosenbaum to document traditional music and musicians of rural Georgians, 2 this project will include interviewing music makers within the Latino and Hispanic communities, recording and transcribing examples of these musicians’ works, photographing the music makers within their musical environment, and synthesizing all findings in a multimedia exhibition for the Clarke County community at large. Ultimately the project will enhance understanding of the vibrant resources present within the Latino and Mexican communities of Athens-Clarke County.

Faculty Research Mentor: Dr. David Schiller, Musicology

The United States, which has one of the safest food supplies in the world, has an estimated 76 million cases of foodborne illness annually (Moore et al., 2006). The most common cause of bacterial foodborne illness is *Campylobacter* (US Food and Drug Administration, 2006). *Campylobacter*, which is a Gram-negative rod-shaped bacterium, frequently colonizes the intestinal tract of animals, such as chickens, without inducing disease (US Food and Drug Administration, 2006). However, human ingestion of *Campylobacter*-contaminated products causes infection (US Food and Drug Administration, 2006). In studies, *Campylobacter* is shown to frequently contaminate 20-100% of raw chicken (US Food and Drug Administration, 2006). Although *Campylobacter* is found in birds and mammals, the high prevalence of *Campylobacter* in poultry is especially important to the United States, which is a major supplier of poultry in the international market (Schupska, 2006). Georgia greatly contributes to the United States’ poultry supply as the number one producer of broilers (Schupska, 2006). In Georgia, poultry represents greater than fifty-percent of the state’s agriculture (Schupska, 2006).

Because of the importance of poultry in the United States’ economy and the high prevalence of *Campylobacter* infection, the United States Department of Agriculture (USDA) searches for a means of reducing *Campylobacter* infections (US Department of Agriculture, 2006). The USDA supports research to better understand *Campylobacter* to better control and monitor the pathogen (US Department of Agriculture, 2006). According to the USDA, the decrease of pathogen loads in animals presented for slaughter often contributes to the decrease in pathogen loads in products (Food Safety and Inspection Service, 2003). Because of this, the USDA cites research relating to interventional methods to reduce *Campylobacter* in poultry as one of its highest research necessities (Food Safety and Inspection Service, 2003).

Although *Campylobacter* is known to reside in the intestine of chickens, it is not known if one region of the intestine exhibits greater concentration of *Campylobacter* compared to other regions. Knowing where the greatest concentrations of *Campylobacter* exist can direct more effective antimicrobial interventions during evisceration and other slaughter procedures (US Department of Agriculture, 2006).

With my research, the objective is to determine where in the chicken intestine *Campylobacter* is most concentrated. Using an *in situ* probe, specific for *Campylobacter*, the pathogen will be detected. In an effort to determine which region contains the highest pathogen load, tissue samples will be taken from various regions of the chicken intestine. The data gained from my research has the potential to help improve the economy by facilitating more targeted antimicrobial interventions to increase safety levels of poultry. With more targeted interventions, it is believed levels of foodborne illness will decrease (US Department of Agriculture, 2006). Also, a more targeted approach of antimicrobial therapy strengthens the agricultural economy by helping slow down the rate of increase in antimicrobial resistance among *Campylobacter* pathogens. Such research can not only help the economy but also generate a pathway for the creation of a system to monitor poultry safety levels (Food Safety and Inspection Service, 2003). A national system to monitor poultry safety levels has the potential to aid in the detection of intentional assaults on United States agriculture (Food Safety and Inspection Service, 2003).

Data obtained from this research has vast implications with its potential to improve the economy, safety of the food supply, and health of the public. Although better understanding *Campylobacter* pathogenesis is important to the United States agricultural economy, information gained can be used to help improve safety levels in developing poultry markets in other parts of the world, thus improving the food safety and consumer health world wide.

*Faculty Research Mentor: Dr. Corrie Brown, Pathology*
The research I will conduct involves situations in which international, domestic, and religious law collide. Violence has recently resurfaced within countries of Southeast Asia that are home to overwhelming Muslim majorities. This violence results from the struggles of domestic governments to both appease international organizations and remain secular democracies and, at the same time, to appease their domestic constituents through the integration of Shari’a law, or the law of Islam, into their domestic legal systems. These domestic governments are engaged in a difficult balancing act. If they decide to integrate Shari’a law into their mainly secular laws and deviate from the democratic ideals for which many of the international organizations in question stand, international organizations threaten to cut off the financial aid that countries such as Bangladesh, one of the poorest countries in the world, so badly need. At the same time, if these domestic governments refuse the incorporation of Shari’a law, radical Islamic groups may resort to the use of political violence in order to make known their dissatisfaction and to intimidate the government into complying with their demands. How can countries compromise the legal demands from abroad and those from home while avoiding the negative repercussions with which they are faced?

Religious extremist groups have targeted those who represent secular law within Southeast Asian countries for their refusal to incorporate Shari’a law into legislation, courts, and other facets of the government. Judges, lawyers, and members of the state legislature have all fallen victim to targeted killings or what some might consider acts of terrorism. Nevertheless, while many Western countries are increasingly involving themselves in Middle Eastern affairs with the hopes of establishing secular democracies across the region, they seem to lack an in-depth understanding of why it has been so difficult for these countries to establish governments with the ability to separate church, or in this case Islam, and state. Therefore, it is necessary to further explore which areas of secular and Shari’a law come into conflict and what can be done to reach a compromise involving these systems. Furthermore, the development of policies capable of extinguishing the threat of political violence directed towards these governments in peril is equally imperative to the establishment of stable democracies that can govern over their both secular and devoutly religious communities.

