

LOYOLA UNIVERSITY CHICAGO

THE GRADUATE SCHOOL'S 17TH ANNUAL INTERDISCIPLINARY SYMPOSIUM

SATURDAY, APRIL 13, 2024



HOSTED BY THE GRADUATE SCHOOL & THE GRADUATE STUDENT ADVISORY COUNCIL

The Graduate School and the Graduate Student Advisory Council host an annual interdisciplinary research symposium on the Lake Shore Campus organized around the diverse research methods exhibited in scholarly work. The symposium is an excellent forum for Loyola graduate students to present their scholarly work. Any current graduate student within The Graduate School is eligible to submit a presentation. Monetary awards are given based on research category and student's program status.

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VOLUNTEERS: The Interdisciplinary Research Symposium cannot operate without the help of volunteers who assist with moderating as well as judging paper and poster sessions. The Graduate Student Advisory Council would like to recognize and show appreciation for those who have kindly offered their time and assistance.

MODERATORS

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REGISTRATION AND WELCOME

9:00 – 9:30 – 4TH FLOOR INFORMATION COMMONS

PAPER SESSION A

9:30-10:45

IC 215

Neeraj Mishra, *Mindfulness strategies for counteracting “Othering”*
Ivette Guadarrama, *Newcomer Students in School: Their Unique Needs and the Extraordinary Liberatory Pedagogical Practices Bilingual Teachers Deploy*

IC 216

Sharnequa (Nikki) Hunter, *The Impact of Positive Childhood Experiences on Black Youths' Mental and Behavioral Health Outcomes, School Engagement, and Resiliency Development*
Madeline Belland, *Maria Campbell's Halfbreed: Writing as a Resistance to Essentialist Definitions of Motherhood*
Constantine Psimopoulos, *Promoting Coherence in Healing from Structural Racism and Oppression: What would Paul Farmer do? (Virtual Presentation)*

BREAKFAST AND COFFEE

4TH FLOOR INFORMATION COMMONS

POSTER SESSION

11:00 – 1:00 – 4TH FLOOR INFORMATION COMMONS

Tim Bertucci, *English Historical Phonology and Orthographic Design*
Maureen Burns, *Investigating the role of organized activities in racial and ethnic identity formation for Black adolescents*
Breana Bryant, *Home is where one's health starts: The impact of neighborhood conditions on physical health, neuropsychological, and academic outcomes in youth with spina bifida*
Zachary Liveris, *Design, Synthesis, and Biological Evaluation of Endochin Derivatives Targeting the Virulent Bacterial Sodium-Dependent NADH: Ubiquinone Oxidoreductase (NaNQR)*
Emma O'Flaherty, *Regulation of Spermatogenesis by Notch Signaling*
Max Pins, *Breaking Glass Closets: The Fat Liberation Movement and Lesbian Identity*
Manuel Sandoval, *Identifying Cyberbullying Roles using LLMs*
Samantha Webster, *Initial Characterization of Phosducin-Like Protein 3 of the Malaria mosquito Anopheles stephensi*

LUNCH

1:15 – 2:15 – 4TH FLOOR INFORMATION COMMONS

PAPER SESSION B

2:30 – 3:45

IC 215

Sibil Shibu, *De sustentatione autonomia: The Ethical Implications of Determining Case Value in Medical Malpractice Lawsuits*

Sara Subotic, *The Animal's Complaint Against Aristotle: Early Modern Animal Trials and the Political Animal*

Rachel Gordon, *CT-to-MRI Synthesis for High-dose-rate Brachytherapy Treatment Planning*

IC 216

Richa Khatiwada, *Flavin Modelling Using Computational Methods*

Nikola Kajmakoski, *Consciousness, Displacement, Hegemony: The 'Macedonian Struggle' Across the 19th-20th Centuries*

Alia Norton, *Racism, Climate-Displacement, and Human Trafficking: Untangling these Intertwining Oppressions*

RECEPTION AND AWARDS CEREMONY

4:00 – 5:00 – 4TH FLOOR INFORMATION COMMONS

Outstanding Paper Presentation in the Humanities

Outstanding Paper Presentation in the Sciences

Outstanding Paper Presentation in the Social Sciences

Outstanding Research Poster

Honorable Mention Research Poster

EDGE Award for Integrating Diversity & Inclusion

PAPER ABSTRACTS

Alia Norton, Racism, Climate-Displacement, and Human Trafficking: Untangling these Intertwining Oppressions

