The Center for Inclusive Education is proud to host Stony Brook University’s first campus wide event to highlight the scholarly and scientific research activities of our diverse graduate students and alumni across all disciplines.
May 2, 2011

Dear Friends and Colleagues,

I believe that encouraging diversity in the learning experience is a key component that contributes significantly to the quality of life on campus and inspires us to even greater accomplishments. The Presidential Mini-Grants for Departmental Diversity Initiatives help bring to fruition the ideas that enable the University to adapt to the changing needs of our community. They are designed to foster the projects that are the seeds of growth for the University, and that will help us improve our research and work together with greater understanding.

I am delighted to see that the Center for Inclusive Education put forth an idea to host the first campus wide event to celebrate the research activities of underrepresented graduate students and that it is being realized through the Celebrating Diversity and Academic Excellence Conference. This one day conference has been designed to include all of the key elements: a research talk and workshop by renowned scientists and scholars; a Research Symposium with oral presentations in the Humanities and Social Sciences disciplines as well as a Poster Session for the Science and Engineering disciplines; and an Awards Ceremony to recognize outstanding contributions and achievements by students, faculty and staff of the Stony Brook University community.

Special thanks to the other departments on campus that have co-sponsored this event in making it a true campus wide initiative. I look forward to awarding certificates to the recipients of the various awards. I would like to offer my sincere congratulations to Professor David Ferguson and his CIE Staff for winning this Presidential Mini Grant and accomplishing something truly meaningful and important to the Stony Brook community. Finally, I thank all of the CDAE participants for making this important event a success.

Wishing you all continued academic and professional growth.

Samuel L. Stanley Jr., M.D.
President
In the United States, there is a growing awareness of the critical importance of broadening the participation of historically underrepresented (UREP) minority groups (African American, Hispanic/Latino, and Native American) in the Academy and specifically in the science, technology, engineering and mathematics (STEM) workforce. Many universities have been developing and implementing aggressive strategies to recruit talented UREP students into their academic programs and transition them into exciting and promising careers upon successful graduation. Top research one institutions like Stony Brook University are at the forefront of this complex challenge.

The Center for Inclusive Education (CIE) at Stony Brook University was established in 2002 to promote intra and inter university in creating pathways for UREP students to successfully complete doctoral degrees. The CIE ensures that UREP graduate students are connected to a network of faculty, staff and peer students beyond their own department and provides access to a range of support services strategically designed to enhance their graduate school experience. The existence of the CIE enables the University to capture, synthesize, record and convey the tremendous strides both the campus and the country are making towards true access and inclusion in higher education. In large part due to the impact of the W. Burghardt Turner Fellowship funded by New York State and the Alliance for Graduate Education and the Professoriate (AGEP) Program funded by the National Science Foundation, there have been significant changes in the culture of graduate school life for UREP students at Stony Brook. These changes have raised awareness about the importance of our mission as well as celebrate the achievements of our students and the contributions of the faculty and staff that have made our programs a success.

At no time in our history has it become more important to grow and nurture the talent among us and generate greater support and understanding for the CIE mission. This is the inspiration for the Celebrating Diversity and Academic Excellence (CDAE) event funded by a Presidential mini grant and co-sponsored by numerous departments on campus. CDAE features a Research Symposium to recognize the scholarship of CIE students and the broader graduate student community, two Professional Development Workshops led by renowned guest speakers, and an Awards Ceremony to salute the student leaders, faculty mentors and staff that contribute to our collective success. Most importantly, CDAE provides powerful evidence that each individual CIE student represents progress towards a more broadly based scholarship, greater probability for more representation in leadership positions and a chance to dramatically improve our country’s overall quality of life in all aspects of health, education, technology and social justice.
Dear CDAE Participants:

Locally, nationally, and globally, there is growing appreciation for the importance of diversity in enhancing education, the workforce, discovery, and innovation. An important dimension of this work is expanding opportunities for underrepresented groups in higher education. Stony Brook University, with its many partners in academia, business/industry and government is helping to lead the way—especially as it relates to creating and implementing model programs, developing communities of scholars, and raising the level of discourse on diversity issues. It is in this rich context, that I welcome you to our Celebration of Diversity and Academic Excellence (CDAE). CDAE, a program of the Center for Inclusive Education (CIE) at Stony Brook and funded by a Stony Brook University Presidential mini grant and several departments on campus, features a Research Symposium and recognizes the scholarship of CIE students and the broader graduate student community. We are honored that two renowned scholars have joined us as guest speakers to support our efforts today.

CDAE builds on the work of the CIE. The CIE, founded at Stony Brook University in 2002, was a major step towards institutionalizing the goals and accomplishments of programs like NSF AGEP, the W. Burghardt Turner Fellowship Program, LSAMP and CSTEP. Over 25 years of experience in diversity initiatives has resulted in a comprehensive understanding of the many critical issues pertaining to access, mentoring, the K-12 experience, research experience for undergraduates, bridge programs and so forth. Currently the CIE has an annual portfolio of more than 50 activities and services for students, faculty, departments and alumni in the areas of strategic outreach, advisement, financial support and advocacy. In a relatively short period of time, the CIE has proven its value and demonstrated its ability to take the leadership role in empowering the campus community to promote access and success for underrepresented minority students in graduate education.

I am joined by Nina Maung, Kathryn Piazzola, Toni Sperzel, and Alexandra Corrales in both welcoming you to CDAE and thanking you for being an important part of our efforts to enhance diversity and academic excellence.

David L. Ferguson, Ph.D.
Director, Center for Inclusive Education, STEM SMART & AGEP
Distinguished Service Professor and Chair, Department of Technology & Society
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## AGENDA

**May 2, 2011**

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<tr>
<td>9:00 am</td>
<td><strong>Registration</strong></td>
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<td>Morning Refreshments</td>
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<td><strong>Welcome &amp; Opening Remarks</strong></td>
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<td>Dr. Lawrence B. Martin, Dean, The Graduate School</td>
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<td>10:00 am</td>
<td><strong>Workshop</strong></td>
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<td>Dr. Kerry Ann Rockquemore</td>
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<td>“How to Win Tenure Without Losing Your Soul!”</td>
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<td><strong>Research Seminar</strong></td>
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<td>Dr. Tyrone Hayes</td>
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<td>“From Silent Spring to Silent Night: A Tale of Toads and Men”</td>
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<td>Introduced by Dr. Peter Gergen, Professor and Director</td>
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<td><strong>Lunch &amp; Networking</strong></td>
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<td>Dr. David L. Ferguson, Chair &amp; Director</td>
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<td>Nina Maung-Gaona, Assistant Dean for Diversity</td>
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Congratulations to our award winners!

**Faculty Award for Outstanding Dissertation Mentoring**

Distinguished Professor Dan Dykhuizen, Department of Ecology and Evolution

Nominated by his Ph.D. student, Javier Monzón who says: "...asking Dan to be my advisor was the best decision I ever made as a Ph.D. student because he is not just an academic advisor, he is a mentor and a support for his graduate students. Dan’s effective mentoring style fosters my academic independence and also motivates me toward the completion of the Ph.D. His thoughtful suggestions help me improve the quality of my scholarly output and his career advice is guided by the desire to see his students in emotionally fulfilling and satisfying positions. Dan Dykhuizen has clearly demonstrated outstanding academic mentorship and is highly deserving of this faculty award for mentoring excellence."

**Faculty Award for Outstanding Service**

Professor Carol Carter, Department of Molecular Genetics and Microbiology

Nominated by Department Chairman Dr. Jorge Benach in collaboration with numerous faculty and students who all say: "Carol possesses the keen ability to recognize seeds of success among students and is highly committed to mentoring underrepresented minority students in particular. Her mentoring style is to improve the students’ experiences in learning and research and contribute positively to their professional growth. She has worked with numerous programs on campus such as NIH MARC, Minorities in Medicine, NSF AGEP and Turner to name a few. She has advised the dissertation projects of two CIE alumni, both of whom are pursuing competitive research careers and she even counsels students that were not offered admissions to increase their chances of admission elsewhere."

**Graduate Student Award for Academic Excellence and Commitment to Diversity**

AnnMarie Torres, Ph.D. Candidate in Genetics

Nominated by the Graduate Program in Genetics (Drs. Turhan Canli, Gerald Thomsen, Ando VanDerVelden and Ms. Kate Bell) who describe AnnMarie as “Cheerful, idealistic, energetic, enthusiastic, and irresistibly likeable – AnnMarie Torres is a born leader. She is inevitably the first to volunteer whenever assistance is requested. She has a strong academic background and is highly motivated, responsible, organized and independent. In January 2010, Annie’s work was selected for presentation at a Keystone on Lymphocyte Activation and Gene Expression in Breckenridge, Colorado. In 2011, she will be present a poster at the American Association of Immunologists General Meeting in San Francisco, California. She has been an outstanding recruiter for the Genetics program and the CIE and has hosted candidates for admission every year.”