For this project, I will use Bangladesh and Indonesia as case studies. Both Bangladesh and Indonesia have engaged in this difficult act of balancing the interests of international organizations upon which they rely heavily for monetary aid and the overwhelmingly large Muslim majorities upon which politicians rely heavily for re-election and political power. Indonesia, though, has already implemented solutions in order to suppress the political violence that this conflict between secular and Shari’a law has given rise to. Therefore, the question I hope to answer through my research is, have these policies been successful in ending the political violence and could they be implemented in other countries? I will conduct such research combining both a qualitative and quantitative approach using data collected through Dr. Stephen Shellman’s Project Civil Strife. The quantitative data I hope to acquire through Project Civil Strife will enable me to better explain the dynamic relationship between all of the actors involved: international organizations, judges, domestic politicians, dissident groups, and the general populous. The qualitative research will involve investigating the pivotal court cases that involve conflicts of international, domestic, and religious law as well as the adjudication of such cases. Through these approaches combined, I hope to have ample information to formulate a series of hypotheses this summer concerning in what cases the intersection of international, domestic, and religious law sparks political violence and what policies best address these sparks before they erupt into wildfires.

Faculty Research Mentor: Dr. Stephen Shellman, International Affairs
There is a critical need for a more accurate and more rapid method for diagnosing infectious pathogens. Current methods are severely limited in sensitivity and accuracy, or are time consuming and expensive. The development of a better technique for detecting low levels of infectious pathogens would aid in intervention approaches, treatment strategies, as well as redefining the need for hospital admission. Overall, better diagnosis of pathogens translates into better protection of public health.

The analytical technique of interest is Surface Enhanced Raman Spectroscopy (SERS). In SERS, the Raman effect is greatly improved when molecules are close to a rough metal surface, such as gold or silver nanorods. The Raman effect, or Raman scattering, is when photons that are scattered from striking an atom or molecule have a different energy from that of the incident photons. Raman scattering is characteristic of a particular atom or molecule, and therefore, it is a very useful analytical technique. However, the usefulness of SERS has been hindered by the development of a simple reproducible procedure for creating SERS-active substrates. Recent research at the University of Georgia has shown that a nanofabrication technique based on glancing angle vapor deposition (GLAD) can produce silver nanorod substrates that are SERS-active.

The objective of this research is to understand the nanorod structural design (size, shape, orientation) produced by GLAD and how it affects SERS spectra, and to develop an immunoassay based on these substrates for the detection of pathogens, especially mycoplasma. In addition to this genus of bacteria, various viruses are of particular interest, including human immunodeficiency virus (HIV) and rotavirus, both of which cause thousands of deaths worldwide every year. It is believed that the development of a SERS-based bioanalytical technique will have significant advantages in terms of speed, accuracy, and cost for detecting current clinical threats or future bioterrorism agents.

*Faculty Research Mentor: Dr. Richard Dluhy, Chemistry*
Unbiased Isolation and Carbohydrate Mapping of Alpha-Dystroglycan

CURO-Jane and Bill Young Scholarship Summer Research Fellow: Andy Kragor

The majority of proteins on the surface of cells are decorated with sugars. These “sugar sidechains” have been repeatedly demonstrated to affect protein structure, stability, and activity. A specific class of sugar modifications, the O-linked sugars, has been demonstrated to play a significant role in diabetes, muscular dystrophy, leprosy, and most recently, cancer. Lance Wells’ laboratory, in conjunction with the labs of Michael Tiemeyer and Carl Bergmann, has embarked on a project to identify and quantify changes in sugar structures and attachment sites on the protein alpha-dystroglycan (α-DG) in normal and cancerous tissue. α-DG is critical for interactions of the cell with its environment. As such, it is an outstanding candidate for affecting cellular movement and adhesion, which are central in the development and spread of cancer. It is therefore not surprising that global, undefined changes in α-DG sugar sidechains have been correlated with the aggressiveness of certain cancers.

I will be isolating dystroglycans from various cell types and tissues and assisting in the mapping of all the carbohydrate structures on the dystroglycans that I isolate. The isolation protocols involve a variety of chromatographic techniques that I have been learning this semester, and include ion-exchange, lectin affinity, and size exclusion chromatography. In addition I will be using SDS-PAGE and Western Blot analysis, as well as trypsin digestion coupled to LC-ion-trap mass spectrometry, to provide proof of purity of the dystroglycan. I expect that the purification protocol will need to be altered depending both on the tissue type and whether it is from a healthy or diseased organ, as this will affect the glycans on the surface, which in turn affect the physical properties of the protein. The carbohydrate mapping strategy makes extensive use of the linear ion-trap mass spectrometer.

I will also be working in conjunction with other members of the Bergmann lab to understand how the changes in surface glycosylation will affect the dystroglycan’s ability to bind proteins in the extracellular matrix. This will require the use of surface plasmon resonance technology. The project I am working on is currently funded by the Muscular Dystrophy Association and will lay the groundwork for a future grant to the National Cancer Institute and/or the American Cancer Society. The grant would focus on specific changes observed in the sugars on α-DG that can be used as a diagnostic marker and are causally related to changes in cell motility and adhesion during cancer. My work will be principally supervised by Drs. Wells and Bergmann.

*Faculty Research Mentors: Dr. Lance Wells, Complex Carbohydrate Research Center
Dr. Carl Bergmann, Complex Carbohydrate Research Center*
Functional Analysis of the *Magnaporthe grisea* Secretome

**CURO-BHSI Summer Research Fellow: Brian Laughtin**

**Introduction:** *Magnaporthe grisea*, a filamentous Ascomycete fungus, 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. The fungus encodes about 800 proteins that are secreted under various growth conditions. Some of these extracellular proteins (ECPs) may serve an integral role in causing the disease. Such pathogenic proteins are potential targets for the design of novel, environmentally safe fungicides.

