UNIVERSITY of WASHINGTON

Undergraduate Research Symposium May 17, 2019 Mary Gates Hall

Online Proceedings

SESSION 1F

IDENTITY AND DIFFERENCE IN THE CONTEMPORARY MOMENT

Session Moderator: Ralina Joseph, Communication
MGH 234
12:30 PM to 2:15 PM

* Note: Titles in order of presentation.

"Not My Type": Exploring the Experience and Perception of Sexual Racism on Mobile Dating Apps Targeted at the LGBTQ+ Community

Kenneth J. (Kenny) Applewhaite, Senior, Communication
UW Honors Program
Mentor: Ralina Joseph, Communication

My proposed research examines how sexual racism is experienced by LGBTQ+ community members in the greater Seattle Area who use Tinder and Grindr and other mobile dating apps. Sexual racism can be defined as a specific form of racial prejudice enacted in the context of sex or romance. My primary research investigates a series of in-person interviews that qualitatively analyze and articulate the various experiences of Black individuals, as well as focus groups to help to understand different and diverse manifestations of sexual racism. I use information/narratives from the in-person, and one-on-one interviews to analyze the experiences and compile them into a data set that can be closely looked at for trends and overlapping experiences. My research analyzing the effects of the experience of sexual racism as shown through mobile dating apps helps readers understand one form of inequity in our modern digital society that often goes unspoken. In addition, my research helps to identify how microaggressions work by the microagressor's dismissing their racialized/sexualized comments as simply an issue of personal preference. While my primary research focuses on sexual racism in local communities, my secondary research draws on literatures that examine sexual racism both nationally and internationally. By working closely with a variety of people in the local community as well as drawing on research from other scholars focusing on the ideas of white privilege, constructed racism, and intersectionality, this research helps me speak up for Black LGBTQ+ individuals who are often marginalized by sexual racism.

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Black Student-Athletes' Experience in the Classroom at Predominantly White Institutes

Michael Eugene Neal, Senior, Communication
UW Honors Program
Mentor: Ralina Joseph, Communication

My research topic is on Black student-athletes' classroom experience at predominantly White institutions. As a Black student-athlete myself, I have been in classes where not only am I the only Black student, but the only Black student-athlete. The research shows that Black students are primarily affected by their perceived ability to succeed in college by the lack of Black representation in amongst their peers and professors, in the classroom. In my thesis, I build upon aspects of UCLA scholar, Tyrone Howard's view of the critical race theory. In particular, I explore the idea that rather than race being biologically grounded and natural, it is socially constructed and functions as a means to maintain the interests of the White population. My thesis argues that Predominantly White Institutions set the "lay of the land" in terms of what is socially acceptable and deemed okay, and which often excludes Black student-athletes. The methods I use are surveys, individual interviews, and a focus group, with an equal number of of Black men and women study participants. This qualitative data will show that Black student-athletes' experience in the classroom at predominantly White institutions is directly related to whether they grew up being around White individuals.

SESSION 2J

MEASURING CELL GROWTH AND EVOLUTION

Session Moderator: Kristin Anderson, Immunology
MGH 271
3:30 PM to 5:15 PM

* Note: Titles in order of presentation.

Characterization of Tse7 in *Pseudomonas aeruginosa*
Savannah Bertolli, Senior, Biochemistry
Mentor: Kaitlyn LaCourse, Microbiology
Mentor: Joseph Mougous, Microbiology

