

“Bio-Informatic Study of Molecular Evolution of Caste Divergence in Apis”

Presenter: Dawit Adnew

Major: Biology

Co-Author(s): Nicholas Arvanitis

Co-Presenter(s): Nicholas Arvanitis

Mentor: Olav Rueppell

Department: Biology

Most social insects, like honey bees, live in colonies with a reproductive division of labor between a queen and her female workers. This constrains population size making them more prone to genetic drift, however, honeybees and other social insects continue to thrive. The evolutionary success of honey bees can be explained by their efficient division of labor, which entails morphological specialization. The queen usually is larger and contains significantly larger ovaries than her workers but the extent of this caste divergence varies among species. To investigate the molecular basis and possible molecular signatures of selection of the caste divergence, we will shotgun-sequence the genome of *Apis dorsata*, the giant honey bee, and compare the obtained sequences of genes related to ovary size and body size to existing gene sequences from *A. mellifera* and *A. florea*. We hypothesize that *A. dorsata*, which displays a low degree of caste divergence in body size and ovary number has experienced less selection for phenotypic caste plasticity. Therefore, we predict that the MacDonal-Kreitman test of natural selection will indicate stronger divergent selection between this species and its sister species than comparisons between the two sister species that both display high degrees of caste divergence. From the two planned sequencing runs we expect to obtain a large number of sequences that will allow us to assemble contigs of functional size and the required assessment of intra-specific and inter-specific variation. If our prediction holds true, we can pinpoint genes that have played a role in evolution of the highly successful yet variable caste system of social insects.

“How the Big Five Relate to Specific Religious Behaviors”

Presenter: Eva Ambro

Major: Psychology

Mentor: Rosemary Nelson-Gray

Department: Psychology

Recent studies show that religiosity correlates significantly with the “Big Five” dimensions of personality. Agreeableness and Conscientiousness are most commonly found to be positively correlated with religiosity. There are inconsistent findings regarding the relationship between religiosity and the remaining three dimensions, Openness to Experience, Neuroticism and Extraversion. This may be due to the differences in which various studies measure religiosity. Many studies conceptualize religiosity broadly, looking at different aspects of religion, whereas others use an overall religiosity score. It is possible that these discrepancies in measurement are causing findings to appear inconsistent. The objective of the current study was to take a detailed look into specific religious behaviors and to examine how these behaviors relate to the Big Five. Religiosity and personality variables were examined in a sample of college students using the RELS to measure religiosity and the BFI to assess the Big Five. It was found that Agreeableness and Conscientiousness were positively correlated with overall importance of religion in daily life and deciding moral actions for religious reasons. Agreeableness was positively correlated with prayer and observing religious holidays. Conscientiousness was positively correlated

with prayer and having friends with similar beliefs. Openness was negatively correlated with religious service attendance.

“archetype: prototype: hybrid - decoding messages in the mid-century suburban home”

Presenter: Ashley Andrews

Major: Interior Architecture

Mentor: Patrick Lucas

Department: Interior Architecture

This typological study focuses on the residential architecture of Greensboro architect Edward Loewenstein (1913-1970) during the 1950s and 1960s for clients in the Irving Park Historic District, New Irving Park and adjacent Kirkwood neighborhood. Following Robert Maxwell’s “Two-Way Stretch” theory, the research defines morphological parameters for archetype, prototype, and hybrid forms. This formal analysis and discussion of the buildings and their proximal relationships to one another reveals varying societal values and attitudes toward tradition and innovation during the birth of regional Modernism in Greensboro.

“Identification of Novel Antibacterial Agents from Natural Products”

Presenter: Jessica Bame

Major: Chemistry

Co-Author(s): Adama Secka

Co-Presenter(s): Adama Secka

Mentor: Nadja Cech

Department: Chemistry & Biochemistry

RTI has a collection of around 2,000 plant samples that are cataloged in a Microsoft Access Database. This prepared database was used to decide on which plants to extract first by priority, starting with the least researched and studied. The plants were extracted and the extracts tested against bacteria in antibacterial assays with the ultimate goal of finding a new compound that can be used against cancer or bacterial infections. For each plant there were two extracts, one of hexane and the other of chloroform. Methods were used such as filtering, evaporation using a rotary evaporator, re-suspension and finally separation by separatory funnels. After 14 extracts were made, the first antibacterial assay was done. The results so far from the experiments however have not yielded any definitive results. From here, the objective is to make more extracts and find a plant that does yield results and proceed with further testing such as chromatography.

“AfterWords”: Crafting Identity Through Holocaust Resettlement Narratives”

Presenter: Bethany Barnes

Major: Communication Studies

Co-Author(s): Melinda Alston

Co-Presenter(s): Melinda Alston

Mentor: Roy Schwartzman

Department: Communication Studies

Research regarding Jewish Holocaust survivors privileges their experiences during the Holocaust, treating liberation as their story’s conclusion. The “AfterWords” Project explores the structure and content of firsthand post-war narratives, focusing on survivors who settled in North Carolina. The project employs personal interviews and recorded testimonies from the Shoah Foundation’s visual history archives. Holocaust survivors construct their identities by negotiating multiple tensions. This study applies relational dialectics theory— conventionally invoked to analyze interpersonal relationships—to reveal the tensions that survivors navigate in their narratives. We examine the patterns of tensions as they relate to the categories of survivor experiences: fleeing, hiding, concealing or changing identity, concentration camp, etc. Some tensions, such as disclosure vs. non-disclosure of Holocaust experiences, parallel those found in traditional relational dialectics. Other tensions, such as assimilation into American culture vs. reclamation of cultural traditions, expand the scope of dialectics when applied to personal identity. This project illuminates how personal and Jewish identity relies not simply on collective suffering but on reclaiming life after trauma and relocation. Examining how narratives perform this restorative process could enrich understanding of other diasporic and persecuted populations.

“Introducing Eco-musicology: a Website and Bibliography”

Presenter: Corey Bellis

Major: Music (General)

Co-Author(s): Nicholas Lee

Co-Presenter(s): Nicholas Lee

Mentor: Aaron Allen

Department: Music

Our project developed a website and bibliography for the Ecocriticism Study Group (ESG) that would also be accessible to non-musicologists interested in the emerging field of ecomusicology. The ESG (affiliated with the American Musicological Society) is a forum for exploring the intellectual and practical connections between music, culture, and nature. The ESG integrates music scholarship with ecocriticism, a well-developed field of literature scholarship that highlights the manifold roles of nature and environment in the creation and interpretation of culture. The project had two main components: Nicholas Lee developed the website using WordPress, and Corey Bellis gathered resources for the website’s extensive bibliography, which is updatable and includes multimedia, web, and text sources pertaining to ecomusicology. With Zotero, an open-source research and bibliography tool, website users will be able to search for specific topics detailed within the bibliography (such as interspecies music or soundscapes). The bibliography and website have been made available to a small group of ESG scholars who offered feedback. While continuing to hone the site and bibliography, Nicholas, Corey, and faculty mentor Dr. Aaron Allen read and discussed some of the bibliography’s resources to better understand the meaning and importance of the interdisciplinary study of ecomusicology.

“Exploring Expertise in the Arts in the Context of Motion Picture Media”

Presenter: Chris Berg

Major: Psychology

Mentor: Paul Silvia

Department: Psychology

Previous studies of the arts have determined major cognitive and perceptual differences between experts in a given field and novice observers (Kozbelt & Seeley, 2007). Film, as a medium, integrates several other artistic media into a single work. Specifically, film has elements of literature, visual art, and music, all of which are crucial to the success of the work as a whole. In spite of the popularity of film and television, the idea of expertise in the motion picture media has not been adequately explored. In the present study the researchers will attempt to determine if the aesthetic fluency scale devised by Smith and Smith (2006) can be applied to the study of expertise in film, and if the same theories of appraisal can be applied (Silvia, 2006). By adapting and applying various scales developed to measure expertise in visual art, the researcher seek to determine if similar differences between experts and novices will exist in the motion picture media, and which of these measures are most effective.

“Denying Closure, Foreclosing Denial: Life After the Holocaust”

Presenter: Fawn Cannon

Major: History

Mentor: Roy Schwartzman

Department: Communication Studies

North Carolina has no secondary school curricular standards that include Holocaust education. This community-based research develops interactive multimedia educational resources that teachers will be able to utilize in the classroom. These resources profile survivors who resettled in North Carolina and how they constructed their identities in a new society, culture, and country, in the aftermath of war and genocide. The profiles employ testimonies newly gathered from survivors and archival footage from the UNC Visual History Archive. By focusing on survivors who have lived in the midst of students’ communities and confronted questions about “fitting in” that resonate with adolescents, the survivor stories allow history to come alive. Perceived distance from the Holocaust and its implications makes students vulnerable to Holocaust denial, which portrays the Holocaust as a Jewish ploy for sympathy, publicity, and resources. This presentation explains how the fallacies of Holocaust denial lure audiences into anti-Semitism under the guise of open debate and scholarly inquiry. The research project probes how mere knowledge about the Holocaust fails to counteract denial. Instead, creating resources that develop a sense of identification with survivors can convert the Holocaust from a morbid history lesson to a study in ongoing identity reconstruction.