Map-based cloning techniques are allowing the isolation and characterization of pathogenic protein encoding genes, such as virulent genes and avirulence genes which control fungal pathogenicity and host specificity, respectively. An ongoing proteomics project in this laboratory has identified by mass spectrometry about 100 ECP species from *M. grisea*. Among the identified *M. grisea* ECPs, two (MgEcp22 and MgEcp23) with unknown functions are present exclusively in rice leaves infested by *M. grisea*. It is possible that these two proteins are either pathogenicity factors or some type of signal molecules that interact with the plant host to determine disease.

**Research Proposal:** Previous research initiated by Evan Conroy (2004) involved the knockout mutagenesis of MgEcp22 and MgEcp23 genes in order to assay their roles in rice blast disease. In light of Conroy’s work, the need for a dependable expression vector capable of overexpressing various genes-of-interest has arisen. My project attempts just the opposite of Conroy’s work: rather than observing the effects of a deficiency of MgEcp22 and MgEcp23, we wish to observe the effects of an excess amount of MgEcp22 and MgEcp23 delivered inside plant host tissues.

Currently, I have constructed an expression cassette, pWH102, which carries the complementary DNA sequence of the MgEcp22 gene under the control of a regular promoter, P_{CES1}. The MgEcp22 and MgEcp23, as well as other noteworthy ECP genes, will also be cloned into a yeast–shuttle vector under the control of a strong and constitutively expressed promoter, P_{RPP2} (RPP2 stands for Ribosomal Protein P2 from *M. grisea*) using the yeast gap-repairing (YGR) technique. While the traditional restriction-ligation cloning method is currently proving the more reliable route, the (YGR) procedure will provide an affordable and high-throughput cloning format in expressing many other genes-of-interest within *M. grisea*. Regardless the cloning method, each protein expressed will be a secreted fusion protein that includes the ECP sequence and a tandem epitope-purification tag at the C-, or N- terminus.

The cloned expression constructs will be transformed into *M. grisea*, and the expression of the *M. grisea* ECP fusion proteins will be evaluated and purified using properties of the fused tandem tag. If time allows, we will also examine the pathogenicity and other phenotypes of the ECP-overexpressed *M. grisea* strains. Furthermore, the probable formation of protein complexes between any of the ECPs and a host protein or proteins during infection will also be investigated and characterized using current proteomics technologies.

Through the above experiments I wish to answer the following questions:

1. Is Yeast Gap-Repairing a suitable alternative to traditional cloning methods in the high-throughput -omics era?
2. What roles do MgEcp22 and MgEcp23 play during the interactions between *M. grisea* and its plant host? Specifically, does an excess of either ECP bear consequences for the pathogenicity of *M. grisea*?
3. Does MgEcp22, MgEcp23 or other MgEcps forms complexes with host molecules?
4. What implications does the research have regarding fungal disease control and food security in general?

**Faculty Research Mentor: Dr. Alan Darvill, Complex Carbohydrate Research Center**
Synthesis of Quinolinol-Based Inhibitors of Rce1p
CURO Summer Research Fellow: James MacNamara

The protein K-Ras, a mutated form of Ras, is a well known oncogene that is responsible for 30% of all cancers, including 90% of pancreatic cancers and 50% of colon cancers. Ras is a GTPase vital to cell growth, and therefore preventing Ras activation in cancer cells could stop them from spreading. Most proteins in the Ras family contain a CaaX motif, where C is a cysteine, a is an aliphatic amino acid, and X is a variety of amino acids and activate through a three step process (Fig. 1). The first activation step involves the addition of a farnesyl group to the cysteine. This step has been a major focus of research, and several inhibitors have been developed to prevent farnesylation. Nevertheless, the inhibited cells are able to use a similar geranylgeranylation instead of a farnesyl group, and the activation process continues unhindered. After the farnesylation, a prenyl-protein-specific protease removes the aaX series from the CaaX motif in yeast, Ste24p and Rce1p catalyze this process, but in humans, only Rce1p is capable of proteolytically processing Ras. After prenylation, the exposed C-terminal prenyl-cysteine is methylated by isoprenylcysteine carboxyl methyltransferase (ICMT), which along with Rce1p, is located on the endoplasmic reticulum. Inhibiting these steps could disrupt the activation of K-Ras and therefore open new leads for anti-cancer therapeutics by providing a starting point to halt cancerous cell growth.

Rce1p is the only enzyme in animals that can process Ras; therefore, it is an excellent target for small molecule-based inhibition of the activation process. By screening an NIH library, Dr. Walter Schmidt (BCMB, UGA) found that the most promising inhibitor of Rce1p and Ste24p was quinolinol 1 (Fig. 2). Quinolinol 2 was also a good inhibitor. The library contained analogs of 1 with different R1 substituents, but did not explore variations at R2. This proposal seeks to synthesize quinolinol 3 and 4 with various R2 substituents to further explore the structure-activity relationships (SARs) for the inhibition of Rce1p and Ste24p. These R2 derivatives of 1 and 2 are novel compounds that have the potential to inhibit Rce1p. The synthesis begins with 8-quinolinol, whose hydroxy group is protected. The protected quinolinol alkylates a variety of aromatic aldehydes. The resulting alcohol is oxidized to the ketone, which will undergo reductive amination with either aniline (R1 = H) or 4-amino benzoic acid (R1 = CO2H). Deprotections, if necessary, followed by HPLC purification, will provide the target compounds. Compound 5 will be synthesized to test the necessity of the hydroxy group at R3. The goal of this research is to synthesize the compounds 3 and 4 in an effort to discover an effective inhibitor of Rce1p and Ste24p. Dr. Schmidt's lab will assay the ability of the quinolinol derivatives to inhibit Rce1p and Ste24p. From these data, SARs will be established, which will inform future synthetic work.