The intersection of climate change, migration, and human trafficking presents a complex web of challenges, exacerbated by global racism and systemic vulnerabilities. Climate-induced displacement strains traditional definitions of refugee status, complicating efforts to identify and protect those affected. Factors driving migration are multifaceted, with climate often playing a subtle yet significant role. The ensuing irregular migration creates opportunities for exploitation, with individuals vulnerable to trafficking amid legal and social barriers. Race intersects with these dynamics, shaping perceptions of victimhood and criminality, while policy responses often reinforce racial biases. Despite increasing displacement and trafficking, current responses fall short, necessitating urgent and holistic approaches. Addressing these interconnected issues requires acknowledging race as a central determinant of vulnerability and resilience. Calls for global solidarity emphasize the need for bottom-up initiatives and inclusive decision-making processes. By amplifying the voices of those directly impacted, this paper advocates for a paradigm shift towards more equitable and effective responses. Failure to address these issues perpetuates injustice and undermines efforts to mitigate the impacts of climate change and human trafficking on vulnerable populations.

Constantine Psimopoulos, Promoting Coherence in Healing from Structural Racism and Oppression: What would Paul Farmer do?

Paul Farmer's work and legacy is central to those values and practices which promote and sustain coherence in healing from racism. His work as a healer, being a medical doctor and anthropologist, through his witness and theological ethics addressed this coherence at the intersections of political, religious and healthcare systems, and the true meaning of therapeutic hope that emerges from spirituality. His principle of accompaniment, literally exemplified a way to bring the "third" world together with modern society, in a 'sympraxis', or "re-binding." By binding the corporeal and internal bodily wounds of the afflicted and infirm people, he was able to form a 're-binding' or a new bond of broken hearts and collective psyches, that of "fostering a regaining of wholeness",

central to the mission of Equity, Diversity, Inclusion and Belonging. The void from those spaces in between, filled the margins out of kenosis, and therefore became one and whole again.

What I wish to explore further, and present is the notion that Paul Farmer promoted coherence in healing from structural racism and oppression that existed in Haiti, but also in the perceptions of the West towards Haiti (and towards marginalized communities within the US). So, if we were to ask the question: "What would Paul Farmer do?" We could perhaps realize that, "If healing the world is God's will, and caring for our neighbor like the Good Samaritan the absolute Christian example, then Paul Farmer was a healer Saint, who promoted coherence in healing from structural racism and oppression."

Ivette Guadarrama, *Newcomer Students in School: Their Unique Needs and the Extraordinary Liberatory Pedagogical Practices Bilingual Teachers Deploy*

There is an influx of newcomers that sporadically floods classrooms everyday across the city and this qualitative study examines the unique challenges and opportunities for both teachers and students this academic school year. Newcomer students, who are often from diverse cultural and linguistic backgrounds, have the potential to enrich the learning environment. Still, many newcomer students also face very specific academic, cultural, linguistic, social, and emotional needs. Bilingual teachers are selflessly dedicating their efforts to welcome newcomer students into already overcrowded, under-resourced, and culturally different classrooms. Focusing on the experiences of two bilingual kindergarten teachers in a public school on the southwest side of Chicago, interviews explore the unique needs of newcomer students and the pedagogical adaptations made by teachers to meet these needs. The teachers' roles extend beyond instruction to extraordinary dedication and advocacy, ensuring that newcomers receive the quality education promised to all students in the country. This commitment to liberatory education is both mentally taxing and emotionally rewarding. The study concludes by questioning how the voices of bilingual teacher advocates can be better heard, supported, and prepared to provide equitable learning opportunities that all students deserve.

Madeline Belland, *Maria Campbell's Halfbreed: Writing as a Resistance to Essentialist Definitions of Motherhood*

In this paper, I argue that Maria Campbell, author of *Halfbreed* and a Métis mother, uses writing to reclaim definitions of femininity and Indigenous kinship previously denied by colonialism. As part of the Métis community, defined as individuals who have both Indigenous and European ancestry, Campbell faces unique and difficult ways of belonging to a community: she struggles with her Indigenous ancestry, compares herself to European women, depends on her great-grandmother and mother, and faces gender-based violence. To work through these social relationships, Campbell leans into *wáhkótowin*, understood by Indigenous people as the intense self-sufficiency, respectful obligation, and loyal kinship relations that constitute the foundation of Indigenous identity. *Wáhkótowin* becomes a way for Campbell to reveal how products of colonialism can always be resisted.