“The Effects of Action on Memory Organization”

Presenter: Naomi Chatley

Major: Psychology

Mentor: Stuart Marcovitch

Department: Psychology

Other Mentor(s): Lili Sahakyan

Organizational strategies involve the grouping of to-be remembered items into conceptually similar categories, but children as old as eight fail to produce organizational strategies in verbal memorization tasks. As both action and language are important in memory formation, it is possible that in children memory for action is dominant as they learn through interactions with the environment around them long before verbal skills develop. The purpose of this ongoing project is to study the effect of physical action on young children’s ability to use organizational strategies. Children are introduced to a list of nine actions that are either learned verbally or enacted to directly compare differences in memory organization. Preliminary data suggests that indeed, more organization for self performed action was found in 4- and 6-year-olds.

“Roman Provincial Policy in Cyrenaica”

Presenter: Ryan Clarke

Major: Classical Studies

Mentor: Jonathan Zarecki

Department: Classical Studies

In 96 BCE Apion, the king of Cyrenaica, died, leaving his kingdom to the Rome. Rome proceeded to annex the territory; however, they did not send a governor to the province until as early as 74 BCE. In that year Publius was sent to the province to establish secure Roman interests. Publius’ appointment as quaestor pro praetore, or fiscal officer, demonstrates a renewed Roman interest in Cyrenaica and his appointment as governor demonstrates financial motivation. Though Publius was the first governor of the province of Cyrenaica, Gnaeus’ arrival in 67 BCE represents a change in Rome’s attitude. As a legatus, or commander, of Pompey, Gnaeus’ duties were military. After 67 BCE, Cyrenaica was governed by a magistrate holding the more usual propraetorian status. My purpose is thus two-fold. First, I will examine the circumstances surrounding Rome’s decision to complete the provincialization of Cyrenaica in 74 BCE, and how economic and military considerations encouraged a period of irresponsible neglect in the years 96-74 BCE. Second, I will illuminate the importance of Rome’s treatment of Cyrenaica in the study of Roman imperialism in the 1st century BCE. As I will demonstrate, Cyrenaica provides a precedent for Rome’s later handling of Pompey’s eastern settlement and the annexation of Cyprus in 58 BCE.

“The Effect of Transgenic Constructs of USP on *Drosophila* Development”

Presenter: Cary Cotton

Major: English

Co-Author(s): Jesse Plotkin

Mentor: Vincent Henrich

Department: Biology

The ecdysteroid receptor complex, composed of the ecdysone receptor (ECR) and ultraspiracle (USP), responds to 20-hydroxyecdysone to control development with chronological and tissue specificity in *Drosophila*. USP has been shown to facilitate ecdysone-inducible transcriptional response by formation of a ECR/USP heterodimer that binds DNA. Cell culture studies and *in vivo* studies suggest the role of USP in ecdysone inducible response is more complex. To test this relationship, we have used genetic tools in *Drosophila* to express three USP constructs under the control of an ubiquitously active actin promoter and a driver specific to the prothoracic gland, the source of the 20-hydroxyecdysone precursor. Wild-type USP was expressed along with a USP construct with deleted DNA-binding domain. An RNAi construct that knocks out USP was also employed. Necrotic phenotypes and third instar larval lethality were observed both with knockout of wild-type USP and with its over-expression both in the prothoracic gland and under the actin promoter. USP with deleted DNA binding domain was only lethal when expressed ubiquitously. These results suggest complication of the heterodimeric ecdysone receptor mechanism in some tissues and suggest that USP has some function outside of DNA binding.

“Marital Conflict, Mother-Child Relationships, and Depressive Symptoms”

Presenter: Michelle Creed

Major: Psychology

Mentor: Lilly Shanahan

Department: Psychology

Marital conflict is associated with children’s psychological adjustment. Children’s reports of marital conflict are expected to be linked with children’s depressive symptoms, and the quality of parent-child relationships will influence how the child is affected by marital conflict. Girls are expected to display more internalizing behaviors than boys, and greater differences in siblings’ reports of marital conflict will be linked with greater differences in siblings’ depressive symptoms. Forty-eight children were recruited from an ongoing research project, along with their siblings and mothers to complete a series of questionnaires. All of the hypotheses were supported, except that a close mother-child relationship increased the child’s risk for depressive symptoms.

“Pastiche and Parody: Imitation's Role in Julie Heffernan's Self-Portraiture”

Presenter: Kyle Cupit

Major: Art

Mentor: Heather Holian

Department: Art

Other Mentor(s): Porter Aichele

This paper examines the role of imitation in contemporary painter Julie Heffernan's oeuvre, mining three paintings held within North Carolina collections for art historical references, and establishing a binary between that process of visual assemblage and an adherence to an essentially feminine visual rhetoric. Heffernan creates an elaborate paradoxical weaving of imagery and agency that is at its heart not only feminine, but purely feminist. Below is an excerpt including the thesis statement: With the proficient brush of an accomplished woman painter appropriating from and competing with the so-called “Great Masters,” she utilizes the practice of imitation via parody and pastiche to create visual puzzles filled with art historical references that keep the viewer from ever completely reaching understanding. I intend to redefine the boundaries and intents inherent in Heffernan’s use of those imitative practices by examining her background, working methods, and their role in her work, shedding the negative connotation associated with mimesis in contemporary culture and restoring imitation’s potential for polemic through a decidedly feminist lens.

“Foster Care Chronicles”

Presenter: La’Shanda Daniels

Major: Social Work

Mentor: Maura Busch-Nsonwu

Department: Social Work

Other Mentor(s): Daniel Veerman, Sue Dennison

The purpose of this study is to collect the opinions and first hand experiences from teens currently living or who have previously been in the custody of Guilford County’s Department of Social Services. The responses that the teens provide will allow the research team to understand what teens in foster care would like to change about the system, as well as gain insight of the participant’s personal experiences. With the knowledge of these personal experiences the team can gain an understanding of how this has affected the participant’s lives. Another component of the study uses narrative, in which participants perform a play written by a former social worker. The participants are able to incorporate personal emotions and experiences within the play. In addition, the research team has conducted anonymous surveys/questionnaires. The surveys/questionnaires ask participants about the foster care system and how it could be a more effective system for themselves and future teens who may become under the care of the Department of Social Services.

“Women's Perceptions of Entrepreneurial Opportunity: Encouraging Women to Move Ahead with Entrepreneurial Plans”

Presenter: Lavonda Daniels

Major: Business Administration

Mentor: Channelle James

Department: Business Administration

Research studies have shown that gender has an effect on the internal and external perceptions of entrepreneurial qualities in women and men. These perceptions affect the opportunities for women versus men to partake in entrepreneurial actions. Limited entrepreneurial development happens because of these perceptions created by gender. Our major themes to research are what do women need in order to change gender perceptions and open avenues for entrepreneurial activity and what can communities do to enhance economic development and meet the needs of these women in the entrepreneurial process? We use the collaboration of the University of North Carolina at Greensboro--Bryan School of Business and Economics--Entrepreneurship Department, the Nussbaum Center of Entrepreneurship located in Greensboro, NC and the Women's Entrepreneurial Leadership and Learning Program (WELL) to explore these topics. WELL was formed to provide a service for women entrepreneurs to network, participate in seminars that target issues in entrepreneurship and to allow women entrepreneurs to showcase their expertise in entrepreneurship. Our research will aid in program development for the WELL Program.

“Music Perception in Primates: Bonobos (*Pan paniscus*)”

Presenter: Ryan Daniels

Major: Music (General)

Mentor: Patricia Gray

Department: Music

The Bonobo, *Pan paniscus*, shares 99.797% of human DNA and is the most closely related to humans of the great apes. Bonobos exhibit many of our species' social propensities and a group at the Great Ape Trust of Iowa (GATI) has demonstrated language capabilities and other culture building characteristics. My research focuses on data I helped capture at GATI and analyze of bonobos - Panbanisha and Kanzi - participating in studies to assess beat entrainment and rhythmicity - abilities traditionally presumed to be uniquely human. Using synthesizers, MIDI, and videography, we collected 3 days of data. Working in LogicExpress, MatLab, PRAAT, and using non-linear analysis techniques, I have participated with two senior researchers in establishing the first evidence of rhythmic entrainment by bonobo apes during improvisational music-making with humans. This research broadens the scope of a key musical capacity to other primates, and suggests that a common ancestor, approximately 6 million years ago, may have had the same capability. These findings are reported in a pending article for NATURE for which I am a co-author. Further, this work suggests a broader evolutionary track and new research paths for spoken language, musical language, and other temporal dynamical communication. I continue to be analyze temporal and melodic contour patterns in bonobo vocalizations for significant musical constructions and patterns. By examining musicality in Bonobo apes, we are expanding our understanding of the 'culture of the ear' while showing musical linkages in the evolution of culture creation.

“The Effects of Perfectionism, Neuroticism, and Negative Life Events on Depression”

Presenter: Heather Dark

Major: Psychology

Co-Author(s): Natalie Hundt, Rosemary Nelson-Gray

Mentor: Rosemary Nelson-Gray

Department: Psychology

Maladaptive perfectionism has been described as the need to avoid failure, an inability to derive satisfaction from superior performances, embedded feelings of inferiority, and a need for approval and acceptance of others. Neuroticism and perfectionism show similar characteristics and both have been shown to be a vulnerability for depression. This study examined the interaction of perfectionism, neuroticism, and negative life events on depressive symptoms in undergraduates. This study (n=275) yielded several significant correlations, but few significant interactions were found. Higher depression scores were significantly and positively correlated with maladaptive perfectionism and negatively correlated with adaptive perfectionism scales. And perfectionism interacted with neuroticism to predict depressive symptoms. This study provides further insight into the multidimensional personality characteristic of perfectionism and its effects on those with other maladaptive personality traits. It also provides further insight into perfectionism as a vulnerability factor for depression. Additionally, this study has negative implications regarding the effects of a high demand for perfection in our lives, including familial and societal expectations in academic and work performances as well as physical appearance.