Figure 1: Ras Processing

Figure 2: Quinoline-Based Target and Proposed R2 Modifications

Molecular Inhibition of Independent Phospholipase A₂ and its Effect on Prostate Cancer Growth

CURO-Interdisciplinary Toxicology Program Summer Research Fellow: Prashant Monian

Phospholipase A₂ (PLA₂) are a family of enzymes that catalyze the hydrolysis of the sn-2 position of glycerophospholipids, leading to production of free fatty acids and lysophospholipids. One of these esterified fatty acids, arachidonic acid (AA), is metabolized into prostaglandin E₂ (PGE₂). A previous study has shown that PGE₂ stimulates proliferation in human prostate cancer cell lines. Because PLA₂ regulate the release of arachidonic acid, they are thought to affect the growth of prostate cancer cells and tumors.

One such enzyme, Ca²⁺-independent iPLA₂ appears to play a role in the provision of arachidonic acid in the cell along with phospholipid remodeling, regulation of store operated calcium channels and apoptosis. Selective inhibition of iPLA₂ could thus decrease the growth of human prostate cancer cells. One possible means for iPLA₂ inhibition would be to use siRNA nucleotides, synthesized chemically by screening the cDNA associated with production of iPLA₂ for unique sequences, and then designing primers for these sequences. The siRNA nucleotide could then be incorporated into a protein complex that recognizes and cleaves the target mRNA.

This work tests the hypothesis that treatment of human prostate cancer cells (PC-3) with siRNA plasmids against iPLA₂ will decrease cell growth. Basic cell counting under a microscope and mitochondrial function will be used to measure the rate of cell growth. Findings from this study will help establish the efficiency of using siRNA technology to inhibit iPLA₂ activity, and thus determine its effect on prostate cancer growth.

Faculty Research Mentor: Dr. Brian S. Cummings, Pharmaceutical & Biomedical Sciences
The Effect of Antagonizing Stress Receptors in Rats During Repeated Exposure to Restraint Stress

CURO-OVPR Summer Research Fellow: Neil Naik

Stress causes an array of physiological, metabolic and behavioral responses in humans and animals, many of which are initiated by activation of corticotrophin releasing factor receptors (CRFR). Previous studies in the Harris laboratory have shown that when rats are subjected to three hours of restraint stress on each of three days they have a reduced food intake and lose weight on the days that they are stressed. In the days after stress, food intake of the stressed rats returns to normal, but the rats do not regain the weight that they lost during stress. Because people who are overweight or obese often regain weight that they lose by dieting, it is important to understand what mechanisms are activated by stress that allows the stressed rats to maintain their weight loss.

The areas of the brain that are known to be important in regulating body weight are the hypothalamus and the brain stem. The third ventricle of the brain is adjacent to many of the hypothalamic nuclei. Experiments in the Harris laboratory have shown that if a CRFR antagonist is infused into the third ventricle just before each of the three periods of restraint stress the stress-induced weight loss is partially prevented. Because the half-life of the receptor antagonist (astressin) is relatively short but the systems that are activated by stress may be prolonged, this experiment will test whether continuous antagonism of the stress receptors on the days of stress is more effective in blocking weight loss of restrained rats.

Male Sprague Dawley rats will be fitted cannulas aimed at the third ventricle. Appropriate placement of cannulas will be tested one week later by ensuring that the rats drink after an infusion of angiotensin II. The daily body weights and food intakes of the rats will be measured daily for 5 days for baseline measurements. The rats will then be divided into three groups and an Alzet miniosmotic pump will be attached to the cannula. These pumps deliver 0.25ul test solution/hr for 7 days. One group will be fitted with pumps that deliver sterile saline to the third ventricle. The other two groups will be fitted with pumps that deliver astressin. Two different doses of astressin will be tested as a high dose of astressin may increase body weight and food intake. Half of the rats in each of the infusion groups will be exposed to 3 hours of restraint stress for three days, starting the day after the pumps are attached. The day after the end of the restraint the pumps will be disconnected from the cannulas. Daily body weight and food intake will be measured for ten days after the end of stress to determine whether either of the doses of astressin has inhibited weight loss in restrained rats.

Faculty Research Mentor: Dr. Ruth Harris, Food & Nutrition
Genetic Studies on the Roles of KITL in Regulating the Proliferation and Apoptosis of Primordial Germ Cells in Mice

CURO-BHSI Summer Research Fellow: Natalie Nesmith

Kit ligand (KITL) and its receptor KIT are required for the development and proliferation of germ cells, melanocytes, and hematopoietic cells in humans, mice and many other vertebrates. Of particular interest to our lab is the role of KITL in the differentiation and development of germ cells in mice.

Germ cell development is initiated when a certain amount of primordial germ cells (PGCs) are specified from somatic cells during gastrulation. PGCs first associate with the gut, then actively migrate toward the genital ridge where they lose their motility. Because of proliferation and suppression of apoptosis, PGC numbers increase rapidly during this time period and both processes are mediated by KITL. Recent studies from our lab have shown that proliferation of PGCs in the gut is partially dependent on KITL but PGC proliferation is completely dependent on KITL once these cells migrate from the gut. Still unknown, though, is whether KITL-mediated control of apoptosis also differs between premigratory and migratory PGCs.

This project will catalog the effects of different Kitl mutations on proliferation and apoptosis of PGCs at several stages of development. Observations that reveal preferential effects of specific Kitl mutations on either process will lead to a better understanding of the function of KITL. Since the KITL network is a prime example of cellular regulation and communication, more detailed understanding of its function has a number of clinical applications in multiple areas including reproductive health and the ability to manipulate and regulate the cellular signaling pathway.