By founding her publication of *Halfbreed* on the principles of *wáhkótowin*, Campbell inhabits the definition of injurious interpellation outlined in Judith Butler's *The Psychic Life of Power*. I apply Butler's self-colonizing terminology to Campbell's material conditions and relationships with her father and her first husband, Darrel, to demonstrate how Métis people face particular forms of patriarchal colonialism. These material conditions allow Campbell to inhabit Indigenous motherhood and femininity and eventually subvert colonial ideals of these identities. Campbell's use of the English language, I argue, forces readers to recognize how writing gives Campbell the means to reclaim her femininity and Métis community, even while existing under colonialism. Even if traumatizing and difficult, the act of writing gives Campbell an active voice in her own history.

Neeraj Mishra, *Mindfulness strategies for counteracting "Othering"*

This article studies the impact of spirituality and mindfulness techniques in countering the notion of 'othering' in everyday interactions of an individual or a group. It first explores the concept of self and 'the other' in Western psychology, followed by an explication of the concept of self and non-self in Buddhism. It argues that Buddhist mindfulness allows space for seeing the other as an extended version of the self, or a fellow non-self merged in

the universal consciousness, of which we are all equal inheritors. Jung calls it the 'collective unconscious', which in its own way unites everyone because there is no possibility of exclusion in this realm, as it is beyond the conscious categories of differentiation, and also a 'collective'. This approach of universal non-self (un-aatm) paves pathways towards overcoming discrimination, injustice, and oppression.

This study dwells in the critical realist paradigm and seeks to highlight the emancipatory potential of mindfulness-based research in incorporating models of justice into social work's vision of diversity. Though mindfulness may come across as an intangible concept, its effects are documented and well evidenced, which open new avenues for post-positivist and critical realist social work research.

It also hopes to catalyze renewal for advancing authentic diversity and decolonization of knowledge in social work education by integrating Eastern ontological positions with Western philosophy and psychology, and their applications in clinical social work for counteracting othering.

Nikola Kajmakoski, *Consciousness, Displacement, Hegemony: The 'Macedonian Struggle' Across the 19th-20th Centuries*

This paper focuses on the Macedonian Revolutionary Organization (MRO) and the various expressions of a Macedonian consciousness that existed across the Balkans, and later diasporas, in the nineteenth and twentieth centuries. The Macedonian Question refers to Macedonia's largely Orthodox Slav population: to which Orthodoxy and Slavic tongue does this group belong?" The Macedonian Struggle, 1893-1913, refers to the struggles between Greco-Slavic nationalisms in nationalizing this group. Macedonians responded with their own violence, hoping to secure autonomy and statehood. Dominant discourse places the Macedonian Struggle's at the conclusion of the Balkans Wars and Macedonia's partitioning amongst its neighbors. This paper examines MRO's left-wing and right-wing factions, understanding how Macedonians navigates a fluid identity that was both national and regional. Some saw themselves as distinctly Macedonian, while others Macedono-Bulgarian: non-Orthodox Slavs held a regional identity. Factions coexisted, until they could not, and shared dreams for autonomy and recognition. Yet, their struggles persisted beyond 1913, factionalism reproduced in nascent diaspora communities. Once fluid identities were forced into solidification by immigration categories that had hegemonic misunderstandings about the environments in which these identities were produced, further polarizing these issues. Macedonian identity's fluidity and transformation can best be understood through Edward Said's Occident-Orient framework, deconstructing these tools to produce a "fourth" Orient at the Greek Civil War's conclusion, completely solidifying this spectrum, ultimately producing narrative silences and imposing a binary where none previously exists. Such consequences have affected modern discourse, which has embraced this binary and ignores the pluralistic realities of Macedonian identity.