“Food Assistance, INC Project”

Presenter: Addison Davis

Major: Mathematics, Marketing

Co-Author(s): Bailey Holt, Christopher Koch, Angeline Webb

Co-Presenter(s): Bailey Holt, Christopher Koch, Angeline Webb

Mentor: Lew Brown

Department: Bryan School of Business & Economics

Our group is doing Marketing Research and creating a Marketing Plan for Food Assistance, Inc. Food Assistance, INC is a nonprofit organization that is volunteer-driven. Jane Carlson, Executive Director of Food Assistance, INC, is the only paid employee. She has enlisted our help in three areas: Grants and Donor Funding, Community recognition, networking and collaboration, and Building a corporate support base; building a larger volunteer base. The project is being done for Dr. Llewellyn Brown’s Marketing 429 class, Advanced Marketing Management. Our marketing plan must incorporate an executive summary, situation analysis, S.W.O.T analysis, marketing strategy development, marketing mix development, marketing objectives, and marketing performance evaluation. The situation analysis includes a company analysis, industry analysis, market analysis, competitor analysis, and environmental analysis. S.W.O.T analysis means, Strengths, Weakness, Opportunities, and Threats of Food Assistance, INC. S.W.O.T analysis is based on the situation analysis. We have been appointed two mentors from the Nussbaum Center, Sam Funchess and Clay Howard, to help guide us through the project with any questions we might have.

“FLUID ARCHITECTURES: A Cognitive Perspective on the Structure of Subjectivity”

Presenter: Aaron Dell

Major: English

Mentor: Annette Van

Department: English

This project bridges two fields that have traditionally had little to do with one another: cognitive science and literary theory. I begin by describing two themes of cognitive science for an audience within the humanities. The first is nativism, the idea that certain features of the human mind are universal and innately specified. Nativism has been received unfavorably within the humanities, but enjoys widespread empirical support in several areas of cognitive science. I show that nativism is not an all-or-none proposition and that, when responsibly qualified, is important to take into account when answering the kinds of questions about culture and society with which literary theorists are often concerned. The second theme is the extended mind hypothesis, which claims that the mind may be usefully viewed as extending beyond the brain into an individual’s body and environment. While these two approaches appear interesting but contradictory in isolation, I present a unified theory of subjectivity—a theoretical framework for answering questions about the individual’s role in social, cultural, and political life— informed by both. Such a framework, I claim, is necessary for literary theorists who are interested in answering large-scale questions about society in the age of digital transformation.

“AD/HD, Academic Achievement, and Social Adjustment: Role of Informant”

Presenter: Brittany Dixon

Major: Psychology

Mentor: Susan Keane

Department: Psychology

Children with attention-deficit/hyperactivity disorder (AD/HD) are more likely to have academic and social problems. Symptoms of hyperactivity, even at subclinical levels, can be detrimental. Identification of these symptoms is complicated by low agreement between reporters of children’s behavior. The goal of this study was to determine which reporter (peers or teachers) was a stronger predictor of later adjustment, and whether it depends on the outcome being assessed. Ninety-five children were participating in an ongoing longitudinal study. In kindergarten, children’s teachers and classmates reported on their hyperactivity. In 5th grade, teachers rated children’s academic success, and a peer measure of social adjustment was gathered (how well-liked the children were by their classmates.) Children also completed a standardized achievement test. We found that by themselves, both teacher and peer reports of kindergarten hyperactivity were associated with worse academic and social outcomes. When we included both reports in a single analysis, only teacher-reported hyperactivity (kindergarten) was a significant predictor of academic outcome (5th grade) and only peer-reported hyperactivity (kindergarten) was a significant predictor of social outcome (5th grade). This suggests that children with hyperactivity should be identified based on multiple reporters, and interventions should target the domains in which the children display symptoms.

“Novel Nitrogen-linked Diphosphine Ligands for Ethylene Oligomerization”

Presenter: Veska Dobrevva

Major: Biology

Co-Author(s): Amanda Roffman

Co-Presenter(s): Amanda Roffman

Mentor: Terence Nile

Department: Chemistry & Biochemistry

In recent years, extensive effort has been made to develop systems that achieve selective oligomerization of linear terminal olefins. In particular, 1-hexene and 1-octene stimulate great interest due to their application as comonomers for the production of linear low-density polyethylene. Several ethylene trimerization catalyst systems have been developed, most of which are based on chromium catalysts using nitrogen-linked nitrogen linked diphosphine ligands, $R_2PN(R')PR_2$ or PNP ligands. Our research has focused on the synthesis of PNP ligands with functional groups that will allow the PNP moiety to be tethered on supports. For example a PNP with $R' = \text{styryl}$ could be polymerized to give the PNP moiety attached to a polystyrene backbone. The synthesis and characterization of this and other PNP ligands will be presented.

“UNCG Marketing and the Community: Working together in an effort to increase the opportunities for informal education for all members of the Guilford County Community”

Presenter: Daniel Englebretson

Major: Business Administration, Marketing

Co-Author(s): Bethany Brown, Lavonda Daniels, Cynamon Frierson, Latasha Herring

Co-Presenter(s): Bethany Brown, Lavonda Daniels, Cynamon Frierson, Latasha Herring

Mentor: Lew Brown

Department: Bryan School of Business & Economics

We are a team of five seniors in the marketing program here at UNCG who have been working with seven of Guilford County’s major cultural attractions in an effort to solidify a partnership between the key members of the downtown cultural district. Through our collaborations with The Natural Science Center, Blandwood Mansion, Greenhill Art Gallery, The African American Atelier, Greensboro Historical Museum, Greensboro Public Library, and The Children’s Museum, we have made significant headway towards the creation of a tangible and realistic marketing plan. Our plan outlines specific strategies and suggests the means to execute as an umbrella organization. The creation of this new organization will allow the network to leverage the strengths of each member as a group while benefiting independently, with the long-term goal of developing an identity for a group of organizations that care. Our research will work to generate heightened awareness, an increase in traffic generated by the local community, and ultimately an increase in the quality of life for all members of the Guilford County community.

“When Can a Dung Beetle Also Be a Hawk? A Game Theoretical Approach to Modeling Behavior”

Presenter: Meghan Fitzgerald

Major: Biology

Mentor: Jan Rychtar

Department: Mathematics & Statistics

Other Mentor(s): Mary Crowe

Forming a brood ball is a necessary but energetically costly reproductive endeavor for the North Carolina dung beetle *Onthophagus taurus*. As a way of increasing individual fitness and decreasing time and energy spent on reproduction, certain females have been shown to steal the brood balls built by others and place their own egg inside. This behavior, known as brood kleptoparasitism, can potentially increase the amount of offspring they are able to produce throughout their lifetime. Our research group has developed a game theoretical model of brood parasitism which incorporates all of the activities required to produce a brood ball as well as potential guarding and stealing behavior. Using this model we have made predictions regarding the Evolutionarily Stable Strategies of a Hawk or Marauder in the population. In order to test the accuracy of the model we used lab and field experiments in conjunction with research data and have found agreement between biological and mathematical data. In both the empirical data and the model there is a relationship between the density of the population and the number of brood balls produced.

“Increasing Awareness and Support for a Local Refugee Resettlement Agencies: A Strategic Assessment Study”

Presenter: Krycia Flores Rojas

Major: Sociology

Co-Author(s): Lindsay Levis

Mentor: Stephen Sills

Department: Sociology

Over the course of the past two decades the Triad area has become home to a large Latino population as well as thousands of new migrants from Africa, Southeast Asia, Central and Eastern Europe, and the Middle East. Many of these immigrants arrived as refugees, fleeing wars, political persecution, or inter-ethnic conflict. The federal government relies on nonprofit agencies to help with the relocation of these refugees, supporting them monetarily to carry out the mission of resettlement. Refugees are expected to be self-sufficient within 180 days of their arrival, and funding is ended after this time period. This deadline challenges resettlement agencies to be as resourceful as possible in providing ESL classes, job-skills training, providing low-cost housing, and assisting in other needs of newly arrived immigrants. This project aimed to review and evaluate the strategies used by a local social service agency to maximize their resources. Staff, volunteers, and refugees were interviewed regarding their current needs and opinions about how to further engage the local community, increase volunteer participation, and address unmet needs. In addition, community donors were surveyed to provide evaluation and feedback about the agency. The research underscored vital areas of unmet needs as well as some of the organizational barriers that limited their ability to take advantage of resources readily available in the community.

“A Trait Network and Genetic Control Model of Resource Allocation Strategies in *Arabidopsis lyrata*”

Presenter: Robert Gove

Major: Computer Science and Applied Mathematics

Co-Author(s): Rebecca Fogel, Jan Rychtar, David Remington

Mentor: David Remington

Department: Biology

Other Mentor(s): Jan Rychtar

We have developed a model using the plant *Arabidopsis lyrata* as a model organism to understand the genetic basis for resource allocation between growth and maintenance vs. current reproductive output. *A. lyrata*, which is a perennial, is well-suited for this task because of its extensive variation in resource allocation strategies. Moreover, it is a sister of the annual model plant *A. thaliana*, and both plants have completed genome sequences. These facts, combined with the contrast between annual vs. perennial life histories, provide excellent conditions to examine resource allocation strategies and trade-offs. We have constructed a trait network to model the hierarchy of growth and reproductive traits in the plant and their influences on each other. From this trait network we derived a system of linear equations to simulate populations in which the phenotypic trait values are functions of genetic, environmental and upstream trait effects. The model is flexible in its ability to simulate different populations which have different traits under genetic control. By comparing the correlations of the simulated data to field data we are able to test the predictive value of the trait network model as well as predict which traits may be under genetic control in that population.