Faculty Research Mentor: Dr. Mary Bedell, Genetics
In the ancient world, the tales of greatest struggle and triumph were captured and immortalized in the lines of epic verse. Distinguished from the rest, this genre of poetry reflects the grand scale of human interaction, stories of those who were greater than the common man and of the events that made them so. While this tradition is widely considered to have been at its peak in the Classical age, those epic works outside of this time period receive far less attention and credit for the stories they tell and the heroes they praise.

In the first work of literature to come from the New World, Don Alonso de Ercilla y Zúñiga captures the story of the battle between the Spanish conquistadors and the Mapuche people in his epic poem, *La Araucana*. Living in what is now Chile, the Mapuche were the only people that denied victory to the expanding Incan empire, and were renowned for their ferocity in war. When the Spanish attempted to take their lands, again the Mapuche showed their strength, and thus began the Arauco War. It should be noted, though, that while this project is designed to investigate the early years of the Arauco War, the Mapuche people never surrendered. To this day, they have still never recognized foreign rule, and while they live on reservations set aside by the Chilean government, they are still at odds with the descendants of the Spanish rulers.

During the mid-1500s, part of the Spanish custom in doing battle with the natives of the New World included the capture of locals, hoping to gain certain insight into either the new terrain or the enemy itself. One of the captured Mapuche was a young boy named Lautaro. He lived for several years with the Spanish and eventually became the servant of the Spanish commander, Pedro de Valdivia. Lautaro learned many things about these strange people, including their tactics, their weapons, and their horses, and after enough time in the presence of the enemy, he returned to his people to share this knowledge. Through his insight, the Mapuche became much more successful in defending against the conquistadors. Lautaro devised a military strategy combining the knowledge of his land and the vulnerabilities of the Spanish, and was able to destroy several cities before his ultimate death in a surprise attack, possibly due to a betrayal by one of his own.

In the midst of the many heavily worked epics of Western history, *La Araucana* is given much less attention, and in the study of the poem itself, the role of Lautaro is studied even less frequently. It is my goal to research and analyze his influences, especially his military tactics and contributions. I plan to accomplish this through a close reading of Lautaro’s appearances in the epic, in English translations and in the original Spanish text, as well as through in-depth reading of historical accounts and studies of the Mapuche people. Any attention given to specific military tactics will be assisted by referencing specific texts in that area of study.

*Faculty Research Mentor: Dr. Ángel Nicolás Lucero, Spanish Literature*
Developing a Biocontrol Agent for Chinese Privet, *Ligustrum sinense*

**CURO Summer Research Fellow: Tulsi Patel**

My research this summer will focus on initiating development of a biological control method for the exotic weed *Ligustrum sinense*. This proposal is based on the hypothesis that a host specific or modified broad host range fungal mutant that overproduces an amino acid that is toxic to *L. sinense* can be used to control the weed. I will be working under the guidance of Dr. Scott Gold in the Department of Plant Pathology at the University of Georgia. Dr. Gold's research focuses on the genetic interactions required for pathogenesis in fungi. In an effort to control Georgia’s #1 invasive plant, Dr. Gold and I started work this fall on this new *Ligustrum sinense* project, which I am pioneering.

*Ligustrum sinense*, commonly known as Chinese Privet is a rapidly growing invasive shrub that was introduced to the United States as an ornamental plant. Privet escaped cultivation in the 1930s and now invades millions of acres of land in the southeastern United States. Privet has the potential to alter ecosystems by forming dense thickets in the undergrowth of natural forests and reducing the amount of light, water, nutrition, and space available to native species. Because birds and small animals easily disperse Privet seeds, it has the potential to convert the diverse forests of the Southeast into a monoculture shrub-land. Moreover, the only effective control measure available is a costly combination of physical removal and herbicide application. The long-term goal of this project is therefore to identify a cost-effective bio-control agent for this exotic weed.

Our approach to develop a cost-effective biological control agent involves various steps. The first of these steps is to identify amino acids that are toxic to Privet. Amino acids regulate specific chemical pathways in living organisms—increasing the concentrations of certain amino acids can create an imbalance in the plant’s metabolic activities, which can eventually kill the plant. During my research last semester, I generated numerous rooted Privet plantlets from geographically diverse cuttings and treated them individually with 8 amino acids. After performing the preliminary experiment, I have concluded that lysine, methionine, and valine are three amino acids that appear most toxic to Privet. To verify the results from this initial experiment, I will run three identical trials during the summer so that the data can be statistically analyzed. I am currently working on determining the minimal effective concentration for each inhibitory amino acid. This experiment will also be repeated during the summer. The next step in the project will be to obtain a pathogenic fungus that could be mutated to secrete large amounts of toxic amino acid. Finding a potential host-specific pathogen involves literature surveys and personal communications. The University of Georgia has an international collaboration with Shanghai Academy of Agricultural Sciences and I will communicate with scientists there about possible control agents. Additional wild *Ligustrum* species are native to the western United States (*Ligustrum ovalifolium*); I will explore the possibility of identifying effective host specific pathogens through contacts with researchers there. This summer I will also contact a government regulatory agency, USDA-APHIS, to learn the restrictions placed on the importation and usage of pathogens either domestic or foreign.

However, before importing a host-specific pathogen, I will first test the experimental principle on *S. rolfsii*, a broad host range fungus. I will create a mutant of this fungus by exposing the fungus to ultraviolet rays or mutagenic chemicals. After identification of a high level secretor, I will inoculate Privet with this mutant to test its pathogenicity and verify the potential of the experimental procedure. If the experiment is successful for *S. rolfsii*, I will repeat it to create a host-specific mutant and test its pathogenicity and host specificity.

Additionally, during the course of the summer, I will use Chinese Privet to explore the current thinking of the ornamental industry with regards to the control of invasive species. I will conduct a survey to learn more about the Green industry’s attitudes and control mechanisms toward invasive plant release.