**Outstanding Graduate Student Leadership Award**

Alexandra Valdés Wochinger, Ph.D. Candidate in Marine and Atmospheric Sciences

Nominated by the CIE Staff who unanimously felt "Alexandra personifies leadership and service throughout her time at Stony Brook University. She is both intelligent and charismatic with a gift for inspiring enthusiasm and action among the people around her. Alexandra discovered she loved marine ecology while snorkeling in her native Puerto Rico. While at Stony Brook, she has participated in every relevant mentoring, recruitment, professional development, teaching and research activity offered on campus and volunteered for some of the most challenging service activities. Alexandra has embodied what it means to be a CIE student and has enriched the Stony Brook campus in valuable ways. Upon graduation, she plans to pursue a faculty career because it combines all the things she loves: research, teaching and service!"
KEYNOTE SPEAKERS

How to Win Tenure Without Losing Your Soul

Workshop by Dr. Kerry Ann Rockquemore, Director of the National Center for Faculty Diversity

Kerry Ann Rockquemore, Ph.D. is Executive Director of the National Center for Faculty Development & Diversity. Her scholarship has focused on interracial families, biracial identity, and the politics of racial categorization. She is author of two books: Beyond Black and Raising Biracial Children, as well as over two dozen articles and book chapters on multiracial youth. After Dr. Rockquemore became a tenured professor (at the University of Illinois at Chicago), her focus shifted to improving conditions for pre-tenure faculty by creating supportive communities for professional development, writing productivity, and work/life balance. Her award-winning work with under-represented faculty led to the publication of her most recent book: The Black Academic's Guide to Winning Tenure Without Losing Your Soul. Through the NCFDD, Dr. Rockquemore provides workshops for new faculty at colleges across the United States, writes a weekly advice column for Inside Higher Education, and works with a select group of new faculty each semester in the NCFDD’s Faculty Success Program.

About the Workshop:

This motivational presentation will teach you how to create a strategic plan incorporating networks of support to execute your plan. For graduate students writing dissertations and faculty seeking tenure, this talk will help you develop concrete strategies to create time for academic writing and research and will teach you how to align work time with institutional and personal priorities. This session also identifies the most common challenges and the biggest mistakes new faculty make when transitioning from graduate student to professor.

From Silent Spring to Silent Night: A Tale of Toads and Men

Research Talk by Dr. Tyrone Hayes, Professor of Integrative Biology at the University of California, Berkeley

Through their extensive research, Dr. Hayes’ lab at Berkeley discovered that Atrazine, the world’s number one selling herbicide, is an endocrine disruptor that has ruinous effects on amphibians, and that the underlying mechanism of Atrazine’s effects has been identified in all vertebrate classes, suggesting a likely connection between the pesticide and increased risks of reproductive hormone dependent cancers, as well as declining fertility rates, in both rodent models and humans. Dr. Hayes’s interest stretches far beyond the bench science that lead to his lab’s discovery. He looks to connect health risk emerging from scientific discoveries with economics, political change, and social justice to encourage the development of policies that protect both endangered species and the racial and ethnic minority populations most likely to suffer from dangerous exposure to this and other pesticides.

About Dr. Hayes:

Dr. Hayes was born in Columbia South Carolina and discovered in childhood his interest in amphibian development and environmental change. After attending Harvard University where he received his B.A. in Organismic and Evolutionary Biology, he joined the Graduate Program in Integrative Biology at UC Berkeley where he received his Ph.D. In 1995, he accepted a professorship at the University of California where he is now a full professor since 2002.
Abstracts featured in this conference program book are in alphabetical order. The order of oral presentations as well as assigned poster number is as follows:

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Comparing Mayan and Andean Manuscripts: A Common Philosophy of Rebellion

The 18th century manuscript of the Popul Vuh, creation of the Quiche Maya culture of the Guatemalan highlands; and the manuscript of the Gods and Men of Huarochiri, writings of the Yunca and Yauyo peoples colonized by the Incas, present us with a fascinating panorama of non-dominant Amerindian cultures and their responses to both internal and external conquest, whether that Conquest was Aztec, Inca, or European. These works of indigenous literature, which demonstrate as well an emerging mestizo culture in Latin America in which Spain was not always the dominant force, provide a key to unlocking both mentalities and mythologies.

Brief Bio: Prior to joining the Ph.D. program in Hispanic Languages and Literature Sharonah spent time across the globe, living and teaching in such places as Mexico, Honduras, Spain, Angola, and Israel. In Summer 2009 Sharonah was awarded the prestigious Tinker Field Research Grant which, in conjunction with Turner Summer Research Grant Funding through Turner, enabled her to research Mestizo colonial Culture in Peru.
Illegal Immigration in the United States: Defending the Human Rights Approach

Many undocumented immigrants in the United States are present because they are unable to meet their basic needs in their country of origin. While a liberal democracy like the United States can consent to the view that all persons ought to have their basic needs met and basic freedoms guaranteed, citizens may be resistant to the idea that their government has an obligation to meet the needs of undocumented immigrants. This problem expresses the tension between human rights, on the one hand, and conceptions of state sovereignty and obligation to outsiders, on the other.

In the larger work from which this presentation is drawn, I explore the theoretical and practical challenges surrounding this tension. In this presentation, I focus specifically on the argument that illegal immigration should be thought of as a human rights issue in the U.S., where the idea of human rights is an important resource in guiding ethical political practice. I defend my use of the human rights approach to the issue of immigration by demonstrating that it meets Onora O’Neill’s requirements of “intuitive understanding” of moral reasoning, which are necessary if our moral conclusions are to guide political practice. I critique traditional views about the concept of universality in human rights and about the claim-obligation relation as represented in the work of Joel Feinberg, in order to develop a more useful way to think about the sources of our obligations to migrants.
Towards an Ethics of Reading: Specters of Testimonial and PTWD (PostTraumatic Writing Disorder) in contemporary Guatemalan Literature

In this essay I offer an alternative to the “post humanist agnostism about literature” inaugurated by Latin American literary critic John Beverly, in his demarcations of the testimonial from literature as such, as well as his disavowal of and revulsion for literary fiction. I move the discussion rather, to consider the phenomenology of witnessing and its relation to writing along with what Shoshana Felman refers to as “performative engagement” of writing in an Age of Testimony. As well as Jacques Derrida’s thinking of the aporaic relationship between fiction and testimony. I offer a close reading of Victor Montejo’s and Q’anil Akab’s, Brevisima Relacion Testimonial de La Continua Destruccion de Mayab (Guatemala), Castellanos Moya’s Insensatez, and the mediatic simulacrum of Rodrigo Rosenberg’s testimony from the grave, along the veins of Emmanuel Levinas conception of a subjectivity turned inside out to the traumatic, painful and obsessive subjection dedicated to the other, to think how writing opens itself to community, sociality, and political action.

Ana Mirón
Advisor: Dr. Kathleen Vernon
Hispanic Language and Literature
Ph.D. Student
Turner Fellow

Brief Bio: Ana joined Stony Brook as a Turner fellow in the fall of 2007 after completing her bachelors degree in Comparative Literature at New York University. A migrant from South Florida/Central America, nesting in New York City. Her current research extends to focus on historical trauma in Latin America, the logic of colonization, the notion of escape in being, with a current project of tracing ecological imaginations in modern Latin American literatures. She presented her work at the ACLA conference in Vancouver last month. In South Florida, she plants tropical fruit trees, restores native plant/fauna habitats and offer a refuge/stopping/resting/information post to incoming migrants to the Homestead area. In between she is a maker of talismans and photographic images.
Sharing Strategies for Racial Uplift: The Collaboration Between Afro-Cubans and African Americans

In 1899, the first of dozens of Cuban and Puerto Rican students who attended Booker T. Washington’s Tuskegee Institute during the first quarter of the 20th century arrived in Alabama.

This connection between Afro-Caribbeans and African Americans reveals an important exchange of strategies for racial uplift among members of both of these post-emancipation societies—an exchange that crossed an imperial rift and transcended deep national loyalties. Examining this exchange will further our understanding of how black leaders in these societies attempted to improve the socioeconomic position of their people in the face of racism, nationalist goals and imperialist aspirations.