Rachel Gordon, *CT-to-MRI Synthesis for High-dose-rate Brachytherapy Treatment Planning*

High-dose-rate (HDR) brachytherapy is a radiation treatment modality that places radioactive sources directly in cancerous regions. Radiation treatment planning for HDR prostate brachytherapy utilizes both CT and MRI to visualize the path of the radioactive source and the prostate gland, respectively. In this work, we propose GAN-CM, a method for conditional CT-to-MRI translation that is based on Generative Adversarial Networks (GANs). The proposed method uses the typical generator-discriminator design of GANs with a modified generator that incorporates semantic masks obtained from the domain image. The use of semantic masks allows GAN-CM to better capture the anatomical details and tissue characteristics present in CT scans, resulting in a more accurate and realistic MRI synthesis. Using "clinically-paired" CT and MRI datasets obtained from 78 patients with prostate cancer who were treated with HDR brachytherapy, we show the advantages of GAN-CM by demonstrating its ability to work effectively with heavy data augmentation and larger batch sizes, as well as its high performance for MRI synthesis. Exploring various experimental settings, we show that training GANs for this task requires careful considerations for preparing the data, such as normalizing and distributing the pixel values of input images through methods such as histogram equalization. Using histogram equalization, GAN-CM achieves the best results overall when using the average of equalized and unequalized CTs.

Richa Khatiwada, *Flavin Modelling Using Computational Methods*

Flavins are one of the most important coenzymes used in biological redox reactions. They get oxidized or reduced to help transfer electrons and protons between enzyme and its substrate. Based on their oxidation and reduction states, they can exist in various forms. AMBER is a suite of programs for molecular dynamics (MD) simulations of biomolecules. MD simulations require force fields to represent the biomolecular systems. A majority of biomolecular force fields can be decomposed into intramolecular and intermolecular interactions. Intermolecular interactions can be described by electrostatic and van der Waals energies, while intramolecular interactions include bond, angle, and torsion terms. These interactions need to be parametrized to find force fields. While AMBER has parameters for proteins, nucleic acid, and various ligands, it lacks a standard set of parameters for flavins. This work focuses on finding a standard set of reliable flavin parameters. We used Restrained Electrostatic Potential (RESP) method for the intermolecular interactions and GAFF, Seminario, modified Seminario methods for the intramolecular interactions. We have parametrized flavin in five different oxidation/reduction states and it was shown to perform as well as or better than the AMBER protein force fields.

Sara Subotic, *The Animal's Complaint Against Aristotle: Early Modern Animal Trials and the Political Animal*

This paper examines the practice of animal trials in the late medieval and early modern periods in relationship to Western philosophical views on human and nonhuman animals as political beings. The foundational philosophical view that is challenged in this paper is that of Aristotle. Taking Aristotle's claim in Politics that man is a political animal, this paper proposes that the early modern period shows how the political space challenges the basis of that claim. Man is the most political and perfect animal for Aristotle, and by incorporating speech into the definition of political, man becomes the only political animal. The practice of animal trials in late medieval and early modern traditions, however, shows how the animal is incorporated into the political space in a way that challenges the hierarchy of beings and the definition of political put forth by Aristotle. This paper examines the motivations behind, and implications of, legally trying nonhuman animals, as well as the conditions that resulted in the decline of animal trials.

Sharnequa (Nikki) Hunter, *The Impact of Positive Childhood Experiences on Black Youths' Mental and Behavioral Health Outcomes, School Engagement, and Resiliency Development*

Over the past several years, there has been a growing interest in the mental and behavioral health concerns and outcomes of Black and African American youth. National data on various mental and behavioral health indicators, such as increased prevalence of mental health disorders and serious emotional disturbance (SED; Substance Abuse and Mental Health Services Administration [SAMHSA], 2019) and reported increases in suicide attempts (Congressional Black Caucus, 2019; Lindsey et al., 2019) suggests that Black youth are a vulnerable population in the United States (Henderson et al., 2019). Further, research suggests that child and adolescent mental health significantly predicts students' academic performance and outcomes (Murphy et al., 2015) and school engagement (Nelson et al., 2020). A large body of research has been dedicated to examining and understanding the impact of risk factors associated with youth mental and behavioral health and school engagement, such as childhood adversities and various other social determinants of health. However, there is a dearth of research examining the impact of protective and resiliency factors, such as positive childhood experiences (PCEs), on Black youths' mental and behavioral health and school engagement. The current study aims to address these literature gaps by exploring the extent to which PCEs impact Black youths' mental and behavioral health and school engagement and contribute to their overall resiliency development. The impact of PCEs on Black youths' mental and behavioral health and school engagement will be examined using quantitative and qualitative methodologies in two separate studies.