The success of this project will provide us with a fungal mutant that will secrete excess amounts of an amino acid that is detrimental to Chinese Privet but does not affect native species. The principle used in this project could then be used as a model to create efficient biocontrol agents for other exotic weeds like Kudzu.

Faculty Research Mentor: Dr. Scott Gold, Plant Pathology
Manner of Hammer Stone Use in Wild Capuchin Monkeys

CURO-OVPR Summer Research Fellow: Tomas Pickering

Background: Recently, in Piauí, Brazil, wild bearded capuchin monkeys (Cebus libidinosus) have been documented using stone tools to crack open palm nuts. The stone hammers that the monkeys use typically weigh one kilogram, which is equivalent to 25-40% of an adult monkey’s body weight. Manipulation of these relatively heavy stones, that must be transported at least short distances to anvil sites and must be lifted in order to strike at the desired palm nut, has led to innovations in behavior made by the monkeys such as bipedalism during transportation.

Objectives: Under the guidance and direction of Dr. Dorothy Fragaszy, I will assist in a seven-week trip (June 25th to August 11th) to Brazil in order to study the kinematics of tool use by the capuchin monkeys. This will include an analysis of primate locomotion and positional behavior, for example, quadrupedalism versus bipedalism, forelimb mechanics, and posturing. An analysis of the movement through space and time (acceleration) of the hammer stone during use will also be of primary importance. The goal will be to collect the kinematic data in order to aid in the overall understanding of the importance of the nut cracking behavior and how it relates to the monkey’s natural history.

Methods: Preceding travels it will be necessary to learn and practice with technologies that will be used during field research and also acquire some basic knowledge of Portuguese. The collection of data on the kinematics of tool use will be done using cameras. At least two cameras will be established to record side and frontal views of the monkeys carrying hammer stones and striking palm nuts with the stones. Following, a frame by frame analysis of multiple joint movements will be done. Acceleration of the hammer stone will be determined by imbedding a wireless accelerometer into the stones that are placed into the field site where a group of habituated capuchins (N=15) frequent almost daily; data will be streamed into nearby laptops and stored. Analysis of accelerometer data will be done using the “LabView” computer software program. Any additional time will be used to help document other available food resources to the monkeys for purposes of aiding to the greater ecological significance of this behavior.

Significance: This project will improve understanding of the overall function of this unusual nut cracking behavior in wild capuchin monkeys. The reference point we are creating on hard-fruit feeding via tool use of a New World monkey is important to our understanding of tool use development in the phylogenetically distant hominid line.

Faculty Research Mentor: Dr. Dorothy M. Fragaszy, Biology
Hirano bodies are intracellular, paracrystalline, actin-rich structures that are most commonly found in the brains of humans suffering from neurodegenerative diseases. Their purpose and structure are not well understood, but their possible link to the prevention, cure, and further understanding of neurodegenerative diseases has made their study worthwhile. Previously, Dicytostelium (slime mold) was used to test if myosin II was essential for the formation of Hirano bodies in cells. Temperature-sensitive myosin II and mutated 34 kD protein were expressed constitutively in Dicytostelium cells. Hirano bodies formed in the cells at permissive temperatures while the cells at non-permissive temperatures died. Hirano bodies were counted and electron microscopy was performed. Myosin II was required for the formation of Hirano bodies, but the characterization was incomplete. Since expression was constitutive, it was impossible to determine how Hirano bodies contributed to cell death.

In order to complete the characterization of the molecular mechanism of Hirano body formation, I have been working with Drs. Marcus Fechheimer and Ruth Furukawa in creating an improved plasmid. Over the course of the year, I have worked on constructing a plasmid with an inducible promoter for the expression of the mutated 34 kD protein fused to red fluorescent protein. The inducible promoter will allow the expression of the 34 kD protein to be turned on and off so I may observe how the Dicytostelium cells operate with the functional and nonfunctional myosin II. The vector I am creating will contain a blasticidin resistant cassette so that only the cells resistant to the blasticidin and expressing the red fluorescent protein will be studied.

By the end of this semester, the vector process should be completed or in its final stages. I will use this summer to perform experiments using the vector so that I may study Hirano bodies. My experiments will focus on how Hirano bodies form and observe how they contribute to cell death. Hirano bodies will be counted, and I will perform fluorescence and electron microscopy and western blotting on the Dicytostelium cells. Over the summer, I will further my understanding of cellular biology, improve my technique and efficiency in the lab, and learn several new techniques. These techniques include transforming Dictyostelium, manipulating protein expression in a cell, performing microscopy and western blots. Ultimately, this will lead me to better understand the research process and how Hirano bodies form.

Faculty Research Mentor: Dr. Marcus Fechheimer, Cellular Biology
Mycobacterium shottsii is an acid-fast bacterium that was discovered in the spleens of several striped bass exhibiting ulcerative lesions in the Chesapeake Bay. This bacterium is of interest to investigators seeking to determine whether it causes the fish lesions. Vaccinologists are also interested in this bacterium. Its inability to grow above 30°C and relatedness to Mycobacterium tuberculosis suggests that it might be suitable for development as an intra-nasal tuberculosis vaccine. An initial characterization of M. shottsii was published by Rhodes and colleagues in 2003. The goal of the CURO summer research project will be to continue the characterization of this bacterium.

One emphasis of the project will be to investigate whether nutritional supplementation can enhance the growth rate of M. shottsii. This bacterium has a very slow doubling time in broth or on agar plates. Because growth on plates can take several weeks for colonies to be visible without a magnifying glass, the focus of this project will be growth in broth cultures. The bacterium grows in Middlebrook 7H9 broth supplemented with OADC (oleic acid, albumin, dextrose, and catalase) and Tween-80. Various nutritional supplements will be examined to determine if they allow M. shottsii to grow faster. A literature review of the growth requirements of other Mycobacterium species will be undertaken to help select candidate supplements to be tested. To be tested first will be ferric pyrophosphate, chicken egg, and pyruvate, as they have benefited the growth of other mycobacteria. Growth will be monitored in parallel supplemented and nonsupplemented cultures by measuring the optical densities at 600 nm.