Brief Bio: Raquel completed her Bachelor's degree in History at Columbia University in 2006 where she founded the Cuban American Students Association and worked as an Oral History Assistant transcribing the oral history of New York Puerto Rican Activist Manuel Dias. In 2009 Raquel traveled to Cuba after receiving a Tinker Field Research Grant from the Latin American and Caribbean Studies Center to research the role of race in the experiences of Puerto Rican laborers in nineteenth century Cuba.
Alvaro Segovia-Heredia

Advisor: Dr. Brooke Larson

History Ph.D. Student
Turner Fellow

The Search for Autonomy:
The Huánuco Rebellion of 1812

This is a case-study of the Huánuco Rebellion of 1812, one of the early separatist movements at the end of the colonial period, which shows us how ambitious creoles helped direct the Indigenous peoples of the Huánuco province against local peninsulares. On February 22, 1812, the indigenous peoples of three districts from the Huánuco province—Huánuco, Panatahuas and Huamalíes—invaded and took over the city of Huánuco. Previously, historians have concluded that the Huánuco Rebellion was the violent reaction of Indians and lower castes to the abuses of Spanish authorities in the region. However, a thorough analysis of primary source material related to the rebellion has led me to hypothesize that the rebellion was not simply a reaction against abusive colonial leadership, but stemmed from larger social demands and political projects that included the region’s creole subjects as well as Indian and mestizo actors. Consequently, this work examines the Huánuco Rebellion of 1812 as a separatist movement that is linked to the larger 'Atlantic World' during the revolutionary era. Ideas of autonomy and independence brought together the castes of the province under the command of the local creoles, who masterminded the rebellion and planned to remove all European authorities from the province by using the indigenous peoples of Huánuco as a political tool, hoping to emulate the success the revolutionaries from Buenos Aires had attained during their push for autonomy in May, 1810. By revisiting the Huánuco rebellion, we can gain a new perspective on studies of anti-colonial resistance and independence movements in Latin America. Additionally, studying the political and economic links between Huánuco and Buenos Aires and their effects on the rebellion promises to insert the Andean region in the history of the Atlantic World during the revolutionary era—something Peruvian historiography has yet to examine.

Brief Bio: Alvaro is a first year Turner fellow in the history department. Born in Ecuador, Alvaro and his family came to the United states during his childhood years and made their home in North Carolina. He completed his Bachelors degree in Latina American Studies and history, Magna Cum Lade from UNC Charlotte in 2007 and his Masters, also at UNC Charlotte in Latin American studies in 2010. In his year at Stony Brook Alvaro has been an active member of the CIE, regularly attending our research cafes, topic based lunches, professional development workshops and special events.
Emmanuel Asare  
Advisor: Dr. Eckard Wimmer  
Genetics Ph.D. Student  
NSF AGEP Student, Bridge to Doctorate Fellow

Brief Bio: Born in Ghana and raised in Bronx, New York Emmanuel joined us at Stony Brook in 2009 as an NSF Bridge to the Doctorate, Ph.D seeking student in the department of Genetics. Emmanuel attended Clarkson University for his Bachelors degree where he participated in the CSTEP and NSF-LSAMP programs.

Alanine scanning mutagenesis of poliovirus protein 2C

Poliovirus (PV), a plus strand RNA member of the genus Enterovirus of the Picornaviridae family, is the pathogen that causes a neurological disease called poliomyelitis. Poliomyelitis causes irreversible paralysis and even death. PV genome encodes a single polyprotein that is cleaved into polypeptides forming structural and non-structural regions, which are additionally cleaved into additional mature proteins. Recent genotyping study shows that PV and coxsackie 20 chimera virus (PV-CAV20) studies revealed that PV mature protein 2C is involved in viral encapsidation. PV 2C protein amino acid at position 252 (aa252) plays a crucial role in the encapsidation process. In this study, we performed alanine mutagenesis scanning around position aa252 to observe their biological impact on PV viral replication and encapsidation. Mutagenesis experiment resulted temperature sensitive viruses.
Rh-catalyzed [2+2+2] and [2+2+2+1] cycloadditions of cycloheptene-diyynes

Fused ring systems make up the core skeleton of many bioactive natural products. As part of the drug discovery and development process, core structures of bioactive natural products can be modified to create more potent derivatives. However, since the supply of natural products is limited, it is necessary to pursue novel approaches to efficiently synthesize these often complex systems. In order to quickly access libraries of natural product and drug like derivatives, it is important to develop methods which allow for convenient and facile modification. Therefore, an optimal synthetic approach for efficient drug development should consist of a straightforward construction of polycyclic cores which are decorated with modifiable functional groups.

As part of our ongoing studies on higher order metal-catalyzed reactions, cycloheptene-diyynes have been subjected to Rh-catalyzed cycloadditions. The substrates have been shown to undergo a [2+2+2+1] cycloaddition in the presence of CO and various [Rh] catalysts. Under similar reaction conditions, cycloheptene-diyynes were converted into the corresponding [2+2+2] product exclusively. The tetracyclic unsaturated systems that were obtained have functionalized handles that may be further modified at various positions. The scope and mechanisms of these novel processes will be discussed.
Factors driving the conservation status of the critically endangered Perrier's sifaka (*Propithecus perrieri*)

The first documented accounts of the natural history of the Perrier's sifaka (*Propithecus perrieri*) from the late 1970's had already acknowledged its extreme rarity and high risk of extinction in the wild. The Perrier's sifaka is a strepsirhine primate, found only within a narrow band of dry deciduous forests in northern Madagascar. Using systematic methods for sampling Perrier's sifaka population levels and status our research teams obtained urgently requested figures on the abundance and distribution of the remaining population. Results indicate that the global population of Perrier's sifakas consists of some 915 individuals, and supports an effective population size of only 230 individuals. With a breeding population of less than 500 individuals, this figure falls below standard thresholds for maintaining genetic diversity in wildlife populations and has implications for the long-term viability of Perrier's sifakas. Surveys throughout the species' historical range also reveal that this range has been contracted. Furthermore, Perrier's sifakas are affected by a myriad of human pressures that vary in intensity and further reinforce its dire conservation status (critically endangered) with the IUCN. These results provide important baselines for furnishing an up-to-date assessment of conservation status and extinction risk as well as insights into what drives abundance and health in wildlife populations and will assist wildlife officials with developing new and more comprehensive management practices for Perrier's sifakas.

Matthew Alan Banks
Advisor: Dr. Patricia Wright

Interdepartmental Program in Anthropological Sciences Ph.D. Candidate
Turner Fellow, NSF AGEP Student

Brief Bio: Matthew is a doctoral candidate in the Interdepartmental Doctoral Program in Anthropological Sciences (IDPAS) at Stony Brook University. He received his Bachelor of Arts from Duke University in 1998 from the School of Environmental Sciences and Policy where he was also awarded a concentration in the area of primatology. Matthew’s research focuses on how ecological and human induced factors regulate abundance in wildlife populations and how this information can be used to implement effective conservation policies.
Computational Models Provide Insights into Heterotrimeric G-Protein Function

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Many of steps in cellular signaling pathways involve specific interactions between proteins in which conformational changes due to ligand binding or post-translational modifications are coupled to complex formation or dissociation. Understanding the mechanisms by which such specific, conformationally-regulated interactions are made is fundamental to the understanding of cellular signal transduction as a whole. We are beginning to address these questions in the context of G-protein-couple-receptor signal transduction, with an initial focus on the coupling of structural dynamics and energetic to association of the subunits of the heterotrimeric G-proteins themselves.

Computational methods provide a powerful approach to this problem, complementary to experimental studies. Molecular dynamics simulations provide details of motions of the proteins at the atomistic level; structural analysis of these simulations provides an intuitive insight into mechanism. Continuum electrostatic models can further be used to an energetic dimension to this analysis, providing a decomposition of individual contributions to protein stability and complex affinity on a residue-by-residue basis. We have performed such analyses on multiple states of representative G-protein—considering both the complex trimer and the dissociated Gα monomer and Gβγ dimer as well as both GTP- and GDP-bound states—using dynamic simulations of each system over an extended period of time as a starting point. The calculations provide several important insights into the mechanism of function in this system. Among these, we find the dynamic ensembles of GTP- and GDP-bound (active and inactive) Gα overlap, and thus these states are more similar than suggested by crystallography.

*presenting author.
Congcong Che
Advisor: Dr. Timothy Glotch
Geosciences Ph.D. Student

Brief Bio: Congcong is a Ph.D student in Department of Geosciences at Stony Brook University. Her field of focus is planetary science, with her current research interest focusing on the effects of heat-induced dehydration and/or dehydroxylation on the infrared spectra of clays and natural zeolites. Congcong anticipates that the results of this project will be applied to future identification of possible dehydrated and/or dehydroxylated clays on Martian surface.