Sibil Shibu, *De sustentatione autonomia: The Ethical Implications of Determining Case Value in Medical Malpractice Lawsuits*

Throughout history, it has been evident that the legal system has influenced the field of Bioethics, and Bioethics has been utilized to determine what morally permissible legal standards ought to be. Various famous legal cases that have been addressed in Bioethics discourse around the globe revolve around notions of medical malpractice where the principles of autonomy, beneficence, non-maleficence, and/or justice were violated. Although the intersectionality between Law and Bioethics is pivotal in discussions, there is a failure to engage diversity in these conversations. In this project, I present how in current medical malpractice cases, determining case value poses various ethical concerns. Specifically, when determining the case value, economic damages and non-economic damages are assessed. Economic damages include medical expenses, lost wages, technological necessities, medications, etc. Non-economic damages include pain, anguish, distress, suffering, etc. An assessment of economic damages and non-economic damages are utilized to inherently calculate a price on a life based on "potentiality". Such practices pose various injustices, especially for patients from minority groups. In this project, I attempt to present alternative forms of calculating case value without violating the autonomy of patients, especially those who may be most vulnerable. These alternative approaches require a call for greater engagement of Bioethics scholars from minority groups in determining what ethically appropriate legal standards ought to be.

POSTER ABSTRACTS

Breana Bryant, *Home is where one's health starts: The impact of neighborhood conditions on physical health, neuropsychological, and academic outcomes in youth with spina bifida*

Spina bifida (SB) is a birth defect that can impact physical, neurocognitive, and academic functioning. This study examines associations between geocoded neighborhood conditions (e.g., access to healthy food, ozone concentration, and poverty rate) and health, neuropsychological, and academic outcomes among youth with SB.

Residential addresses of youth with SB living in the Midwest (N=130, Mage= 11.5±2.5; 45.5% male; 50.8% non-Hispanic White) were geocoded according to census tracts, which were linked to the respective state-normed overall Child Opportunity Index (COI) score. Youth were administered performance measures of attention, IQ, working memory, cognitive flexibility, and academic achievement. Parents and teachers completed standardized questionnaires assessing attention, executive functioning, and academic achievement. Teachers also rated the youth's academic achievement. Parents reported on number of shunt revisions and urinary tract infections. Subdomains that were adequately associated ($\alpha > .6$) were combined. Cross-sectional regression analyses were conducted with age and lesion level entered as covariates.

COI scores were positively associated with youth performance on measures of working memory, IQ, cognitive flexibility, and academic achievement ($ps < .05$). Associations between the COI and parent/teacher-report of these subdomains were nonsignificant. There were no significant associations between COI scores and health complications, attention, inhibition, or academic competence.

Neighborhood resources/conditions are significantly associated with several neurocognitive subdomains in youth with SB. These results highlight the importance of devoting resources to better serve youth with SB living in lower-opportunity neighborhoods and can be used to support systems and policies driving equitable outcomes these youth.

Emma O'Flaherty, *Regulation of Spermatogenesis by Notch Signaling*

Notch signaling is an evolutionarily conserved pathway that is crucial in fate acquisition and spatiotemporal patterning. The Notch signaling pathway plays a significant role in gonad development and spermatogenesis, but little is known about the specific targets through which Notch signaling functions in the testis. The *Drosophila* testis contain two populations of stem cells: germline stem cells (GSCs) and cyst stem cells (CySCs) also known as somatic cyst cells. The CySCs and early somatic cyst cells that surround the spermatogonia express traffic Jam (Tj), which encodes a MAF family transcription factor. They continue to express Tj in the somatic cyst cells surrounding the spermatogonia through the transition zone, as they begin to express Eya and shift to a late cyst cell fate. Notch signaling is active in the transition zone during this time and is activated by the Delta ligand expressed in the germline. Previous work in our lab data has shown that increased Notch signaling in somatic cyst cells prevent their complete transition from early to late cyst cell fate, suggesting that Notch signaling is important for this transition and must be downregulated to allow progression through development. To explore the downstream effectors of Notch, RNA sequencing was performed, and 1619 potential Notch targets were identified. Further analysis was conducted to narrow down this list to 66 genes. We are now testing these potential Notch targets to expand our understanding of Notch's role in spermatogenesis across species.