This project will also examine antibiotic resistance in M. shottsii. This project will examine antibiotics that have been used for molecular cloning in other Mycobacterium species. In particular, the antibiotics kanamycin and hygromycin will be studied. A colorimetric assay using Alamar blue is used to determine the minimum inhibitory concentration (MIC) of drugs against M. tuberculosis. We will modify this assay for MIC determinations by M. shottsii. The assay will be performed in sterile 96-well dishes. Bacterial culture will be added to wells containing increasing amounts of each antibiotic. Sterile Alamar blue solution will be added to each well. Triplicate samples for each antibiotic concentration will be prepared. Cultures will be incubated at room temperature over several weeks and monitored for color change (from blue to pink). The drug concentration at which the color change is observed will indicate the MIC.

The final goal of this project will be to determine whether M. shottsii has a mycobacteriophage L5 attachment site on its chromosome. This site is used in other mycobacteria to integrate DNA into the chromosome, thereby allowing a gene to be present in single copy. Other researchers in the laboratory have successfully transformed M. shottsii with a multi-copy plasmid encoding a mycobacterial plasmid origin of replication, green fluorescent protein, and resistance to kanamycin. Therefore, a suicide plasmid encoding the mycobacteriophage L5 attachment site and integrase, and resistance to kanamycin will be electroporated into M. shottsii and plated onto 7H11 agar supplemented with OADC Tween-80 and 25 µg/ml kanamycin. If colonies appear, they will be screened by PCR for DNA specific to the suicide plasmid. If the DNA is present, then it will support the hypothesis that M. shottsii has an L5 attachment site.

Faculty Research Mentor: Dr. Russell Karls, Microbiology
I will use my CURO Summer Research Fellowship to fund research of Chinese-American relations under the guidance of Dr. Dawn Robinson. As globalization becomes an increasing force in contemporary society, progressively more Chinese businessmen are placed in business-oriented interactions with American businesswomen and vice versa. I wish to examine how differing cultural sentiments and expectations of gender roles between these two cultures affect workplace interactions.

Affect Control Theory provides a means of investigating these consequences as well as how such interactions are transforming cultural expectations. The cultural basis of the theory provides an opportunity to investigate cross-cultural interactions in a variety of contexts. However, few researchers have taken advantage of the opportunity to expand Affect Control Theory to this type of application, and these potentially far-reaching and significant implications have gone unexplored. Furthermore, as one of the few formalized, mathematical theories in Social Psychology, Affect Control Theory provides a precision and a depth that is rare in the contemporary study of social interaction.

A Clarke International Scholarship will be funding a two-week journey to Guangzhou, China to collect a Chinese dataset under the supervision of a renowned Affect Control Theorist at Sun Yat-sen University. I will combine this scholarship with a CURO Summer Research Fellowship. This research fellowship will provide the funding necessary for me to collect a corresponding American dataset, perform an in-depth analysis, and begin the working foundations of a thesis upon returning to the University of Georgia.

Faculty Research Mentor: Dr. Dawn T. Robinson, Sociology
Does Writing Ability Signal Academic Excellence?  
Evidence from the New Scholastic Aptitude Writing Section (SATW)  
CURO-UGA Alumni Association Summer Research Fellow: Jessica Van Parys

What Am I Studying? My research intends to determine if scores on the new writing section of the Scholastic Aptitude Test (SATW) are better able to predict collegiate academic success for incoming first-year students. I hope to answer several questions on this topic. First, does the SATW help predict student success in college more accurately than the old version of the SAT? Second, do scores on the new SAT disproportionately predict success for certain types of students (e.g. English majors versus Chemistry majors)? Finally, based on the research findings, what are the implications for students, admissions offices, and education policymakers?

Why Is This Study Important? Presumably, policymakers altered the SAT format to provide a test that better reflects important skills. It could also help admissions offices at colleges and universities better differentiate among candidates for admission. Universities admit students for a variety of reasons, but most commonly, they choose students who are most likely to succeed academically. Both students and the university suffer when dropout rates and academic probation rates are high. If a university can predict a student’s capacity for collegiate success, the student and the university are matched appropriately, and both parties benefit. Thus, it is important to evaluate how much predictive power measurement tools (e.g. the SATW) have in determining such success. Ceteris paribus, if the SATW does not better predict levels of student achievement, then the policy change was unproductive. In that case, high school students should spend less time on, and contribute fewer resources toward, preparing for the writing section. Similarly, universities should not use the SATW in their admissions decisions. Moreover, students, school districts, and universities may choose to emphasize alternative mechanisms to predict student achievement (e.g. high school end-of-course tests). Overall, it is important to understand the implications of new policies, as it is inefficient to promote policies that fail to provide helpful results.

Which Methods Will I Use? I will employ multi-variable regression analyses on student-level data from the University of Georgia Admissions, Financial Aid, and Registrar’s offices. I will limit my attention to the current first-year students because this is the first cohort of students who took the SATW. Professors Christopher Cornwell and David Mustard have permission to obtain and use these data to examine questions pertaining to student behavior and achievement in college. They will, however, need to update this data set at the end of this academic year.

My research will examine the determinants of a number of outcome variables, such as GPA, GPA in one’s intended major, the number of credit hours students complete, and the number of classes from which they withdraw. I will determine whether the new SATW exam helps explain these outcome variables while controlling for factors such as high school grade-point average (GPA), math and verbal SAT scores, gender, race, financial aid package offered (e.g. HOPE), and geographic region or school district.