“Big Brothers Big Sisters of the Central Piedmont – Volunteer RecruitmentBig Brothers Big Sisters of The Central Piedmont - Volunteer Recruitment”

Presenter: Kyra Haifley

Major: Business Administration, Marketing

Co-Author(s): George Acheampong, Rachel Leigh Dickinson, Carrie Jerman, Tyler Wilson

Co-Presenter(s): George Acheampong, Rachel Leigh Dickinson, Carrie Jerman, Tyler Wilson

Mentor: Lew Brown

Department: Business Administration

Our project involves the recruitment of volunteers for The Central Piedmont branch of Big Brothers Big Sisters, which is located in High Point, North Carolina. The organization is non-profit and relies heavily on volunteer support to provide services to youth. The programs available through Big Brothers Big Sisters of The Central Piedmont involve an adult mentor (ages 18 and older) matching up with a youth in the area based on background, interests, schedule, and a variety of other characteristics. The volunteers commit for a minimum of a year, and visit the youth either at school or at their (the youth's) home, based on which program the pair is enrolled in. The "Big" (volunteer) and "Little" (youth) can engage in a range of activities including homework help and outdoor recreation (kicking the soccer ball, playing basketball). There are several hundred youths on the waiting list because of the shortage of volunteers. Therefore, our group is charged with finding innovative ways to draw more volunteers, particularly males, to the program.

“Regulation of Wnt5a Gene Expression”

Presenter: Ashley Harris

Major: Biology

Co-Author(s): Christopher Gage, Amber Kuk, Karen Katula

Co-Presenter(s): Christopher Gage

Mentor: Karen Katula

Department: Biology

Wnt5a is a secreted protein that activates the noncanonical Wnt signaling pathway. It is involved in cell growth control, differentiation, and cell movement. Significantly, Wnt5a is often over expressed in a variety of cancers. Its over expression has been associated with malignant progression and increased invasiveness of cancer cells. We are interested in the regulation of the Wnt5a gene. Different amounts of Wnt5a upstream sequences were cloned into the pGL4 luciferase reporter vector and stably transfected into NIH 3T3 cells. These constructs and cell lines were used to analyze the expression of the Wnt5a gene. The expression of the Wnt5a gene was analyzed during the cell cycle, in serum starved and growing cells, and in cells treated with inhibitors of various signaling pathways. Results indicated that 1) the Wnt5a gene requires over 2000 bp of upstream sequence for maximal expression; 2) the gene is not regulated during the cell cycle; 3) the gene is expressed at a higher level in growing cells; and 4) the expression of Wnt5a is linked to several signaling pathways including MAPK, PI3K, and PKC, and AKT. These findings suggest that Wnt5a expression can be altered by changes in a variety signaling pathways associated with cancer.

“Phenylthiocarbamide (PTC) Taste Blindness in General Population: Sensory and Neurocognitive Deficits in Relation to Schizophrenia”

Presenter: Joshua Harrison

Major: Psychology

Mentor: Walter Salinger

Department: Psychology

People diagnosed with schizophrenia are more than twice as likely to be PTC taste blind (i.e., inability to taste phenylthiocarbamide) as healthy controls. Moreover, healthy individuals whose first-order relatives have schizophrenia carry an elevated genetic burden of risk for developing the disorder and are also more than twice as likely as controls to be PTC taste blind. Together, could these facts mean that the TAS2R38 genotypes for PTC taste blindness are genetic markers for elevated risk for developing schizophrenia, even in a sample that is largely composed of healthy controls? To address this question, we genotyped 359 college student volunteers and we evaluated aspects of their psychological functioning that relate to risk for developing schizophrenia, using the questionnaire-based Psychosis-Proneness Scale (PPS) and Executive Function Scale (EFS), using the standardized measures of cognitive functioning, including the Paired Associates Learning Task (PALT) and the Scholastic Aptitude Test (SAT), and using a tested subset for PTC taste blindness. We report that college students who had the TAS2R38 genotypes linked to PTC taste blindness were significantly more likely than those who did not to display modest indications of elevated risk for schizophrenia on the EFS, PALT, and SAT measures, but not on the PPS.

“Identifying novel components of the Dtopors chromosome segregation pathway.”

Presenter: Miranda Hayworth

Major: Biology

Co-Author(s): Mohammad Rasool

Mentor: John Tomkiel

Department: Biology

The nuclear protein, Topors, has been implicated in a variety of human cancers. We are studying the homologous gene (Dtopors) in the fruit fly, *Drosophila melanogaster*, to gain insight into its function. A mutation in Dtopors results in abnormalities in meiosis including disruption of the nuclear membrane, defects in centriole division, and perturbation of proper chromosome segregation. The Topors protein is a member of a family of Sumo and Ubiquitin ligases. This family of proteins is involved in the modification of proteins to alter their function or to target them for destruction. We have designed a genetic scheme to identify genes in the Topors pathway based on suppression of male sterility caused by mutations in Dtopors. We have identified eight mutations that restore fertility to Dtopors mutants. Currently, we are mapping these mutations to identify the genes involved in the suppression of sterility and will cytologically characterize their effects. We expect that some or all of these Topors modifiers will identify new members of conserved pathways involved in tumorigenesis and provide insight into the possible role of Topors in cancer.

“Finding Our Space Between: Ethnographic Journeys in Search of Self, Community, and Religion in Virtual Reality.”

Presenter: Kevin Heston

Major: Religious Studies

Co-Author(s): Cardea Virtual Research Team: Rebecca Davis, Sabrina Epps, Anna Michelle Lampley, Jayme Mallindine

Co-Presenter(s): Rebecca Davis, Sabrina Epps, Anna Michelle Lampley, Jayme Mallindine

Mentor: Gregory Grieve

Department: Religious Studies

The virtual is the vast space between human reality and the human imagination. Reality has never satisfied humankind and so we continually journey through the virtual reaching for but never grasping our imagination. Until recently, unless we were gifted writers, story tellers, artists, or musicians our virtual journeys remained locked within. Computers and the Internet make it increasingly possible to unveil our virtual visions and to share more of our journey with others. This unveiling is given new opportunity in the 3-D cyberworld of Second Life. With narcissistic attention to detail, residents create virtual-selves and a wide range of social systems. Many individuals react to this unprecedented agency by recreating and embedding in virtual analogues of traditional and modern social structures; others embrace the new freedom of expression and association and approach a post-modern, cosmopolitan self. Join five UNCG students from the Department of Religious Studies in their ethnographic journeys into the virtual world of Second Life. Share the experience of recreating your “self” to your own “virtual” specifications; of building the cities, synagogues, mosques, churches and landscapes of your dreams, and join in community, and encounter religion along the way.

“The Effect of Soil pH and Nitrogen Level upon the Concentration of Dodeca-2E,4E,8Z,10Z-tetraenoic acid isobutylamide in Echinacea purpurea”

Presenter: Alan Jarmusch

Major: Biochemistry

Mentor: Nadja Cech

Department: Chemistry & Biochemistry

Different pH and nitrogen rates were used as experimental treatments to greenhouse grown Echinacea purpurea in a 3 x 3 factorial randomized complete block design. Each treatment was replicated 6 times with 2 replicates to be harvested at each harvest time (emergent, flowering, and post-bloom). The concentration of dodeca-2E,4E,8Z,10Z-tetraenoic acid isobutylamide was quantified using mass spectrometry. It was found that the concentrations of the dodeca-2E,4E,8Z,10Z-tetraenoic acid isobutylamide did not change in various soil pH's and nitrogen concentrations, or change when harvested at different times throughout the plants growing cycle. It was also found that the Echinacea purpurea ethanolic suspensions were stable and did not degrade over time.

“Oxidation of Chiral Aromatic Aldimines by Rabbit Liver Aldehyde Oxidase”

Presenter: Derek Koonts

Major: Chemistry

Mentor: Bruce Banks

Department: Chemistry & Biochemistry

Aldehyde oxidase is a molybdenum-containing enzyme present in most living organisms, including mammals and humans. The enzyme catalyzes oxidation of aldehydes and aromatic nitrogen heterocycles, many of which occur as xenobiotics. Aromatic aldimines have recently been established as a new class of highly efficient and stereoselective substrates for aldehyde oxidase. In this project, chiral aromatic aldimines were synthesized from the reaction of α -methylbenzylamine with 4-substituted benzaldehydes. Compounds containing cyano, nitro or hydrogen at the 4-position have been synthesized and characterized by NMR and infrared spectroscopy. Oxidation of these chiral compounds by rabbit liver aldehyde oxidase would offer a new method for the synthesis of enantiomerically enriched amides. Results of enzymatic oxidations in mixed organic aqueous solvents will be reported.