Manuel Sandoval, *Identifying Cyberbullying Roles using LLMs*

Social media has enabled individuals and groups from around the globe to communicate instantaneously. Unfortunately,

this means Cyberbullying, defined as the use of electronic communication to bully an individual, has also evolved. A growing amount of research indicates that social media use is correlated with depression, anxiety, and suicide. Thus, computer scientists have begun developing machine learning models, a type of algorithm that can learn a task through data, to detect cyberbullying. While displaying promise, these efforts have various limitations. These methods rely on a one-size-fits-all approach which results in inherited systemic bias and a lack of subtlety when analyzing social media interactions. There is also a lack of insight into how these methods can help foster greater inclusivity and positive engagement. In conjunction with these issues, researchers have established a troublesome correlation between participation in a LGBTQ+ community and experiencing harassment online. The current undertaking is to collect a new dataset that will enable the development of three new models: a prosocial behavior classifier, a LGBTQ+ specific cyberbullying classifier, and a cyberbullying user role identification classifier.

Maureen Burns, *Investigating the role of organized activities in racial and ethnic identity formation for Black adolescents*

Racial and ethnic identity (REI) formation is associated with better psychological well-being for all youth, especially for adolescents of color. While research has considered how school settings inform REI development, less is known about other settings, including organized activities. The current study investigates the association between dimensions of organized activity participation and REI formation.

A sample of 181 Black-identifying youth (M age= 16.30, SD= 1.38) completed the Organized Activity (OA) Inventory and REI Scale (REIS). The REIS provides a total score and two subscales (Belonging and Search). Sports were the most popular OA, with 47% of youth reporting sports participation. Greater breadth of OAs, or the number of different types of OAs (i.e., sports, arts) an adolescent participants in, was correlated with higher REIS Total, $r=.26$, $p<.001$, Belonging, $r=.21$, $p<.001$, and Search, $r=.26$, $p<.001$. Higher OA intensity, or the total hours of weekly participation across all OAs, was correlated with higher REIS Total, $r=.17$, $p=.022$, and Search, $r=.17$, $p=.023$. In terms of specific categories of OA involvement, school involvement activities were correlated with higher REIS Total, $r=.19$, $p=.015$. A forward regression indicated breadth of OAs ($\beta=.26$, $p<.001$) accounted for 7% of variance in the REIS ($R^2=.07$, $F(1,179)=13.28$, $p<.001$), but intensity and the total number of OAs did not enter the regression model. These findings suggest Black adolescents with a higher breadth of OAs have a stronger sense of REI. Future work should investigate how OA breadth and school-based activities support identity development using qualitative methods.

Max Pins, *Breaking Glass Closets: The Fat Liberation Movement and Lesbian Identity*

I believe the explanation for the high participation of lesbians in the Fat Liberation Movement is two-fold. Firstly, these women created the fat liberation organization the Fat Underground out of necessity. They were excluded from National Association to Advance Fat Acceptance (NAAFA), the feminist movement at large, and the feminist health movement. They were too feminist for NAAFA, and too lesbian and radical for all three movements. Secondly, lesbians became leaders in and felt welcomed in fat liberation because they uniquely understood fat oppression due to their positionality as lesbians. As lesbian women, they understood what it felt like to worry about discrimination because of how you look, to be oppressed by a societal and patriarchal gaze. Like many lesbians hiding their sexuality, many fat women would try to hide their size, through baggy clothes, unnoticeable clothes, sitting in a position that takes up as little space as possible, etc. For lesbians there is always a possibility of being "read" as gay, even if one is trying their hardest to remain in the closet. Queer theorist Eve Kosofsky Sedgwick uses the term "the glass closet" to refer to people whose gender nonconformity makes them visibly gay, despite failed attempts to conceal their sexual orientation. This is similar to how, though one can make one's body less noticeable, it is impossible to hide one's body size. Therefore, for many lesbians, fat women, and lesbian fat women, coming out does not mean simply revealing who you are, it is about proudly reclaiming your identity. Fat liberation was a needed space for fat lesbians to come out as who they fully were

without shame and create community.