SPECTROSCOPIC STUDY OF DEHYDRATED AND/OR DEHYDROXYLATED PHYLLOSILICATES AND NATURAL ZEOLITES: IMPLICATIONS FOR MARTIAN EXPLORATION

Phyllosilicates detected on Mars are primarily associated with heavily cratered Noachian terrains. It has been suggested that at least some phyllosilicates on Mars were likely formed from long-lived hydrothermal systems initiated by impact processes, then pre-existing phyllosilicates were excavated by following repeated impact events. Abramov and Kring (2005) modeled an impact-induced hydrothermal system on Mars and the results indicated that temperatures as high as 1200 °C could last for thousands of years. Fairen et al. (2010) calculated the temperature increases in a transient crater resulting from an impact, and their model showed that temperatures can reach close 1000 °C in a certain area around the point of impact. In the laboratory, 400-500 °C is efficient for phyllosilicates to lose their interlayer H$_2$O and most phyllosilicates can be completely dehydroxylated at 900 °C. These previous conclusions lead us to propose that phyllosilicates on Mars may have been affected by impact processes, with an emphasis on postshock heating and that dehydrated and/or dehydroxylated phyllosilicates may occur on the present-day Martian surface.

In order to (1) study how the infrared spectra of phyllosilicates change with increasingly higher temperatures and (2) provide a database for future search of the possible existence of dehydrated and/or dehydroxylated phyllosilicates resulting from impact-induced high temperatures on Mars, we acquired attenuated total reflectance (ATR), mid-to-far-IR specular reflectance, mid-to-far-IR emissivity, near-IR diffuse reflectance spectra of incrementally heated phyllosilicate samples. Here we present the summary of spectroscopic study of dehydrated and/or dehydroxylated phyllosilicates and the implication for Martian exploration.
Vocalizations of a Nocturnal Lemur: 
*Avahi peyrierasi*, a Data Deficient Species

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Patricia Wright, *Anthropological Sciences*, Stony Brook University, Stony Brook, New York, patchapplewright@gmail.com

Woolly lemurs (*Avahi sp.*) are folivorous, nocturnal, and pair bonded. The calls of *Avahi peyrierasi*, a recently defined species listed as data-deficient on the IUCN Red List, have not yet been described. During a three month study in the south-eastern rainforests of Madagascar, I followed seven groups of *A. peyrierasi* documenting their calls. Vocal recordings were obtained during 15min-6hr follows. Five types of calls are identifiable: grunts, whistles, ‘ava-hi’ calls, chatter-like calls, and whistle-like calls. Grunts are low calls that may serve an alarm function. These were recorded during the physical examination of two males. An individual who emits whistles is answered by whistles and is sometimes joined by another individual (likely the one who responded). Whistles may serve a group cohesion function. ‘Ava-hi’ calls are often preceded or followed by whistles. Individual woolly lemurs head towards the one producing ‘ava-hi’ calls suggesting a group cohesion or territorial function. The chatter call is a low volume call that was only heard at a distance of about 5-10meters. Those that emitted the chatter call would do so while staring at a stationary researcher and shortly thereafter move away from the researcher, suggesting a group cohesion or alarm function. The whistle-like calls were recorded from a group with a young infant. These are likely either infant calls, calls generally reserved for infants or calls of such low volume that they could not be detected in other cases. This study will increase awareness of this species and also allow for between-species comparisons.

**Brief Bio:** Catherine is an M.S. Student in the Department of Ecology and Evolution. She is currently researching vocal communication in primates. Catherine’s latest field experience was in Madagascar where she studied woolly lemurs. Her project is one of the first documentations of the vocalizations of *A. peyrierasi*, providing valuable preliminary information on the role of vocalizations in social interactions.
Emmanuel Garcia
Advisor: Dr. Hoi-Chung Leung

Psychology M.A. Student
NSF AGEP Student, Bridge to Doctorate Fellow

This Just In: Updating in Spatial Working Memory

Working memory refers to the temporary maintenance and manipulation of information relevant to current goals. This dynamic memory system is thought to be critical to a person’s ability to perform complex cognitive tasks such as reasoning, problem solving, and language comprehension and production. **Updating**, or the ability to continuously modify working memory content to accommodate new information, and to ignore no-longer relevant information, is a key feature of working memory. In a memory system with limited capacity, like working memory, updating allows for great flexibility, and allows a person to selectively attend to task relevant information while ignoring task irrelevant information. To better understand the brain mechanisms underlying spatial memory updating we have conducted behavioral and event-related potentials (ERPs) experiments using a spatial delayed response task to compare and contrast neural activity during a condition requiring memory selection with control conditions. We have identified ERP components corresponding to the cue used for indicating the selection demand. To further determine whether observed ERP components are modulated by the cue type, we are replicating this experiment but using conceptual cues (based on categorical differences of the study stimuli) and planning to compare the results with the existing data where perceptual cues were used (based on color differences of the study stimuli). If the ERP components we have identified truly represent updating or memory processes, then they should not be influenced by cue type. In contrast, ERP components related to sensory and semantic processing would be modulated by cue type.

*Brief Bio:* After completing his Masters Degree, Mani plans to pursue his Ph.D. His interests lie in the intersections of neuroscience, social psychology and psycholinguistics methods. This fall Mani participated in several CIE efforts including service on the Recruitment team at SACNAS, and attending along with a group of CIE students the SREB Institute on Teaching and Mentoring which have motivated him to become active in the work of the Center. In what spare time he has away from Graduate Studies, Mani is also a documentarian, having spend the four years leading up to 2010 researching and preparing Belief, a documentary miniseries exploring the dynamics of belief formation and change among former Jehovah’s Witnesses.
Genome-wide exploration of Forkhead Transcription Factor targets in Fission Yeast

Forkhead proteins are transcription factors regulating development, metabolism, signaling pathways, and even aging. The Forkhead DNA binding region is highly conserved from yeast to humans. Humans have 39 forkheads while simpler organisms like yeast have fewer. The Fission Yeast, Schizosaccharomyces pombe has four forkheads, and we aim to unravel the interactions of two of these, Fkh2 and Sep1. Both Fkh2 and Sep1 are needed for normal cell cycle regulation and appear to control mitosis and cell division. Based on somewhat indirect evidence, it has been proposed that Fkh2 is a repressor and Sep1 is an activator for a similar subset of genes. To find out which genes are direct targets of Fkh2 and Sep1, we performed genome-wide Chromatin-Immunoprecipitation on Chip (Affymetrix Microarray) assays; that is, we isolated Fkh2-DNA complexes as well as Sep1-DNA complexes, purified the DNA, and then used microarrays to find out which DNA sequences were present in each complex. Our initial experiments suggest that, in a majority of cases, Sep1 and Fkh2 bind to different genes. If this result is correct, then it will overturn the current models for the roles of Fkh2 and Sep1 in cell cycle control. We are now analyzing which kinds of genes are regulated by each factor in order to understand their intertwined functions. We also want to find out how these factors with very similar DNA binding regions are targeted to different genes.

Angad Garg
Advisor: Dr. Janet Leatherwood

Molecular and Cellular Biology
Program Ph.D. Student

Brief Bio: Angad is a Ph.D. student in the department of Molecular and Cellular Biology. Prior to arriving at Stony Brook, Angad received his M.Sc. Biomedical Sciences from the University of Delhi as well as his B.Sc. Biomedical Sciences, also at University of Delhi.
Conceptualizing Intragroup Dynamics: The Processes and Consequences of Marginalized Status within a Stigmatized Group

Given the fundamental importance of belonging and social acceptance (e.g., Baumeister and Leary, 1995), research has compellingly demonstrated the impact of negative intergroup contact on the health (Clark et al., 1999), psychological well-being (Jackson et al., 1996), and cognitive functioning (Steele et al., 1995) of ethnic minority group members. Yet, few studies have explored the potentially damaging effects of ingroup rejection on already stigmatized group members, as well as the relationship between outgroup contact and ingroup rejection concerns. Acceptance from ingroup members may provide stigmatized individuals with social support in the face of outgroup marginalization, and thus perceiving rejection from ones ingroup may be particularly stressful. We argue that members of traditionally stigmatized groups, (in this case, on the basis of ethnicity) may develop heightened concerns about being rejected by their ethnic ingroup. In a cross-sectional survey study, Black and Latino participants completed a new measure of Ingroup Rejection Concerns (IRC), designed and validated in this study, as well as measures of self-esteem, outgroup contact, and frequency of discrimination experiences. Findings suggest that for Black participants, increased levels of IRC were associated with lower self-esteem. Further, high IRC scores did not relate to concerns related to outgroup rejection or ethnic identification.
Isoflurane Potentiation of Human α1 Homomeric Glycine Receptor Function: Single Channel Kinetic Analysis

Glycine receptors (GlyR) are fast inhibitory anion channels found throughout the CNS, in particular the brainstem and spinal cord. Each GlyR contains five subunits. Isoflurane, a clinically used volatile anesthetic, enhances the function of GlyR, but the kinetic mechanism of this potentiation is unknown. Here, we analyze glycine receptor behavior at the single channel level. We hypothesize that isoflurane increases the frequency and/or duration of GlyR open states.