“Aldimine Oxidation by Aldehyde Oxidase: New Tricks for an Old Enzyme”

Presenter: Maryanna Lanning

Major: Chemistry

Mentor: Bruce Banks

Department: Chemistry & Biochemistry

Aldehyde oxidase is a molybdenum-containing enzyme present in most living organisms, including mammals and humans. The enzyme catalyzes oxidation of aldehydes and aromatic nitrogen heterocycles, many of which occur as xenobiotics. Aromatic aldimines have recently been established as a new class of highly efficient and stereoselective substrates for aldehyde oxidase. In this project, chiral pyridine aldimines were synthesized from the reaction of α -methylbenzylamine with 3- and 4-pyridine carboxaldehyde. Both the racemic and enantiomerically pure forms of the compounds were purified and characterized using NMR and infrared spectroscopy. The chiral pyridinimines were evaluated as substrates for rabbit liver aldehyde oxidase and stereoselectivities were determined. Results of these experiments should assist in further defining the stereoselectivity of aldehyde oxidase towards chiral substrates, including pharmaceuticals and other xenobiotics.

“Children’s Personality Judgments Vary as a Function of Social Ambiguity and Self-Concept”

Presenter: Candace LaPan

Major: Psychology

Co-Author(s): Janet Boseovski, Sandra Bosacki

Mentor: Janet Boseovski

Department: Psychology

The present study examined how self-concept influences personality attributions in middle to late childhood. Fifty-four children between 6 and 11 years of age were read stories about a target character who was excluded from a social interaction. Stories were either ambiguous or unambiguous (i.e. exclusion was intentional). Participants then made personality attributions and behavioral predictions about the actors and the target character. Harter’s Self Perception Profile (1982) was administered to assess participants’ self-concept. Preliminary data analyses revealed that participants were more likely to make negative attributions of the characters in the unambiguous condition, (Wald = 4.22, $p = .04$). Participants with a higher self-concept made fewer positive attributions about the actors, $r(54) = -.27$ $p < .05$, and were less willing to befriend them hypothetically, $r(54) = -.29$ $p < .05$. These findings suggest that children in middle to late childhood are sensitive to social ambiguity and make appropriate personality attributions dependent upon the type of information provided. In addition, self-concept may be a social buffer, as children with a higher self-concept were more hesitant to subject themselves to a possibly unfavorable social situation.

“A Search for Metamorphic Cues in the Marine Snail *Ilyanassa obsoleta*: Adults and the Neurotransmitter Gamma-aminobutyric acid.”

Presenter: Joshua Long

Major: Biology

Co-Author(s): Jayce Cook, Jeremy Washburn, Nishant Shah, Esther Leise

Mentor: Esther Leise

Department: Biology

Ilyanassa obsoleta inhabits intertidal mudflats along the eastern United States and, like most marine invertebrates, displays a biphasic life cycle consisting of a swimming larval stage followed by metamorphosis into a benthic adult. In *Ilyanassa*, larval metamorphosis is initiated by environmental cues and we know that two endogenous neurotransmitters, serotonin and nitric oxide (NO), are involved in this process. Serotonin induces metamorphosis, whereas NO maintains the larval state. To further our understanding of metamorphosis and its underlying mechanisms in *Ilyanassa*, we have sought both natural inducers and other endogenous neurotransmitters. Results from preliminary experiments led us to suspect that adult snails produced an inductive cue. Some of our experiments yielded positive results, while others did not. Because gamma-aminobutyric acid (GABA) had been used to induce metamorphosis in marine molluscs, we turned our attention to this ubiquitous inhibitory neurotransmitter. While many molluscs, such as clams (*Venerupis*), oysters (*Ostrea*), and abalone (*Haliotis*), metamorphose upon exposure to GABA, in *Ilyanassa*, metamorphosis is inhibited by this neurotransmitter. Application of the GABA inhibitor, picrotoxin, induces metamorphosis, suggesting that inhibitory signals from GABA-producing cells are responsible for dampening the metamorphic process in *Ilyanassa*.

“Developing Exercise Programs for Sedentary Mexican Immigrant Children”

Presenter: Cara Mann

Major: Anthropology

Mentor: Susan Andreatta

Department: Anthropology

There is a growing rate of obesity among Mexican immigrant children in Guilford County, North Carolina. This paper proposes to reach Mexican immigrant children through a school exercise pilot project to prevent the development of Type 2 Diabetes, and to facilitate healthy lifestyles by encouraging activity both on an individual and family level. This exercise program will include various methods to increase the children’s physical activity levels. Among these are the use of active classrooms, more fulfilling practices in physical education classes and walking school buses. Incorporating an exercise program in conjunction with a rewards program, this project is designed to support and coexist with a culturally conscious school lunch program. This program will use applied anthropologist John VanWilligen’s Participatory Action Research method. Community participation will be encouraged by using methods of focus groups, family interviews and observation of daily routines in both the home and school. This study is to help Mexican immigrant children assimilate, enculturate and acculturate without rapid weight gain.

“Exploring the Opportunities for and Barriers to Using Local Farm Products in Restaurant Menus in the Piedmont Triad”

Presenter: Paul Marini

Major: Hospitality & Tourism Management

Mentor: Bonnie Canziani

Department: Recreation, Tourism & Hospitality Management

Carlo Petrini of Italy founded the International Slow Food organization which seeks to reverse the negative effects of fast food, fast life and non-sustainable food production on our society, local economies and environments. Slow Food is both a philosophy and a call for activism in the arena of sustainable food production and consumption. This study explores the opportunities for and barriers to using local farm products in restaurant menus in the Piedmont Triad. Face to face interviews with chefs, restaurant owners, farmers, and local Slow Food members yielded a comprehensive perspective on how the Piedmont Triad can use more local products in restaurants. Results indicate that both farmers and chefs have a desire to deal more directly with each other but current relationships are influenced by menus requiring guaranteed product availability and competitive food costs. Pricing is a major issue in that farmers and chefs have yet to agree upon whether wholesale or retail pricing levels are most appropriate. Subjects generally concur that education at an early age is required to create community awareness and commitment to local consumption habits.

“Evaluation of Food Security, Nutritional Outcomes and Program Satisfaction among Food Assistance, Inc Participants”

Presenter: Anna Matteson

Major: Nutrition

Mentor: Lauren Haldeman

Department: Nutrition

Food Assistance Inc. (“Groceries on Wheels”) is an outreach program for low-income seniors and disabled in Guilford County NC. Food, friendship, and hope are offered by its volunteers to enhance the quality of life for these individuals. The goal of this study is to determine if the foods offered enhance the diet quality and food security among its participants. The study also serves to assess overall participant satisfaction with Food Assistance Inc. A convenience sample of 35-40 participants will be recruited from a master list. Data will be collected in the homes of participants using a quantitative questionnaire and semi-structured interview. Information collected will include: socioeconomic and demographic status; personal health and nutrition/food concerns; the effect of Food Assistance Inc. on monthly food needs, quality of life, and diet; reliance on program provided nutrition education materials for making healthy behavior changes; and participant level of need and satisfaction with the program. The results of this project will be used as a means to evaluate Food Assistance Inc and improve the services it offers to its participants.

“The Romans’ True Colors”

Presenter: *Lauren McCormick*

Major: Classical Studies

Mentor: David Wharton

Department: Classical Studies

Languages across cultures and times vary greatly in the ways that they name and categorize colors. English, along with the languages in most European, industrialized countries, has eleven Basic Color Terms (BCTs): black, white, gray, red, yellow, orange, pink, brown, blue, green, and purple. But anthropological and linguistic studies in the last 50 years have shown that some languages have as few as two or three BCTs. The purpose of this project is to address some long-standing confusion about the color words of ancient Latin – how many BCTs did it have, and what range of hues did they denote? A survey of surviving Latin literature shows strong support for three BCTs: niger (“black”), albus (“white”), and ruber (“red”). But the infrequency and limited uses of other color words in the Latin color vocabulary, such as viridis (“growing-fresh-green”), caeruleus (“green-blue-gray-black”), and luteus (“bright yellow”), indicates that they were probably not BCTs, and the average Latin speaker of the 1st century B.C. would thus have categorized colors much differently from us.

“Developing Inbred Lines for an Outcrossing Plant: Genetic Analysis Tools for *Arabidopsis lyrata*”

Presenter: *Madeleine Mvula*

Major: Biology

Co-Author(s): Sahar Osman

Co-Presenter(s): Sahar Osman

Mentor: David Remington

Department: Biology

Arabidopsis thaliana is an important model organism for studying plants genetics and molecular biology; with a short genome, compact size, short lifespan and inbreeding habits. Its close relative *Arabidopsis lyrata* has the additional advantages of being perennial and highly variable in life history patterns and having strong local adaptations. An important difference between the two species is that *A. thaliana* is self compatible, while *A. lyrata* is self-incompatible making development of inbred lines for genetic analysis impractical. To resolve this problem we are presently developing in our lab, inbred lines from rare *A. lyrata* populations that are self-compatible. We currently have four second and third generation inbred lines from three different *A. lyrata* populations from near the Great Lakes. We plan to use these lines to develop near-isogenic lines with contrasting alleles for important quantitative trait loci (QTLs) identified in outbred populations, via repeated backcrossing. This will facilitate fine-scale mapping to identify the underlying genes and other types of genetic analysis requiring genetically uniform lines.