Samantha Webster, *Initial Characterization of Phosducin-Like Protein 3 of the Malaria mosquito Anopheles stephensi*

Phosducin-like proteins (PhLPs) are small thioredoxin domain-containing proteins highly conserved in eukaryotes from yeast to humans. PhLPs are around 25 kDa in size and share the same protein organization with an N-terminal helix domain, central thioredoxin domain, and short C-term tail domain, suggesting a conserved function in various organisms. We recently discovered in a collaborative project that *Drosophila* flies lacking PhLP-3 are sterile. Immunofluorescence studies in sterile male PhLP-3^{-/-} flies indicate compromised sperm development. We are interested in *Anopheles stephensi* PhLP-3 (AsPhLP-3) because *Anopheles* mosquitoes are among the most prominent disease vectors, transmitting infectious diseases such as Malaria, Dengue, and Yellow Fever.

Here, I describe the initial characterization of AsPhLP-3. We identified the PhLP-3 gene in the *A. stephensi* genome. It shares 72% amino acid sequence identity with *Drosophila* PhLP-3, suggesting a similar function in the dipteran insects. I cloned AsPhLP-3 from *A. stephensi* cDNA. Following sequence verification, the gene was expressed in bacteria, and the recombinant protein was purified, yielding 2.62 mg of total recombinant AsPhLP-3. Next, I tested redox activity by performing insulin reduction assays. I found that insulin reduction significantly increases in the presence of PhLP-3, indicating PhLP-3 is redox active. Next, we will test whether AsPhLP-3 is redox active with the thioredoxin system. Furthermore, we will send out AsPhLP-3 for antibody production to investigate PhLP-3 expression in mosquito tissues, specifically the germline. New insights into the function of PhLP-3 and its involvement with mosquito fertility may open new avenues to combat this critical disease vector.

Tim Bertucci, *English Historical Phonology and Orthographic Design*

Using phonological data from across modern English dialects in combination with a diachronic analysis of English pronunciation from Old English through Middle English into Modern English, I will devise and represent what a reform of English orthography would require in terms of the minimal amount of complexity and/or irregularity which a single, standardized, diaphonemic writing system could sustain. This approach will necessarily involve the exploration of lexical sets which demonstrate dialectal differences allowing us to distinguish one variety from another. It will also entail a look back into the historical evolution of the language and its repeated fragmentation into new, separate varieties. Concerns like homophones, homographs, and homonyms, as well as the challenges of both child and foreign learners of English spelling, will inform the process. The poster will be an interdisciplinary project which marries computer science with an informed humanities approach to language planning.

Zachary Liveris, *Design, Synthesis, and Biological Evaluation of Endochin Derivatives Targeting the Virulent Bacterial Sodium-Dependent NADH: Ubiquinone Oxidoreductase (NaNQR)*

The therapeutic efficacy of antibiotics has been significant in extending the average human life expectancy by combating virulent bacterial infections. Consequently, multidrug-resistant (MDR) microorganisms remain a global crisis and are resistant to conventional antibacterial agents. A novel antibiotic target found exclusively in pathogens is the NADH: Ubiquinone Oxidoreductase (Na⁺-NQR) which is an essential integral membrane-bound enzyme used by the bacterium to maintain overall cellular functionality and has been shown to be present in several bacterial strains including *V. Cholerae* and *H. influenzae*. The enzyme serves as a key protein in the electron transport chain of the bacterial cell and operates as a conserved primary Na⁺ pump that drives numerous cellular functions such as bioenergetics and virulence factor formation. The six subunit protein shuttles electrons from an NADH cofactor to a ubiquinone substrate which drives the translocation of Na⁺ ions across the plasma membrane. Ubiquinone-like compounds were tested against the enzyme which resulted in the discovery of the endochin lead molecule which is able

to suppress the enzymatic activity and stimulate bacterial cellular death upon inhibition. Progress in the synthetic modulation of the ubiquinone-like lead compound, endochin, is reported resulting in the development of an even more potent and selective inhibitor targeting the Na⁺-NQR enzyme complex.