Outside-out patches from transfected HEK-293 cells were perfused with 1-5 µM Gly with or without 100-360 µM isoflurane. The processed data was fitted to a kinetic model in order to estimate kinetic parameters using a maximal likelihood algorithm.

Control bursting data was well described by a kinetic model with 3 closed states and 2 open states. Effects of isoflurane were readily seen as an increase in the frequency of bursts of channel activity and of multiple channel openings. However, neither the frequency nor duration of the open states changed with [isoflurane]. Linear regression of the rate constants (or log(rate constant) vs. [isoflurane] data gave slopes that were not significantly different from zero.

The study was hampered by the difficulty in finding patches with few enough channels to produce sufficient single channel bursts. The lack of significant changes in the kinetics of bursts suggests that isoflurane is having its effect on GlyR function before the start of a burst. One possibility is that isoflurane accelerates the recovery from a desensitized state.
ABSTRACTS

Studying how a DNA binding protein uses a clamping motion to help recognize DNA

Kevin Hauser
Advisor: Dr. Carlos Simmerling

Chemistry Ph.D. Student
NSF AGEP Student, Bridge to Doctorate Fellow

Proteins control life at the chemical level, regulating the expression of genetic information by binding specific sites on the DNA, for example. We want to answer the open question of how DNA binding proteins recognize their target sequence of DNA. To answer this important question, we use human mitochondrial transcription termination factor-1 (MTERF1) as a model DNA-binding protein. X-ray crystallography provides a static starting structure of MTERF1 bound to its target sequence of DNA. DNA binding involves a structural change, which we hypothesize to be a clamping motion. We modeled the unbinding of MTERF1 and determined that unbound MTERF1 is more open than when it is bound, leading to the conclusion that when MTERF1 binds DNA, it clamps. In the future, we will study how MTERF1 recognizes the right sequence of DNA as it clamps, providing a model mechanism for DNA binding proteins.

Brief Bio: NSF Bridge to the Doctorate and AGEP student Kevin passion for Chemistry and Science go beyond his research as a Ph.D. student here at Stony Brook. An active mentor in the CSM program, Kevin is also interested in ways to generate interest in STEM fields at the elementary and intermediate school levels. This March, Kevin’s artistic rendition of biochemical structure was selected to be used on the cover of the American Chemical Society’s National Conference meeting book.
ABSTRACTS

Evolutionary relationships and biogeography of lemurs from Madagascar

The lemurs of Madagascar are an ancient group of primates that have been evolving in isolation for 60 million years. During that time, climate and habitat change may have been involved in speciation processes that resulted in the most remarkable diversity of primates anywhere in the world. By combining data on the anatomy and molecular biology of lemurs, I test fundamental hypotheses about the evolutionary relationships among major groups. I also reconstruct the most likely geographic and ecological distribution of the ancestors of modern lemurs. My results support some published relationships among lemur taxa, while also indicating interesting patterns in anatomical evolution. Also, my results suggest that most lemur ancestors can be traced back to the eastern rainforests of Madagascar, with modern lemurs arriving in other areas and habitats via dispersal from the rainforest. My results place fossil lemurs in the context of modern diversity by including anatomy as well as genetics. Further, the results indicate potential events in life’s history that may have resulted in the amazing biodiversity we see today; namely, origins and diversification in rainforests and dispersal into unique niches like dry forests and deserts.

James Herrera
Advisor: Dr. Patricia Wright

Interdepartmental Doctoral Program in Anthropological Sciences Ph.D. Student
Turner Fellow, NSF AGEP Student

Brief Bio: NSF GRF recipient, Turner Fellow, and AGEP student James Herrera came to Stony Brook’s IDPAS program in 2009 already moving at full speed. Upon arrival he set forth on participating in the Center for Inclusive Education’s Writing to Win Workshop (receiving an NSF GRFP fellowship) and our conference support opportunities, having already been invited to present work as a fall semester, first year Graduate Student at the Annual meetings of the American Society of Primatologists. James proposed and developed the idea for the CIE’s Hispanic Heritage month film series, and serves as a mentor in the EOP/AIM TAMP program.
Do Matrix Metalloproteases Regulate Oligodendrocyte Differentiation?

Complex interactions between neural cell types are used to generate the brain circuitry. These interactions include the process of myelination, in which oligodendrocytes form protective layers of myelin around neuronal axons. This lipid-rich myelin coat ensures rapid and efficient nerve transmission and promotes neuronal survival. Developing oligodendrocytes extend processes from their cell bodies that adhere to and wrap around the axon to form the myelin sheath. How myelination is regulated at the molecular level is still not fully understood. However, various extracellular factors are known to affect oligodendrocyte survival and myelination potential. Among them are the matrix metalloproteinases (MMPs), several of which have been implicated in the regulation of oligodendrocyte differentiation. Our laboratory has been exploring the temporal expression of MMPs during oligodendrocyte development, as well as potential MMP substrates and their signaling mechanisms. One candidate MMP substrate being tested currently is the adhesion receptor, dystroglycan (DG). Interestingly, DG has been implicated in oligodendrocyte process remodeling and myelin production. We hypothesize that cleavage of DG by MMPs results in DG turnover and altered adhesion, in turn promoting oligodendrocyte process outgrowth and subsequent myelination potential.
Elizabeth Louie
Advisor: Dr. Emily Chen
Pharmacology Ph.D. Student
NSF AGEP Student

Increased Neurotrophin-3 Expression Promotes the Metastatic Growth of Breast Cancer Cells in the Brain

Nearly 20% of breast cancer patients with non-localized disease are eventually diagnosed with brain lesions, making breast cancer the main source of metastatic brain disease in women. Most metastases remain undetected until its advanced stages, presenting a therapeutic challenge. The molecular basis for breast cancer metastasis to the brain remains largely unclear. Our previous studies suggest a metabolic adaptation of metastatic breast cancer cells in the brain microenvironment and we identified a novel proteomic signature associated with breast cancer brain metastasis. Neurotrophin-3 (NT-3) is found expressed higher in the brain-derived metastatic breast cancers compared to the non brain-derived metastatic breast cancer cells. To evaluate the importance of NT-3 in the growth advantage of breast cancer brain metastatic cell lines, NT-3 expression was knocked down in brain-derived metastatic breast cancer cells or overexpressed in non brain-derived metastatic breast cancer cells. Brain tumor development was observed, showing that NT-3 is necessary and sufficient for the ability of breast cancer cells to grow in the brain. To elucidate the role of the microenvironment in breast cancer brain metastases development, the presence and activation of microglia was observed. Microglia was recruited to both brain-derived and non brain-derived metastatic breast cancer tumors, but activation is higher in the non brain-derived. These results suggest that NT-3 is integral in increasing the growth advantage of breast cancer cells in the brain, and that microglia may play an integral role in this ability.

Brief Bio: Elizabeth currently works in the lab of Dr. Emily Chen in the department of Molecular and Cellular Pharmacology. Her research experience started in the lab of Dr. Jacek Majeski at Rockefeller University where she was able to present some of her finding for publication in the Journal of Genome Research. She received her B.S. in Bioinformatics and Molecular Biology at Rensselaer Polytechnic Institute. While at the institute she participated for three years (2004-2007) in The Cancer Cell Biology Group. Liz was the recipient of a 3rd place Poster Award during the 2007 undergraduate research symposium at Rensselaer Polytechnic Institute, a gathering with over 150 participants, with her presentation on Chemoattractants and Neuronal cancer. While at Dr. Chen’s lab in Stony Brook she published part of her dissertation work in the Breast Cancer Research Journal. Upon graduation, Liz wants to continue her work in the cancer field, by expanding her knowledge of stem cell and/or factors that promote tumor growth.
The benefits of mutualism or why nice guys don't always finish last

Mutualism is an inter-species interaction in which participants incur a net benefit. An important component of mutualism is dependency. It is predicted that mutualist species depending on each other should benefit more from mutualism than those that don’t. Also, dependent species should suffer a larger fitness decrease when mutualism interactions are not possible.

Between Alpheid shrimp and Gobiid fishes a mutualism occurs. Shrimp construct a burrow which is shared with a goby partner and both use to avoid predators. Shrimp have poor vision and are at risk of being eaten while exiting the burrow. Dependent gobies remain at burrow entrances and provide a warning signal to shrimp when predators are present. Non-dependent gobies provide no such signal.