“Characterizing an Important Resource Allocating QTL in *Arabidopsis lyrata*”

Presenter: Rebecca Nielsen

Major: Biology

Co-Author(s): Rabia Karim

Co-Presenter(s): Rabia Karim

Mentor: David Remington

Department: Biology

In our lab we are using *Arabidopsis lyrata* as an experimental system to study the genetics and evolution of resource allocation in plants. From the genetic mapping in field studies using crosses of plants from North Carolina and Norway populations, we have identified several quantitative trait loci (QTL) that affect resource allocation. The largest of these are in region near FKF1 of Chromosome 2. Our study is twofold. A) to examine and characterize the importance of the QTL region within the adaptive evolution of this species. To evaluate this importance, we are evaluating the effects of this QTL region within two other crosses. B) We are identifying candidate genes within the QTL. To identify this gene, we will identify all genes within corresponding regions of the *Arabidopsis thaliana* genome based on gene function. For our most promising candidates we will use a polymerase chain reaction (PCR) process to identify polymorphic gene markers. From here, we ultimately plan to sequence the alleles from different populations to identify potential functional polymorphisms.

“Bisubstrate Enzyme Kinetics of Oxygen Evolution by Photosystem II”

Presenter: Brandon Ore

Major: Biology

Co-Author(s): Alice Haddy

Mentor: Alice Haddy

Department: Chemistry & Biochemistry

Within plants and cyanobacteria, the enzyme complex responsible for the photosynthetic oxidation of water to molecular oxygen is photosystem II (PSII). Past research has shown that calcium (Ca²⁺) and chloride (Cl⁻) are important cofactors in this process and without them the function of PSII becomes drastically impaired. Our recent research has been concerned with the interdependence of chloride and calcium on oxygen evolution rates. We used PSII from which two extrinsic subunits with molecular weights of 23 kDa and 17 kDa had been removed. Removal of these subunits allows calcium and chloride to readily dissociate from the enzyme complex, making it easier to study their effects. It was found that varying the concentration of chloride had an effect on the optimal calcium concentration. This result suggests that a bisubstrate enzyme kinetics model can be used to explain the activation by these two ions. As the concentration of chloride was decreased, it was found that calcium became inhibitory at high concentrations. Thus, substrate inhibition by calcium appears to be suppressed by high concentrations of chloride.

“Le Six: One Group of Six, or Six Groups of One?”

Presenter: Patrick Parker

Major: Music (General)

Co-Author(s): Jay Welborn

Co-Presenter(s): Jay Welborn

Mentor: Anthony Taylor

Department: Music

In 1920, Henri Collet wrote an article in which he named a group of six young French composers “Le Six.” These six composers were Francis Poulenc, Darius Milhaud, Arthur Honegger, Louis Durey, Germaine Tailleferre, and Georges Auric. Many musicians today believe that “Le Six” embody the musical ideals of Paris in the 1920’s. These ideals are short pieces that are neoclassical, have rhythmic and melodic motifs, and have more or less simple (although untraditional) harmonies. Through musical examples and primary sources, we will argue that “Le Six” should not be seen as a group of six composers, but six composers who shared human and musical influences for a brief time. We will prove this by first comparing their brief time together in roughly 1919-1921, and understanding why people place the six composers in the same category. We will then use musical examples and primary sources to prove that from 1921 on, which was the majority of all six composers’ careers, the composers went separate ways both personally and in musical composition.

“Infant Immunity in the DC Community”

Presenter: Liza Parker

Major: Public Health

Mentor: Regina Pulliam

Department: Public Health Education

In Washington, DC there are some areas encountering the problem of having low infant immunization rates. As an intern, I will be responsible for educating the providers of daycares & headstarts with low immunization compliance rates, and conducting a pre/post test. In doing so, the end result should be to see the rates increase. This project is centered around National Infant Immunization Week (NIIW 4/25/09-5/2/09). All of the various assignments given to me during this experience will be incorporated into the poster presentation.

“Testing Epigenetic and Adaptive Models of Plant Resource Allocation in *A. lyrata*”

Presenter: Caitlin Phalen

Major: Biology

Co-Author(s): Arte Huey

Co-Presenter(s): Arte Huey

Mentor: David Remington

Department: Biology

Other Mentor(s): Jan Rychtar

Although it is fairly well known that the distribution of resources between reproduction vs. survival varies within and between plant species, it is not well understood exactly how this distribution is regulated genetically and adaptively. The plant species *Arabidopsis lyrata* is a good experimental organism for research allocation studies because *A. lyrata* is a perennial plant closely related to the well-studied annual model plant *A. thaliana*. Our research is designed to address two questions: whether resource allocation is epigenetic with trait variation regulated through developmental pathways, and whether resource allocation is adaptive. The first question will be addressed by studying the F2 offspring from a cross of North Carolina populations with German populations. The scoring of genetic markers from these offspring will allow us to estimate path coefficients that would suggest possible epigenetic trends. The second question will be addressed by developing predictive models to identify optimal survival strategies in different environments. These models will be compared with collective data and allocation differences between populations from different environments.

“Evaluating a community-based divorce education program; Perspectives of participants, presenters and the longer-term impact”

Presenter: Deborah Powell

Major: Human Development & Family Studies

Co-Author(s): Lori Pelletier; Rebecca Starnes

Mentor: Sherrill Hayes

Department: Conflict Resolution

The research project is to reflect on the need to fulfill agency programs evaluation needs and relationships to existing literature about divorce education. There are several questions that will be asked to help the research team collect valid information concerning the long-term effects of divorce education programs. The research also has several parts to understand the need of participants such as, a pre and post-program questionnaire, six-month follow-up questionnaire which will be distributed by agency to program participants, questionnaires distributed by researchers to program presenters and an in-depth interview of twelve months or more after participants have attended the program.

“Fighting to End Chronic Homelessness: A Case Study on Guilford County's 10-Year Partners Ending Homelessness Initiative”

Presenter: Rachel Pullen

Major: Political Science

Mentor: Ruth DeHoog

Department: Political Science

Chronic homelessness is said to be the most visible form of homelessness in cities and counties nationwide. Guilford County defines a chronically homeless person as one who has a disabling mental or physical condition, and has been continuously homeless for at least a year, or has had four or more episodes of homelessness within the past four years (Partners Ending Homelessness). Chronically homeless persons comprise ten percent of Guilford County 's entire homeless population, but consume over fifty percent of crisis management resources (Partners Ending Homelessness). In 2006, a county-wide task force drafted the Partners Ending Homelessness initiative to end chronic homelessness by 2016. Through a series of interviews, I have gathered information on the fundamental components of the initiative including operations of the annual Point-in-Time count, and the Carolina Homeless Information Network database. I have also gathered data on the Housing Support Team, which is a pilot housing-first program. In my research, I have explored the obstacles of these specific programs, and how the county is working to overcome these challenges. These findings are aimed to enlighten surrounding communities on innovative approaches to improving the implementation and assessment of chronic homelessness initiatives. Citation: Partners Ending Homelessness, <http://partnersendinghomelessness.org> (accessed March 16, 2009).

“Dtopors is required for separation of homologs at anaphase I in male Drosophila”

Presenter: Mohammad Rasool

Major: Biology

Mentor: John Tomkiel

Department: Biology

In most organisms, reciprocal exchanges (or cross-overs) between paired homologous chromosomes act to hold together partners at meiosis I. Resolution of cross-overs occurs at anaphase I, allowing homologous chromosomes to segregate to opposite poles of the cell. Male fruit flies, however, lack crossing over, and have evolved a unique mechanism for regulating pairing between homologous chromosomes at meiosis I. An adhesion complex involving three proteins, Teflon (Tef), Modifier of mdg4 in meiosis (MNM) and Stromalin in meiosis (SNM), is required to hold paired chromosomes together, but virtually nothing is known about how they eventually separate at anaphase I. We found that a ubiquitin/SUMO dual ligase called Topoisomerase-interacting Arginine Serine-rich protein (dTopors) is required to release homolog pairing at anaphase I. Male flies mutant for dtopors show a high frequency of meiosis I anaphase bridges, which results in near sterility. Both the sterility and the frequency of these bridges is greatly reduced in males that are doubly mutant for dtopors and tef. This suggests that dTopors acts to resolve Tef-dependent pairing complexes, thereby allowing the separation of paired homologs at anaphase I.

“Theft: It doesn't just happen to humans”

Presenter: Erin Raspet

Major: Biology

Co-Author(s): Shunda Rushing

Co-Presenter(s): Shunda Rushing

Mentor: Jan Rychtar

Department: Mathematics & Statistics

Other Mentor(s): Mary Crowe

Kleptoparasitism, the stealing of food and/or reproductive resources, has been documented throughout the animal kingdom. Recent investigations particularly within dung beetle populations, have documented the complexities of such practices in regards to both the act of parasitizing as well as defending against such parasitism. The most common form observed within dung beetle populations is the theft of brood balls in which one female lays an egg within a brood ball assembled by another female. Many factors influence whether or not it is more beneficial to steal vs. not, including density of females, time to create vs. parasitize a brood ball, the time females need to develop an egg. We have already developed a game theoretical model of this behavior and in this poster we outline a few experiments to measure some of the parameters of the model.

“Husbands' Traditionality and Wives' Marital and Personal Well-being in Mexican American Families”

Presenter: Yuliana Rodriguez

Major: Human Development & Family Studies

Co-Author(s): Monsy Bonilla, Jill Walls

Mentor: Heather Helms

Department: Human Development & Family Studies

In this investigation, we examined the link between husbands' traditionality and their wives' marital and personal well-being in 125 Mexican American couples raising young children. During home interviews with couples recruited via cultural insiders and snowball sampling methods, husbands and wives described themselves and their marriages, the extent to which they ascribed to gendered views about marriage and parenting, and their familiarity with and acceptance of various dimensions of Anglo and Latino culture. Analyses were conducted to: 1) examine the link between husbands' traditionality and wives' reports of marital quality and personal well-being, and 2) examine whether or not this link varied based on wives' acculturation and gendered attitudes about marital roles.