Bacteria inhabit a world filled with threats, including antagonism from other species throughout different environmental conditions. One mechanism microbes employ as protection from these hazards is the type VI secretion system (T6SS) - a system bacteria utilize to inject toxic proteins into neighboring cells, leading to cell death. The H1-T6SS of *Pseudomonas aeruginosa* comprises 7 pairs of toxins and cognate immunity proteins (which prevent self-intoxication). I hypothesized that each of these toxins could be maximally effective against specific kinds of competing bacteria, however the function of many effector proteins is unknown. My research focuses on characterizing the protein Tse7, encoded by the gene PA0099, and elucidating its potential role in species-specific antagonism. To begin, I identified its key functional amino acids and the gene encoding its immunity protein. I designed and created mutant strains with several genes adjacent to PA0099 deleted and co-cultured these with wild-type *Pseudomonas aeruginosa* to identify any mutants with a loss in competitive fitness. This lead to the discovery that the gene PA0100 encodes the cognate immunity protein. To determine key functional residues, I identified potential candidates using conserved motifs in the toxin's amino acid sequence. By creating mutants of these residues and analyzing their change in competitive fitness compared to wild type, I recognized histidine 230 as the residue vital for Tse7 function. Going forward, I will attempt to determine whether Tse7 improves fitness of *P. aeruginosa* against any specific families of bacteria, indicating the toxin targets that particular bacteria. Almost one-third of Gram-negative bacteria have T6SSs. These systems largely dictate the ability of bacterial species to compete with one another, dramatically affecting bacterial community structure and the landscape of human infections. Therefore, this deepened understanding of its function could further our knowledge of and ability to manipulate bacterial interactions' impact on environmental and human health.

SESSION 2L

MCNAIR SESSION - EDUCATIONAL EQUITY AND IDENTITY

Session Moderator: Carolyn Jackson, GO-MAP/Graduate School
MGH 287
3:30 PM to 5:15 PM

* Note: Titles in order of presentation.

Classifying in the Classroom: Education Experiences of Mixed Race College Students
Izaiha X Ellis, Junior, English
McNair Scholar, UW Honors Program
Mentor: Ralina Joseph, Communication

As the number of American students who identify as mixed race or biracial continues to grow, the American education system still has yet to make the necessary changes that are responsive to the needs of this shifting demographic. While identifying students on their own terms is important for all students, for mixed-race students, the questions and potential disconnect between racial labelling and how one defines themselves is fundamental. This study examines the roles biracial categorization plays in today's classrooms through lived experiences as remembered by college students. Many classrooms still struggle to incorporate the achievements of minorities, and, in some cases, the mixed identity of a historical figure is overlooked entirely. The inability to see themselves in the curriculum may be causing mixed-race students to feel invisible in the classroom and disconnected from their education (Joseph-Salisbury, 2017). Drawing on findings from survey results, focus groups, and individual interviews, this research project contributes to studies focusing on the schooling experiences of mixed-race students. Maria Root (1996) and Kristen Renn's (2003) models of biracial categorization are used as a framework for the study, as the project re-assesses the inclusivity and adequacy of the biracial categories introduced. In the classroom, seemingly small interactions and events may be forcing students to choose one aspect of their identity, rather than celebrating both. Focusing on how the classroom setting impacts identity has the potential to make the classroom a more inclusive space that is responsive to the myriad of ways biracial students may or may not choose to identify.

POSTER SESSION 3

MGH 206, Easel 170
2:30 PM to 4:00 PM

A Bacterial ADP-Ribosyltransferase Toxin Promotes Interbacterial Antagonism by Inhibiting Cell Division
Shuo Huang, Senior, Biology (Molecular, Cellular & Developmental)
Mentor: Joseph Mougous, Microbiology
Mentor: See-Yeun Ting, Microbiology

Modification of biomolecules is responsible for the regulation of cellular activities in all organisms. A type of enzyme, named ADP-ribosyltransferase (ART), plays a crucial role in such modifications by transferring one or multiple ADP-ribose moieties onto its target molecules. Some bacterial ART proteins are toxins that serve as virulence factors that enable pathogens to disrupt host cell functions during persistent infection. However, it was unclear if ARTs play roles in interbacterial interactions. Here, I report the discovery of the first interbacterial ART toxin encoded by a *Serratia proteamaculans* strain, a commensal bacterium isolated from plant root. Growth competition assays showed that the toxin is capable of conferring a higher fitness for *S. proteamaculans*. Subsequent analysis by microscope revealed that target bacterial cells became elongated, leading up to cell lysis. Together, my results offered new insights into the complex question of how bacteria compete against each other. The finding expanded our knowledge of the diverse roles of ART proteins and their cellular activities.