Here, I’ve compared two goby species (one dependent on shrimp, the other not) on how each is affected by shrimp presence and absence. I devised an aquarium experiment in which individual gobies faced live predators with shrimp burrows present or absent. I found that both species had similar survival probabilities when shrimp burrows were absent but the shrimp-dependent goby performed better when shrimp burrows were present. I have quantified two behaviors which explain these differences.

These findings demonstrate that dependent mutualists do incur more benefit than non-reliant species but do not necessarily pay a higher cost when the mutualist partner is absent. This evidence suggests that the dependent mutualist has greater fitness. That all mutualist species do not evolve dependent mutualism would suggest there is a constraint on mutualism evolution.
Corticosterone Stress Response and Parental Behaviors in the Host of an Interspecific Brood Parasite, The Striped Cuckoo

Interspecific brood parasitism relieves the parasitic parent of the cost of raising offspring, and transfers that cost onto the host parent. Little is known about the physiological costs to hosts raising parasite chicks, and such costs could impact future, as well as current, reproductive success. Corticosterone (CORT) can influence reproductive success in birds by mediating trade-offs between survival and reproduction. If the burden of raising a single parasite chick exceeds the burden of raising a host’s own brood, then we expect this increased energetic effort to be reflected in differences in baseline and stress-induced corticosterone levels between parasitized and unparasitized host parents. We compared baseline CORT, stress-induced CORT, and parental behavior between breeding pairs of the rufous-and-white wren (Thryothorus rufalbus) raising their own chicks and those raising a single chick of the brood parasite the striped cuckoo (Tapera naevia). There was no significant difference between parasitized and unparasitized parents in nest provisioning rates in the nestling stage. In the post-fledgling stage there were a significantly higher number of contact calls between cuckoo chicks and parasitized parents, and parasitized parents exhibited protracted post-fledgling care. Baseline CORT levels did not differ between parasitized and unparasitized parents in the incubation, nestling, or post-fledgling stages, and stress-induced CORT did not differ in the incubation or nestling stages. Stress-induced CORT levels were significantly higher in parasitized parents. These data indicate that parasitized rufous-and-white wrens increase parental investment in parasite chicks and experience an increased stress response, both of which may lead to a decrease in future reproductive success.

Melissa Mark, Ph.D.

NSF Minority Postdoctoral Fellow, Ecology, Evolution, and Environmental Biology, Columbia University. Alumna, SBU Ecology & Evolution, AGEP student, Turner Fellow

Brief Bio: Melissa’s current research focuses on the costs of nest parasitism to host birds in a coffee agroforestry landscape. Working with Dr. Dustin Rubenstein to measure the effects of living in modified habitats and raising cuckoo chicks on stress and immune function in a neotropical wren, Melissa’s primary interests are on individual decision making in, and adaptation to, human-modified landscapes. She is also concerned with the conservation of biodiversity in rural areas in Latin America, and the use of ecological principles to develop sustainable livelihoods in these areas. While at Stony Brook, her dissertation advisor was Drs. Charlie Jansen and Catherine Graham.
Javier Monzón

Advisor: Dr. Dan Dykhuizen

Ecology and Evolution Ph.D. Candidate

Turner Fellow, NSF AGEP Student, Bridge to Doctorate Fellow

Brief Bio: Turner Fellow, AGEP Student, Bridge to the Doctorate Fellow, and mentor to both graduate and undergraduate students, Javier recently added “proud new father” to his list of important titles. In April Javier joined a group of AGEP students in attending the 2011 Preparing for the Professoriate Conference at SUNY Albany. There he gave an oral presentation of his research on the population genomics of coyotes in the Northeast. Javier anticipates defending his Ph.D. dissertation in the Spring of 2012.

POPULATION GENOMICS OF NORTHEASTERN COYOTES

Detecting population genetic structure and differentiation largely depends on the type of genetic marker used and its variability in the population. I present new data on 96 autosomal single nucleotide polymorphisms (SNPs) in 96 northeastern coyotes (Canis latrans), and compare them to data on mitochondrial DNA (mtDNA) sequences of 686 coyotes. The mtDNA data are ineffective at detecting genetic structure, except at the broadest geographic level. In contrast, an analysis of molecular variance with the SNP genotypic data detected finer spatial genetic structure. I discuss possible reasons for the observed discrepancy and highlight the advantages of using SNPs over other widely used molecular markers in exploring questions of population structure, hybridization, and adaptation. This is one of the first surveys of a wild animal pioneering the use of SNPs ascertained from a genome project of a model organism.
Christopher Morales
Advisor: Dr. Joshua Rest
Genetics Ph.D. Student
Turner Fellow, NSF-AGEP Student

Fitness Landscapes of Gene Expression: A case study in understanding the evolution of transcriptional regulation in Saccharomyces cerevisiae.

Polymorphism in gene expression is pervasive, but the associated fitness consequences and their dependence on environment and epistasis have not been mapped for a continuum of gene expression alleles. We sought to understand the low level of expression polymorphism for Lcb2, an enzymatic subunit that is rate-limiting for sphingolipid synthesis, by mapping its fitness function. We systematically altered levels of Lcb2 expression in yeast and found that wild-type levels are at the edge of a fitness cliff, where even small decreases in expression have significant fitness costs. Expression levels above wild-type form a plateau that is either the same fitness as wild-type, or confers a fitness advantage, depending on the environment. These results are consistent with a scenario where any increases in gene expression that would confer robustness to genetic, stochastic, or environmental perturbations have been driven down by neutral processes.

Brief Bio: Chris is a Ph.D student in the Genetics Program at Stony Brook University. His advisor is Dr. Rest, from the Ecology and Evolution Department. Chris is currently studying the effects of altering gene expression on the fitness of S. cerevisiae. The results of this project will help us understand the evolution of gene expression levels.
ABSTRACTS

The study of modified *Staphylococcus aureus* acyl carrier protein and its role as a substrate for enzymes involved in fatty acid biosynthetic type II pathway

The acyl carrier protein (ACP) is a small, acidic cofactor that covalently binds a phosphopantetheine linker on a conserved serine residue. In *Mycobacterium tuberculosis* (MTB), ACPM plays an essential role in the biosynthesis of mycolic acids as a substrate shuttled in type II (FASII) pathways. AcpM consists of three different forms: apo-, holo-, and acyl-ACP. Each form differs by the substituent bound to the conserved serine residue. The separation and purification of the three different forms of AcpM, and the modification of the inactive apo form to the natural acylated substrates are both time and labor intensive. Therefore, purifying ACP from a different species that predominately yields the apo form can facilitate a less time intensive purification and modification to the acylated substrate. Overexpression of *Staphylococcus aureus* ACP (saACP) predominantly produces the apo form; it has a 67% sequence identity to AcpM. This study aims at developing saACP substrates for more efficient kinetic and inhibition studies of enzymes involved in MTB FASII pathway.

Carla Neckles
Advisor: Dr. Peter Tonge
Chemistry Ph.D. Student
NSF AGEP Student, Bridge to Doctorate Fellow

Brief Bio: Carla is a Bridge to the Doctorate and Chemical Biology Training Grant Fellow in Professor Peter J. Tonge research lab. She enjoys getting involved within the scientific community as an active member of the Graduate Chemical Society executive board at Stony Brook. Currently, Carla also volunteers time as a Long Island Youth mentor at Brentwood Residential.
ABSTRACTS

Exploration of the putative role of the \textit{ebony} gene on variation in pigmentation and life history traits in \textit{Drosophila melanogaster}

Phenotypic traits, such as morphology, often do not evolve independently and are correlated with other traits. Studies of insect pigmentation have been informative in studying these effects since they have revealed that pigmentation may play a role in multiple traits and be subject to diverse selection pressures. I have begun to investigate how the pigmentation gene \textit{ebony} in the fruitfly species \textit{Drosophila melanogaster} may interact with life history traits such as starvation resistance and lifespan. \textit{ebony} is involved in enzymatic reactions during pigmentation production in insects and is required to suppress the formation of dark pigment or melanin. Previous work has revealed a putative role of this gene in insect pigmentation and life history traits. Life history traits are considered to be significant in the adaptation of \textit{Drosophila} species to temperate habitats. I compared \textit{ebony} \textit{D. melanogaster} mutants, which are darkly pigmented with normally pigmented controls in their survival rates under starvation conditions. Additionally, I compared rates with mutant lines that overexpressed \textit{tan} and \textit{ebony}, which exhibit dark and light levels of pigmentation respectively. \textit{ebony} mutants had significantly lower survivorship compared to the controls in both males and females. Mutants that over-expressed \textit{tan} and \textit{ebony} had survivorship values similar to the controls. These results suggest that the \textit{ebony} gene is contributing to starvation tolerance rather than the increase in dark pigmentation. Future work will aim to determine what genetic polymorphisms in \textit{ebony} exist in natural populations and how they may contribute to variation in the traits of interest and adaptation to temperate environments.