“Supporting the Broken Hearted: The influence of Social Support after a Myocardial Infarction”

Presenter: Rebekah Sanders

Major: Nursing

Mentor: Patrica Crane

Department: Nursing

Over half of the annual myocardial infarctions (MIs) are recurrent, and the incidence of MIs increases with age. A barrier to health behaviors to prevent recurrent MIs is fatigue. We know that social support (SS) influences fatigue post MI. However, we do not understand which dimensions of SS are important. Data from a cross-sectional study of 98 adults, age 65 and older, who were 6 to 8 months post MI were used to answer the following research questions: (1) Are there differences in the subscales of the Social Provisions Scale (SPS) between men and women 6 to 8 months post MI?, (2) Do the subscales of the SPS influence fatigue 6 to 8 months post MI?, and (3) Do the sub-scales influence hospital readmissions? Mean scores of the SPS subscales ranged from 12.6-15. There were no sex differences on any of the 6 subscales ($p > 0.007$). All subscales but nurturance negatively correlated ($p < .05$) with fatigue. The subscales explained 14% of the variance in fatigue ($F=2.45 (6, 91); p=.03$) with no individual subscale significantly contributing to the model. Subscales of SS did not predict hospital readmissions. All subscales are important in explaining fatigue in men and women.

“NCLEX-Informational: A Student Perspective”

Presenter: Jill Sharpe

Major: Nursing

Mentor: Deb Stanford

Department: Nursing

A few of the concerns seniors may have as they near graduation are career fairs, resumes, first interviews, and landing that first real job. There is a great deal of uncertainty as students from all disciplines approach graduation. As a nursing student nearing graduation, it becomes increasingly evident how much stress and confusion there is surrounding what happens after the nursing degree is actually earned. Before entering the workforce, registered nurses must complete the educational requirements, skills training, and pass their licensure exam, the NCLEX-RN for registered nurses. In addition to the typical concerns of a graduating senior, there is an exam nursing students have to be prepared for. The rigors of nursing school should not be magnified by anxieties and concerns about the testing process for licensure. For these reasons, my intent was to thoroughly explore the NCLEX-RN exam itself, its development, eligibility, the registration process, and include those factors that tend to impact exam success. After completing the required research, I provided fellow students with a comprehensive collection of resources in a simplified form, to ease concerns about the examination and examination registration process without overwhelming them with too much information.

“Sexual Victimization and Alcohol: How Extroversion Moderates the Relationship”

Presenter: Benjamin Shook

Major: Psychology

Co-Author(s): Kevin Swartout

Mentor: Jackie White

Department: Psychology

Previous research has found, in women, that extraversion is negatively correlated with coping motivations for alcohol use, and that sexual victimization positively predicts alcohol use. This suggests a relationship may exist between extraversion, sexual victimization, and alcohol use among female college students. This study tested the hypothesis that extroversion moderates the relationship between sexual victimization and alcohol use. This entailed assessing the interaction between level of sexual victimization and level of extraversion in predicting alcohol use. It was hypothesized that there would be a significant negative relationship between this interaction and level of sexual victimization. This study utilized female participants (N= 650) from two locations who completed a battery of questionnaires which included measures of extraversion, alcohol use, and sexual experiences. In accordance with previous research, extraversion and sexual victimization were both positive predictors of alcohol use. The interaction between extraversion and sexual victimization also positively predicted increased alcohol use—which runs counter to the hypothesis of this study. However, a limiting factor of this study was the inability to distinguish between prior and post-victimization alcohol use. As such, directionality of the relationship could not be established.

“Sarah Hunter Kelly Touches North Carolina”

Presenter: Denise Smith

Major: Interior Architecture

Mentor: Patrick Lucas

Department: Interior Architecture

The purpose of this research was to interpret Sarah Hunter Kelly’s designs for the existing North Carolina modern houses in light of her contributions as an emerging practitioner to the profession of interior design. This research provides a profile of Sarah Hunter Kelly through discourse analysis by combining quantitative and qualitative methods and deploying methods grounded in material culture theory, historical research, and visual analysis. Through this process, interpretations have been fashioned of Kelly’s presence in North Carolina, the kind of work that she did while collaborating in the state, and her contributions later as a participant in the development of the 1964 World’s Fair “House of Tomorrow.” This discourse analysis sheds tremendous light on an unexplored area of research in the contributions of women designers whose work coincided with the emergence of the interior design profession.

“Evaluation of the substrate specificity of the acyl-CoA dehydrogenase mmgC of *Bacillus subtilis*.”

Presenter: Jeffrey Smith

Major: Biochemistry

Mentor: Jason Reddick

Department: Chemistry & Biochemistry

In the bacterium *Bacillus subtilis*, the mmg operon is an operon activated during sporulation and is likely responsible for fatty acid and propionate metabolism. Our research group has shown that one of the genes in this operon, mmgC, acts as an acyl-coenzyme A (CoA) dehydrogenase that can oxidize the substrates isobutyryl-CoA and butyryl-CoA to the appropriate enoyl-CoA products. Since this organism's fatty acids are predominantly methyl-branched, we expect that a third compound, 2-methylbutyryl-coenzyme A, will also be a substrate for the mmgC enzyme. If this potential metabolite is a substrate for mmgC, then further β -oxidation by the mmgAB enzymes would lead to propionyl-CoA, a molecule that can be further metabolized by a potential methylcitric acid cycle, likely encoded in part by mmgDE and yqiQ. We have prepared 2-methylbutyryl-CoA and are currently evaluating it as a substrate for the overexpressed mmgC enzyme.

“Inhibition of Cytochrome P450's by alternative medicine”

Presenter: Jill Sollenberger

Major: Biochemistry

Mentor: Greg Raner

Department: Chemistry & Biochemistry

The increased interest and usage of alternative medicines has prompted an evaluation of their interactions with the Cytochrome P450 (CYP) drug metabolizing system. Of particular interest, is the CYP2E1 enzyme, which is associated with oxidative stress due to the generation of a reactive oxygen species over the course of catalysis. Therefore, the inhibition of this enzyme by certain natural remedies may prove to have not only the beneficial properties that have been reported anecdotally for thousands of years, but also antioxidant properties. The current study, which evaluates herbal remedies as inhibitors of the CYP2E1 enzyme, has shown that essential oils containing aldehydes are most effective at inhibiting the enzyme. The same model was probed using both saturated and α,β -unsaturated aliphatic aldehydes with chain lengths ranging from 8-12 carbons. The most promising inhibitor, undecylenic aldehyde, was further studied in order to identify the mechanism of inhibition that it follows. Expanding the knowledge in this area will help to advance the development of natural products for their more effective use as health care products.

“Measure to Assess Cognitive Responses in Goal Pursuit in Depression”

Presenter: Shannon Spillman

Major: Psychology

Mentor: Kari Eddington

Department: Psychology

Regulatory Focus Theory (Higgins, 2001) is a cognitive-motivational theory that distinguishes between motivational states and strategies for goal pursuit. There are two classes of goal pursuit orientations: promotion, making good things happen, and prevention, keeping bad things from happening. Based on Higgins (2001) self-report measure, the Regulatory Focus Questionnaire (RFQ), this research project will incorporate the self-regulation model into a measure to assess the extent to which people tend to focus on promotion and prevention goals in different aspects of their lives. The participants will include psychology undergraduate students at The University of North Carolina at Greensboro during the 2008-2009 school year. Participants will complete computerized questionnaires, via Media Lab, measuring depressive symptoms, goal adjustment, personality, characteristics of personal goals in social and occupational settings, and goal orientation. The long-term goal of the research is to develop a goal assessment measure that is sensitive to possible situational differences in motivational orientation.

“Phenotypic Characterization of CG16972”

Presenter: Zimuzor Ugochukwu

Major: Biology

Mentor: Dennis LaJeunesse

Department: Biology

In order to study the cellular basis of digestion using the *Drosophila* Model System, we have identified a novel region in the anterior midgut of *Drosophila* that we call the Superior Cupric Autonomic Nervous System. The SCANS region is a cluster of 7-9 neuron-like cells called lettuce head cells. The SCANS region is located at the juncture of the innervated anterior midgut and the copper cell/acid secreting region of the larval. This valve-like region regulates the flow of food through the anterior midgut. We have identified several genes that are expressed in the lettuce head cells using the UAS/Gal4 expression system. Of these genes is represented by the C805Gal4 enhancer trap. We have cloned the flanking DNA adjacent to C805 enhancer trap using plasmid rescue strategy. We have found that this enhancer trap line inserts into the CG16972 gene, which encodes a novel protein of unknown function. Although novel, the CG16972 protein has a slight similarity to the product of the Treacher-Collins syndrome gene. We believe that a careful genetic phenotypic analysis of CG16972 will allow us to understand how the SCANS region functions and, perhaps, the role that Treacher-Collins syndrome gene has in human disease. Mutant phenotypes provide a tremendous amount of information regarding the cellular and molecular roles of any gene. CG16972 is an essential gene, meaning that its expression is required for the viability of the organism and therefore its biochemical role within the cell is needed for the organism to survive. Considering CG16972 encodes a completely novel protein, such information becomes even more imperative. We have characterized the phenotype of CG16972 deficient embryos and larvae, and this will help us better understand the cellular role of CG16972. We examined the mutant phenotype of CG16972 and generated embryos and larvae that were hemizygous for a strong loss of the function allele of CG16972. First, we determined the lethal stage of CG16972 deficient larvae or embryos. The lethal stage represents the earliest requirement for

CG16972 function in the flies. Once we identified a lethal stage, we characterized the cellular defect present in those cells. We then determined whether cellular proliferation was altered in these tissues by determining the level of expression of a mitotic cell marker, phospho-Histone H3, using standard immunohistochemical techniques. Finally, we determined the levels of programmed cell death or apoptosis in CG16972 deficient organisms using an antibody against activated Caspase 3. We then decided whether or not CG16972 was required for maintaining the proper balance of cell death in the organism.