POSTER SESSION 3

MGH 206, Easel 171

2:30 PM to 4:00 PM

Understanding the Role of Widespread Polymorphic Toxins in Bacterial Infection by Temperate Phages
Elizabeth Daiyun Su, Junior, Biochemistry
Mentor: Joseph Mougous, Microbiology
Mentor: See-Yeun Ting, Microbiology

Microbial toxins are a molecular weapon involved in pathogenesis, immune evasion, and bacterial competition. A prime example of such microbial toolkits are polymorphic toxin systems, which consist of multi-domain proteins and are widespread in all major bacterial lineages. A polymorphic toxin system called MuF has been newly identified and is the first to be discovered in temperate phages and their bacterial hosts. Though it is highly abundant in the human gut microbiome, its biological role has not been defined. To better understand the toxin system, our team is studying a model species *Enterococcus faecalis*, a commensal bacterium encoding a two-domain MuF toxin protein on one of its phages, consisting of an N-terminal MuF domain and a C-terminal toxin domain. The toxin domain is predicted to be an ADP-ribosyltransferase (ART), which post-translationally attaches ADP-ribose moieties to its target molecules and can profoundly impair cell processes, leading up to cell death. Using genetic approaches to generate phages with malfunctional ART activity, I have found that the mutations change phage infectivity and the morphology of the plaques formed (clear zones in a cell layer formed due to lysis by phage). Moreover, heterologous expression of the toxin domain in *E. faecalis* results in cell aggregation. From this, I hypothesize that the MuF toxin is delivered by phages to help infection and ensure phage DNA incorporation into host genomes. To further dissect the mechanism by which the MuF toxin system operates, our team is currently developing a fluorescent protein reporter system to investigate and track the detailed process of phage infection. In addition, by applying X-ray crystallography and electron microscopy, I aim to uncover structural information on the toxin, which may lend insight into the mechanism of MuF toxicity and its larger role in the human microbiome.

POSTER SESSION 3

Commons East, Easel 60

2:30 PM to 4:00 PM

Illuminating the Rain Shadow: Characteristics of Clouds and Precipitation on the Lee Side of the Olympic Mountains
Jamin Kurtis (Jamin) Rader, Senior, Atmospheric Sciences: Climate, Atmospheric Sciences: Meteorology
Mary Gates Scholar, UW Honors Program
Mentor: Lynn McMurdie, Atmospheric sciences
Mentor: Angela Rowe, Department of Atmospheric Sciences
Mentor: Joseph Zagrodnik, Atmospheric Sciences

From November 2015 through March 2016, the Olympic Mountains Experiment (OLYMPEX) was conducted on the Olympic Peninsula to study the evolution of wintertime clouds and precipitation in frontal systems passing over this coastal mountain range and to validate satellite-derived precipitation measurements from the U.S.-Japan Global Precipitation Measurement (GPM) mission. While most OLYMPEX research has focused on precipitation processes on the windward (usually southwest) side of the Olympic Mountains, this study uniquely examines the leeward (usually northeast) side of the mountains where there is climatological rain shadow (i.e. a minimum in precipitation relative to the windward side). The vertical structure of the frontal systems over the northern Olympic Mountains is examined using data from a radar managed by Environment and Climate Change Canada on Vancouver Island (EC-XBAND), including intensity inferred from radar reflectivity. Using environmental data from North American Regional Reanalysis on the windward side of the mountains, this study classifies the leeside radar data based on upstream large-scale conditions. The cloud and precipitation structure on the leeward and windward sides of the mountains are compared utilizing the Doppler on Wheels (DOW) radar in the Quinault River Valley, and the EC-XBAND radar. Cloud and precipitation particles measured by in situ aircraft over the windward and high terrain illumi-

nate situations when particles are lofted over the mountains to the leeward side, reducing the rain shadow. These findings will inform local studies of snowpack and water supply in the Olympic Peninsula as many reservoirs there depend on precipitation that occurs on the leeward side. Outside of the Pacific Northwest, these findings can be applied to other midlatitude coastal mountain ranges on the west side of continents around the world.