Rocio Ng
Advisor: Dr. John True
Ecology and Evolution Ph.D. Student
Turner Fellow, NSF AGEP Student

Brief Bio: An Urbanite New Yorker, Rocio came to Stony Brook in 2006 after finishing her Bachelors degree at New York University. She currently works as part of the lab of Dr. John True, examining how correlated traits help to shape evolution. As a CIE student Rocio has participated in numerous activities including service as an SRI tutor, writing to win, CSM mentor, and the Turner Summer Research Grant. In addition to her work as a Ph.D. student Rocio is an artist and blogger, working with a variety of media including illustration, paint, sewing, papercraft, and crochet with a talent for crochet animals.
Evolution of Size in Fish: Evaluation of Natural Selection for Size

Body size is important for fitness. Body size is expected to face positive selection because it increases offspring survival, and is associated with higher mate and territorial acquisition. I reviewed the literature for studies that had measured size-selective mortality in fish and calculated standardized selection differentials. Selection was found to favor larger size at age in the early life history of fishes. This selection was 5 times stronger than selection in terrestrial taxa. Despite the evidence that selection is strong in the early life history of fishes it is not clear whether this selection fluctuates over the entire life history. To evaluate if selection in a model fish species, the Atlantic silverside (Menidia mendia) varies over the growing season, I made repeated collected of a cohort of fish over their growing season. I used a common otolith back-calculation method to estimate size at previous dates. Otoliths, or fish ear bones, form daily rings, are positively related to fish length, and enable us to track the traits of survivors. Selection was found to be both positive and negative and varied both over the season and from year to year. This has important implications for the evolution of fish size. Although in the early life history selection appears to be quite intense, the overall selection pressure for size is likely to be weak. This finding may help explain why sub-maximal growth in fish populations is so common.

Kestrel Perez
Advisor: Dr. Stephan Munch

School of Marine and Atmospheric Sciences Ph.D. Candidate
Turner Fellow, NSF AGEP Student

Brief Bio: In 2005 Kestrel came to Stony Brook’s SOMAS program as the youngest recipient ever of the W. Burghardt Turner fellowship after completing her Bachelors degree in Marine Science from LIU Southampton. She arrived to SBU’s campus early through support from the AGEP Summer Bridge program and jumped into her research with both feet. Kestrel’s participation in CIE activities throughout her time at Stony Brook has sparked her interest in academic diversity initiatives. As a result, she spent time this spring working with the CIE in coordinating the CDAE conference. Kestrel is scheduled to defend her dissertation this spring and is considering a Post Doctorate offer from the University of Texas.
ABSTRACTS

Nuria Protopopescu
Advisor: Dr. Robert Aller

School of Marine and Atmospheric Sciences Ph.D. Candidate
Turner Fellow

Brief Bio: Nuria joined the Turner Fellowship program in 2009 as a recipient of the prestigious W. Burghardt Turner Dissertation fellowship program. She has volunteered as a mentor for both the Center for Inclusive Education’s Community of Student Mentors and the EOP/AIM TAMP program, mentoring undergraduate students with an interest and desire to engage in graduate education.

Optical Method for the Measurement of Dissolved Calcium in Marine Sediments

To date, no method has previously been developed to optically measure the high millimolar concentrations of dissolved calcium (Ca\(^{++}\)) in seawater and porewater directly, without the need to dilute the sample. My fluorescence based method can measure up to 20 mM with decent resolution, is sensitive, selective and pH independent. This represents a big advancement in this area of research and could lead to the development of flow-through seawater and porewater sensors as well as two-dimensional membrane sensors. The use of such membranes would enable studies on the effects of dissolution processes on shell-bearing organisms in heterogeneous surface deposits. Calcium is a major component of carbonate minerals and is also closely coupled to the carbon cycle. Being able to optically measure dissolved calcium (this work), in conjunction with the effects of pH and pCO\(_2\) (for which sensors exist in our laboratory) is the ultimate goal. Increasing ocean acidification resulting from anthropogenic CO\(_2\) production places a premium on understanding CaCO\(_3\) cycling and acid neutralization at the seafloor.
Understanding PDZ Domain Interactions of PSD-95 with Neuronal-Nitric Oxide Synthase Using Single Molecule FRET Techniques

Interactions between PDZ domains are among the most commonly found protein-protein contacts in nature, playing major roles ranging from the assembly of signaling complexes to lending architectural support in multi-component protein scaffolds. In particular, the post-synaptic density of neurons poses as a quintessential example in which PDZ domain interactions mediate the clustering of receptors at the post-synaptic membrane by binding highly conserved sequence motifs on their targets' C-terminal tails. For example, PSD-95 is responsible for the recruitment & anchoring of potassium channels and N-Methyl-D-Aspartate receptors at post-synaptic membranes. Transmission of excitatory signals which begins at the synapse between NMDA receptors and their ligands, bares both physiological relevance and pathophysiological consequences. In the context of stroke, ischemic injury is thought to bring about neuronal damage as a result of the subsequent excitotoxicity from NMDA receptor over-stimulation. Furthermore, neuronal nitric oxide synthase is known to become activated upon NMDAR mediated calcium influx and capable of binding to post-synaptic density protein-95 as well. In order to gain some understanding of the binding nature of these proteins, single molecule FRET (smFRET) using Total Internal Reflection Fluorescence Microscopy techniques were employed during the course of our experiments. Studies in the future aim at developing experiments which could reveal the binding behavior between these proteins in order to extract possible kinetic constants (i.e., dissociation constants) with the hope that this information will provide useful insight in the development of...
Metallization and Magnetic Ordering in \( Y_4\text{FeGa}_{12} \) and the Quest for Quantum Criticality

High Temperature superconductors (HTS) have been under intense scrutiny the past decade. Questions regarding why they work, how they can be cannibalized, and why they behave in the peculiar manner they do have all been voraciously debated. Ironically, we will need an understanding of the ultra-cold to gain insight into the nature of high temperature superconductors. As of 2009, the highest-temperature superconductor (at ambient pressure) is mercury thallium barium calcium copper oxide (\( \text{HgBa}_2\text{Ca}_2\text{Cu}_3\text{O}_x \)), at 135 K. This is still more than 150 K colder than the operating temperature of most electronic devices. There have been two representative theories regarding HTS, the most popular being that the HTS emerge from anti-ferromagnetic spin fluctuations in a doped system. Above the Curie temperature (\( T_c \)) Ferro-magnets, FM, behave para-magnetically taking on Curie-Weiss behavior. Quantum criticality is the special class of magnetic ordering occurring at absolute zero. At this point phase transitions are no longer driven by entropy but by zero point quantum fluctuations associated with Heisenberg Uncertainty. Understanding why and how such transitions occur may have significant ramifications in establishing an ontological explanation of superconductivity. With this understanding we can eventually create superconductors that operate at room temperature without the need for additional cooling provisions.

Jude Safo
Advisor: Dr. Meigan Aronson

Materials Science and Engineering M.S. Student
NSF AGEP Student, Bridge to Doctorate Fellow

Brief Bio: Jude was born in Nigeria but has since lived in Ghana, Liberia, Massachusetts, Brooklyn, Long Island and Virginia. He transferred to Stony Brook in 2006 from the University of Virginia. Once here he double majored in Physics and Engineering Science specializing in Materials Science and Engineering. He is currently completing a combined Bachelors-Master’s degree in Materials Science. Since high school he has interned with Northrop Grumman, Lockheed Martin, BNLs RHIC, BNL’s Condensed Matter Physics Department and worked as a volunteer firefighter for the town of Stony Brook. He is a member of the Louis Stoke Alliance for Minority Participation Program. In 2009 he was awarded the NSF Graduate Research Fellowship. Jude will begin his PhD degree in Nuclear Engineering at the Massachusetts Institute of Technology this fall where he intends to continue materials research toward better reactor confinement and mitigating the hazardous effects of nuclear waste.
**Toward The Step-Wise Construction of Molecular Polyhedral Frameworks as Potential Components in Single-Electron Transistors**

Single-electron transistors (SETs) are attractive devices, whose potential applications include computer memory components and highly sensitive electrometers. Unfortunately, reliable fabrication of SETs remains a challenge owing in part to the diminutive size of the single-electron island (SEI), which must be ≤ 0.1 nm for reliable room temperature operation of the SET. One potential solution to this challenge is caging the SEI in a molecular structure, which can be anchored onto an electrode surface in the SET. Such a structure will need to be robust, functionalizable, stable, and non-collapsible. In light of these requirements we have designed molecular polyhedral frameworks than can be used for this purpose.