Faculty Research Mentor: Dr. David B. Mustard, Economics
Through the summer research fellowship and in collaboration with the administrators of the Multicultural Archive of Georgia, I will conduct rigorous research, primarily through interviews, on the Civil Rights Movement in Georgia. The research will be based on the actions of the citizens from Atlanta, Athens, Albany, Savannah, Camilla, Americus, and other places in Georgia during the movement and will examine how the citizens were catalysts in desegregation and equal rights. The information compiled will be added to the online archive that the administrators have created specifically to aid teachers and students in their research of information on the Civil Rights Movement in Georgia. I also intend to personalize the process to include some research of my own.

A concept that I colorfully coin as “Beauty Imposed” is a controversial issue highly debated in the African American culture. This idea, in basic terms, explores the images of beauty held by members of the African American community and how much these images are influenced by the media, generations of cultural conditioning, and popular culture. Recent research has revealed that “color schemes,” or the different shades of skin, affect ideas of beauty for African Americans, especially in their consideration of the opposite sex within the culture. In addition, certain physical features are preferred over others, and varying stigmas, mostly negative, are attached to members of the culture based on the lack of particular physical features.

I will condense and reveal the results of recent research on these contemporary aesthetics in African American culture. In addition, I intend to compare the results with findings of my own. I want to uncover the images of beauty imposed on African Americans, particularly women, during the Civil Rights Movement. I will focus primarily on the concepts exposed in the arts and literature of the Black Aesthetic during the Black Arts Movement, which existed almost concurrently with the Civil Rights Movement. I will compare the concepts illustrated in the literature and arts from the movements with information given from the primary sources by incorporating questions from my personal research into the interviews. My findings will hopefully reveal the ideas of beauty in the African American culture prior and up to the Civil Rights Movement and the similarities the notions of beauty have to contemporary aesthetics.

The results of my research will provide a better understanding of the unique styles and different concepts of beauty within the African American culture and show how the different styles conform to or reject the standardized notion of beauty within the culture. In addition, I intend to simultaneously alleviate the negative perspectives that African American women may have of themselves when they do not conform to the standardized notions of beauty prevalent to the culture, by disrupting the imposed negativity of any conditioned thoughts and images of beauty.

Faculty Research Mentor: Dr. Barbara McCaskill, African American Studies and English
Since I currently do research under Dr. Whitford, we will utilize the summer as an in-depth extension of our current research. The three main goals for the summer are to complete the final revisions on our “Political and Social Foundations for Environmental Sustainability” paper, to finish our transfer pricing research, and to start a new project on social entrepreneurship.

Environmental sustainability is the long-term preservation of our environment for the future. The purpose of our essay is to quantitatively investigate several possible foundations for environmental sustainability, as measured across countries with varying geography, development patterns, social customs, and political arrangements. We first test two central hypotheses about the roles of democracy and federalism. Our study asks if democracy increases environmental sustainability and if federalism reduces sustainability. We also assess the roles of organized groups representing different kinds of environmental interests, development paths, and religious orientations. We find little evidence for variation in sustainability levels given variation in either democracy or federalism. However, we find that the effect of economic development (both current and historical) depends on the measurement of sustainability. Stress and vulnerability are affected by business practices and international environmental organizations (but environmental systems are not), and the effect of Protestant religious affiliations depends on our measurement of sustainability. Although these findings show no clear political foundation, they portray a complex and varied set of foundations for environmental sustainability.

Since we only have revisions left on the sustainability paper, the second thrust of our research will focus on the transfer pricing paper. The purposes of the transfer pricing project are to provide a broad overview of regulatory compliance in the international political economy, to consider the role and reasons for different regulatory policies, to see how these policies influence investment and productivity, and to model transfer pricing regimes (rules) across OECD countries, to consider evidence for how some countries depart from the norm, and to provide explanations for why those departures exist. Our main conceptual argument in this paper is that firms don’t like uncertainty and regulatory decisions can reduce this uncertainty. Since transfer pricing is very important to large firms crossing jurisdictions, we will narrow the scope of our research by focusing on regulatory decisions in the context of transfer pricing. To reduce the uncertainty inherent in transfer pricing, APAs (Advanced Pricing Agreements) help reduce uncertainty. In our paper, we ask why some nations allow APAs, while others do not. We assess the roles of broad regulatory regime quality, legal origins, political systems, corporate tax rates, and tax dependence of countries in their likelihood of adopting APAs. We will then formulate a model and explain deviations away from the norm such as Italy and Japan.

Lastly, we will start research on social entrepreneurship. Social entrepreneurship is business organizations or ventures that advance a social, philanthropic mission through business methods. We will study international social entrepreneurship in a comparative context.

Faculty Research Mentor: Dr. Andrew Whitford, Political Science
Appendix A

CURO 2006 Summer Research Fellows

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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 Covene, 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
  Rac1 and Ste24 Inhibition by Dipeptidyl Acyloxymethyl Ketones: A Potential Target for Cancer Therapeutics

Alicia Higginbotham, CURO Summer Research Fellow
  Dr. Thomas Cerbu, Department of Comparative Literature
  Christopher Logue’s Iliad: A Work in Translation
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 C

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 Agglutinin 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 Lymphocytes  
During Early Experimental Schistosomiasis Mansoni

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

Gehres Paschal, CURO-OVPR Summer Research Fellow  
Dr. J. David Puett, Department of Biochemistry and Molecular Biology  
Activating Mutations of the Lutropin/Choriongonadotropin 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 D

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

Creating a Culture of Undergraduate Inquiry
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 E

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 Pandiyen  
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 F

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...*
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*
2007 Summer Research Fellowships

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