“Life as an Intern”

Presenter: Erica White

Major: Communication Studies

Mentor: Jessica Delk McCall

Department: Communication Studies

For the fall semester 2008, I spent my semester in Washington, D.C. interning with the Leadership Conference on Civil Rights. As an intern for the Leadership Conference, I learned many new skills and was able to participate in a many exciting projects. My poster will highlight my day-to-day task and illustrate the steps needed within our organization to bring an issue into the public arena. I will also highlight each department’s role in the information process. I will highlight three projects: Digital TV Transition, Equal Opportunity, and Disability Rights, focusing on the Americans with Disabilities Act (ADA) Amendments Act of 2008.

“Modeling the effect of fires on red-tailed leafhoppers and sedentary moths”

Presenter: Matthew Wilhelm

Major: Mathematics

Co-Author(s): Jasmine Alexander-Floyd, Maya Chhetri

Co-Presenter(s): Jasmine Alexander-Floyd

Mentor: Maya Chhetri

Department: Mathematics & Statistics

Fire often destroys a portion of a species’ habitat patch. Since either a fraction of the individuals gets killed or the surviving individuals get scattered in neighboring patches, local population dynamics gets disturbed. The post-fire recovery of the patch depends on the neighboring patches (number, quality, and proximity). We will use mathematical models to adequately describe the effect of wild/managed fires on populations of the endangered red-tailed leafhoppers (*Aflexia rubranura*) and sedentary moths (*Papaipema eryngii*).

“Effect of Harvesting on the Ideal Free Distribution of a Two Patch Predator-Prey System”

Presenter: *Matthew Wilhelm*

Major: Mathematics

Mentor: Maya Chhetri

Department: Mathematics & Statistics

The ideal free distribution (IDF) describes the way in which individuals distribute themselves proportional to the resource availability in the area. We construct a mathematical model to investigate the effect of harvesting on the IDF of predator-prey systems in two patches. In particular, we consider two different types of harvesting, “constant effort” and “constant yield”, of prey species in analyzing the model.

“Inhibition of Cytochrome P4502E1 with Essential Oils”

Presenter: *Emily Williamson*

Major: Biochemistry

Mentor: Greg Raner

Department: Chemistry & Biochemistry

The problem with P4502E1 is that it is not a “well behaved” enzyme, meaning that it will catalyze chemical processes that are, in fact, detrimental to the cell. The goal for this research project was to determine if essential oils would be good inhibitors of Cytochrome P4502E1. There were two main experiments used to determine the activity of the enzyme. A screening experiment and a Michaelis-Menton experiment. The goal of the screening experiment was to determine which essential oil inhibited the most and by how much. The goal of the Michaelis-Menten experiment was to determine which type of inhibition, competitive, uncompetitive, or mixed, the essential oil presented. It was determined that all of the oils were competitive inhibitor. Lemon oil showed to be the best inhibitor because it had the lowest K_i (dissociation constant), 0.2863 mg/mL. Bergamot oil inhibited the least with a K_i of 1.574 mg/mL.

“Interoctave Threshold Measurements in Student Musicians”

Presenter: *Brittiany Wilson*

Major: Speech Pathology & Audiology

Mentor: Susan Phillips

Department: Communication Sciences & Disorders

Approximately half of the students in the UNCG School of Music have hearing loss that is consistent with a loss caused by loud sounds (Phillips, Shoemaker, Mace & Hodges, 2008). The typical audiogram configuration for this population is a “noise notch,” which is characterized by a decrease in sensitivity to sound at 6000 HZ. The aim of this project is to determine if the actual frequency of greatest loss is at a frequency that is not typically measured during a traditional hearing test. Participants are tested with a special audiometer that can test many more frequencies in a sound booth, located in the Speech & Hearing Clinic in the Ferguson Building. Testing frequencies include 1000, 2000, 3000, 4000, 6000, and 8000 Hz. In addition, frequencies between 4000 and 6000 Hz will be tested in 100 Hz steps. Tympanometry is performed to assure normal middle ear health. Data will be analyzed for associations between instruments or ensemble and frequency of greatest loss. This is an ongoing study; results will be presented as case studies.

“Interoctave Threshold Measurements in Student Musicians”

Presenter: Anna Winnicki

Major: Speech Pathology & Audiology

Mentor: Susan Phillips

Department: Communication Sciences & Disorders

Approximately half of the students in the UNCG School of Music have hearing loss that is consistent with a loss caused by loud sounds (Phillips, Shoemaker, Mace & Hodges, 2008). The typical audiogram configuration for this population is a “noise notch,” which is characterized by a decrease in sensitivity to sound at 6000 HZ. The aim of this project is to determine if the actual frequency of greatest loss is at a frequency that is not typically measured during a traditional hearing test. Participants are tested with a special audiometer that can test many more frequencies in a sound booth, located in the Speech & Hearing Clinic in the Ferguson Building. Testing frequencies include 1000, 2000, 3000, 4000, 6000, and 8000 Hz. In addition, frequencies between 4000 and 6000 Hz will be tested in 100 Hz steps. Tympanometry is performed to assure normal middle ear health. Data will be analyzed for associations between instruments or ensemble and frequency of greatest loss. This is an ongoing study; results will be presented as case studies.

“Through the Eyes of the Storm: A Photographic Comparative Analysis of Survivors of Hurricane Katrina”

Presenter: Rosemary Yelton

Major: Anthropology

Mentor: Arthur Murphy

Department: Anthropology

Other Mentor(s): Eric Jones

In the aftermath of Hurricane Katrina, photographs quickly became the nation's source of information as to what happened to people along the Gulf Coast. However, it could be argued that photographs displayed by national news sources were not accurate in their portrayal of the victims. Katrina scholars have emphasized the relationship between race and power in the storm's aftermath. Did race become a factor when noting the degree of powerlessness or degree of empowerment in victims? To answer this query, thirty-eight photographs (half African American, half Caucasian subjects) from national sources were shown to 93 students in four UNC-Greensboro undergraduate classes. I analyzed the correlation between the degree of powerlessness portrayed in photos and the apparent race of the victims. In photos analyzed, most African Americans were portrayed as passive (rated as weak), while photos typically depicted Caucasians to be actively seeking aid (rated as strong).

“Family Stress, Maternal Responsiveness, and the Development of Children’s Aggression during Early Childhood”

Presenter: Katherine Youngblood

Major: Psychology

Mentor: Susan Calkins

Department: Psychology

Children diagnosed with a disruptive behavior disorder, such as Conduct Disorder (CD) or Oppositional Defiant Disorder (ODD), are associated with an increased risk of further antisocial development in adolescence. Lack of responsive parenting and family stress are important factors which contribute to the development of these behavior problems. The current study examined how the role of negative parenting and stress act as precursors to child aggression. Specifically, increased life stresses experienced by mothers were expected to adversely affect maternal responsiveness which in turn would directly predict to CD and ODD. Data from an ongoing longitudinal study of child socioemotional development were used. Participants included 344 five-year old children and their mothers who were assessed during a laboratory visit. Laboratory observations of mother responsiveness during mother-child interaction tasks were assessed. Maternal self-report measures of stress and maternal report of child aggression outcomes of CD and ODD were also used. Significance for mediation was found where increased life stresses experienced by mothers indirectly affected child aggressive outcomes for CD through maternal responsiveness. Similarly, mediation through maternal responsiveness for ODD approached significance. Future research is needed to delineate whether stress is a factor which indirectly contributes to the maintenance of ODD and CD.

“A case study analysis of cultural issues in a pre-licensure baccalaureate nursing program”

Presenter: Ashlee Zackeru

Major: Nursing

Co-Author(s): Elizabeth Nemitz

Mentor: Mona Shattell

Department: Nursing

Other Mentor(s): Jie Hu, Sharon Starr

Nurses must be culturally competent to provide quality health care in an increasingly multicultural society. This study explores how cultural issues are reflected in a pre-licensure baccalaureate nursing program, preparing students to effectively deliver culturally competent nursing care. Junior and senior year nursing students will be surveyed using two cultural competency measurement tools (Blueprint for Integration of Cultural Competency in the Curriculum and the Transcultural Self-Efficacy Tool). Students will be invited to participate in focus groups for in-depth discussions regarding their comfort and ability to provide quality health care to diverse populations and faculty will be interviewed. The School of Nursing Student and Faculty Handbooks, the School of Nursing’s mission statement, the undergraduate curriculum, and the School of Nursing’s Race and Gender Committee minutes will be reviewed. Findings from this study may yield important information about how cultural issues are reflected in a pre-licensure baccalaureate nursing program and may illustrate how cultural issues are addressed within the nursing curriculum. Through interaction with the diverse surrounding local community and more innovative teaching/learning strategies within the program, students’ experiences may be enhanced to achieve more in-depth cultural understandings.

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