The proposed frameworks include one trigonal prism, and two rhomboid prisms. The primary building units for all three frameworks are: 1) Re(phen')(CO)₃C≡CR where phen' is a 1,10-phenanthroline derivative, for the corners; and 2) Oligo(phenylethynylene) units (-C≡C₆H₄C≡C-)ₙ or polyyne units (-C≡C-C≡C-)ₙ for the edges. These primary building units have been chosen for their stability, their rigidity, and their shape. These primary building units have been assembled into higher order structures, which have been used to create the prisms’ faces via step-wise synthesis. Step-wise synthesis has been chosen as the synthetic methodology over self-assembly because it offers greater synthetic control and affords stable covalent bonds. In the future these faces will be assembled into half-prisms. These half-prisms will be coupled via Sonogashira cross-coupling producing the respective prisms.
**Alexis Santana**  
**Advisor: Dr. Laurie Krug**  
**Molecular Genetics and Microbiology Ph.D. Student**  
**NSF Bridge to the Doctorate Fellow, NSF-AGEP Student**

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**Investigation the role of NF-κB in the regulation of MHV68 gene expression**

Alexis Santana, Benson Cheng, Shirin Jaggi, Bobby Stockton, Laurie T. Krug

Chronic gammaherpesvirus infection is characterized by the ability of the virus to establish life long latency in lymphocytes. The NF-κB signaling pathway is an important host determinant for latency in vivo. Overexpression of NF-κB inhibits replication and viral lytic promoter activation in Murine Gam-maherpesvirus 68 as well as its human counterparts Epstein Barr Virus (EBV) and Kaposi’s sarcoma-associated herpesvirus (KSHV) and therefore may contribute to the establishment and maintenance of latency. However, the mechanism by which NF-κB inhibits lytic promoter regions to promote latency is currently unknown. We hypothesize that direct binding of NF-κB to promoter regions in the viral genome contributes to lytic gene repression. Here we describe the identification of NF-κB binding sites in the viral genome and the initial characterization of the regulatory regions that contain these sites in response to the lytic transactivator RTA and during productive infection NF-κB inhibition with Bay 11-7082 increases lytic transcript levels, but is insufficient to drive infectious particle release.

Bay 11-7082 enhances TPA induced reactivation as evidenced by an increase in viral particle production and lytic gene expression. In silico analysis of putative binding sites coupled with Electrophoretic Mobility Shift Assays (EMSA) identified 6 binding sites in the viral genome upstream of ORFs 6, 21, and 75B. Tiled microarray data was coupled with 5’RACE analysis to define upstream regulatory regions of ORF 6, 21, and 75B. Afterwards, regulatory regions were cloned into a luciferase reporter vector and assayed for responsiveness to both NF-κB and the lytic transactivator RTA. The Orf 6 and 21 regulatory regions were activated in response to MHV68 infection. Moreover, the NF-κB subunit p65 inhibits RTA-mediated activation of the ORF 6 and 21 regulatory regions. In contrast, the ORF75B promoter is less responsive to RTA and slightly activated by p65.

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Brief Bio: Alexis joined the Ph.D. program in Molecular Genetics and Microbiology at Stony Brook in 2008 as an LSAMP Bridge to the Doctorate Fellow in after completing her Bachelors degree at SUNY New Paltz. She has served as a Mentor in the Center for Inclusive Education Community of Student Mentors program for the past two years and recently represented the Center as part of our graduate recruitment teams at the 2010 Annual Biomedical Research Conference for Minority Students and the Sigma Xi Northeastern Research Symposium. She works in the lab of her advisor, Dr. Laurie Krug.
Mechanisms Utilized by *Francisella Turarensis* to Invade Hepatocytes

*Francisella tularensis* is a facultative intracellular bacterium that is the etiological agent of tularemia. The liver is an important target of infection in tularemia, and *F. tularensis* grows to high numbers within hepatocytes, the major cell type of this organ. This study investigates the mechanisms utilized by *F. tularensis* to invade hepatocytes.

Mechanisms of uptake of *F. tularensis* Live Vaccine Strain (LVS) were investigated in vitro using the murine hepatocyte cell line. Additionally, an *F. tularensis* ssp. novicida transposon library was screened for mutants with altered uptake by hepatocytes.

Addition of cytochalasin D to the hepatocytes blocked uptake of the LVS nearly completely. In contrast, bacteria killed by heating or formalin fixation were readily ingested by the hepatocytes. Treatment of the bacteria with chloramphenicol also had no effect on invasion. LVS mutants lacking components of pili or the type I secretion system retained their ability to be taken up by the hepatocytes.

Screening of the *F. tularensis* ssp. novicida transposon library led to identification of two unclassified outer-membrane proteins, the absence of which enhanced uptake by both mouse and human hepatocytes.

These results show that polymerization of the actin cytoskeleton is needed for uptake of *F. tularensis* by hepatocytes. Additionally, there is no requirement for viability of or protein synthesis by the bacteria. The mutants identified by the screen suggest that certain bacterial genes may negatively regulate the uptake of *F. tularensis* by hepatocytes. Further characterization of these genes is in progress.
Characterization of the mechanism by which L-asparaginase II of *Salmonella enterica* serovar Typhimurium induces T cell Inhibition

Departments of Molecular Genetics and Microbiology\(^1\), Program in Genetics\(^2\), Stony Brook University, SUNY, Stony Brook, NY, USA, 11794-5120

AnnMarie Torres\(^2\), Amy L. Kullas\(^1\) and Adrianus W. M. van der Velden\(^1,2\)

T cells play a key role in controlling and clearing infection with the bacterial pathogen *Salmonella enterica* serovar Typhimurium (S. Typhimurium). However, T cell-mediated immunity against *S. Typhimurium* takes months to develop and has been described as slow and inefficient. Previously, we have shown that *S. Typhimurium* have a direct inhibitory effect on T cells, down-modulating expression of the beta chain of the T cell receptor (TCR-beta) and inhibiting T cell proliferation. Furthermore, we have shown that a soluble, proteinaceous factor produced or induced by *S. Typhimurium* is responsible for this inhibition. Most recently, we have found that STM3106 is required for *S. Typhimurium* to inhibit T cells and that L-asparaginase II, which is encoded by STM3106, is present in the supernatants of T cells cultured in the presence of *S. Typhimurium*. In addition, we have found that L-asparaginase II produced by *S. Typhimurium* is both necessary and sufficient for the inhibition of T cells. With further characterization, this research should provide new insight into the mechanism by which *S. Typhimurium* inhibit T cells, avoiding immune clearance.

*AnnMarie Torres*

**Advisor: Dr. Ando VanDerVelden**

*Genetics Ph.D. Candidate*

*Turner Fellow, NSF AGEP Student*

*Brief Bio: A graduate of UMASS Amherst, and Long Island native from Bayshore, AnnMarie joined the Genetics program at Stony Brook in 2007 as an AGEP student and Turner Fellow after working as a Lab Assistant at Cold Spring Harbor Laboratory. This May AnnMarie will attend the Immunology 2011 annual conference with funding from the Turner Fellowship program where she will present her research, currently advised by Ando VanDerVelden. She has participated in the CIE’s writing to win workshop and CSM programs.*
Environmental sources of human viral pathogens into local coastal surface waters

As part of an effort to determine the presence of human viral pathogens in coastal marine and estuarine systems, we examined coastal surface waters along the North Shore of Long Island, New York for three human viruses, enteroviruses, hepatitis A viruses and noroviruses. These viruses are associated with a variety of diseases (i.e. paralysis, hepatitis and gastroenteritis) and while they have been detected in coastal surface waters worldwide, their ecology of transmission is still unknown. This is due to current difficulties in their environmental concentration and detection methods and because the variability among environmental conditions at each specific geographical locations. Although, they are mainly introduced into coastal waters via non-point (e.g. urban runoff) and point sources (e.g. sewage outfall) of human waste. Once there, they can survive for extended periods of time (months), increasing the probability of human exposure. Over a four year period surface water samples were collected from two recreational coastal sites, the Nissequogue River and the Port Jefferson Harbor with the aim of identifying local environmental input sources of human viral pathogens. Viruses in the water samples were concentrated via tangential flow filtration (TFF) and/or adsorption-elution (AE) techniques. Then, after a total RNA extraction, the presence of enteroviruses, hepatitis A viruses and noroviruses were made via conventional Reverse Transcriptase PCR (RT-PCR) and Quantitative RT-PCR (QRT-PCR). Our results show that while no human viral pathogens were detected in the Nissequogue River surface water samples, enteroviruses were detected at the Port Jefferson Harbor after rainfall event and during low tide. So far, these results indicate that rainfall events which can carry untreated human wastes into coastal waters are a likely input source of human viral pathogens.
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