

McNair Scholars Program

Portland State University

August 11, 2021



Land Acknowledgement

Portland State University is located in the heart of downtown Portland, Oregon in Multnomah County. We honor the Indigenous people whose traditional and ancestral homelands we stand on, the Multnomah, Kathlamet, Clackamas, Tumwater, Watlala bands of the Chinook, the Tualatin Kalapuya and many other indigenous nations of the Columbia River. We acknowledge the ancestors of this place and recognize that we are here because of the sacrifices forced upon them. In remembering these communities, we honor their legacy, their lives, and their descendants.



Dear McNair Scholars, Faculty Mentors, Colleagues, Families and Friends,

Welcome to the eighteenth annual Ronald E. McNair Post-Baccalaureate Achievement Program Symposium and Awards Ceremony.

Our symposium and celebration in 2021 are virtual. They are fitting expressions of our resilience, adaptability and commitment to our students. The challenges we faced this year have been relentless. The hardship and burdens on our students and families have been extraordinary. PSU faculty mentors, staff and administrators have worked tirelessly to support and protect our students and communities during these difficult times. Our students have persevered.

We celebrate our McNair Scholars and their faculty mentors for their commitment to excellence and scholarly achievement. We celebrate our collective persistence and determination. We celebrate the possibilities and promise of our McNair scholars. We celebrate hope. Students being honored today have demonstrated their potential to achieve doctoral degrees, and to transform the professoriate to reflect the backgrounds and diversity of students in higher education. We recognize the intellectual community of faculty, staff, alumni and administrators that ensured these scholars achieved their goals. We appreciate your service and contributions to student success at PSU.

I thank faculty mentors that have guided and helped our McNair scholars in their research and academic endeavors. You are integral to the success of every McNair scholar. Additionally, I thank Toeutu Faaleava and McNair teaching fellows Sulema Rodriguez and Brooke Shea for their leadership in co-creating rigorous and engaging learning opportunities for our scholars.

Thank you also to families and friends. Your support and love have been invaluable to your scholar's success. Congratulations PSU McNair scholars of 2021 for successfully completing the requirements of the McNair Scholars Program and for your intellectual tenacity and hard work. We wish you well in your pursuit of doctorates.

Sincerely, Susan Jeffords, Provost and Vice President for Academic Affairs Principal Investigator,
McNair Scholars Program

A handwritten signature in black ink, appearing to read 'SJ', with a stylized flourish extending to the right.



Dr. Ronald E. McNair

“The true courage comes in enduring ... and persevering, the preparation, and believing in oneself.”- Ronald E. McNair

Dr. Ronald Erwin McNair was born October 21, 1950 in Lake City, South Carolina.

While in junior high school, Dr. McNair was inspired to work hard and persevere in his studies by his family and by a teacher who recognized his scientific potential and believed in him. Dr. McNair graduated valedictorian from Carver High School in 1967. In 1971, he graduated magna cum laude and received a Bachelor of Science degree in Physics from North Carolina A&T State University (Greensboro). Dr. McNair then enrolled in the prestigious Massachusetts Institute of Technology. In 1976, at the age of 26, he earned his Ph.D. in laser physics. His dissertation was titled, “Energy Absorption and Vibrational Heating in Molecules Following Intense Laser Excitation.” Dr. McNair was conferred an honorary doctorate of Laws from North Carolina A&T State University in 1978, an honorary doctorate of Science from Morris College in 1980, and an honorary doctorate of science from the University of South Carolina in 1984.

While working as a staff physicist with Hughes Research Laboratory, Dr. McNair soon became a recognized expert in laser physics. His many distinctions include being a Presidential Scholar (1971-74), a Ford Foundation Fellow (1971-74), a National Fellowship Fund Fellow (1974-75), and a NATO Fellow (1975). He was also a sixth-degree black belt in karate and an accomplished saxophonist.

Dr. McNair’s hard work and intellectual prowess and accomplishments earned him an appointment to the NASA Space Shuttle Program in 1978. His first space shuttle mission launched successfully from Kennedy Space Center on February 3, 1984. Dr. Ronald E. McNair was the second African American to fly in space. Two years later he was selected to serve as mission specialist aboard the ill-fated U.S. Space Shuttle Challenger.

Dr. McNair died when the US Space Shuttle Challenger exploded. All seven crew members died.

Dr. McNair was posthumously awarded the Congressional Space Medal of Honor.

After his death in the Space Shuttle Challenger explosion on January 28, 1986, members of Congress provided funding for the Ronald E. McNair Post-Baccalaureate Achievement Program. Their goal was to encourage low-income and first-generation college students, and students from historically underrepresented ethnic groups to expand their educational opportunities by enrolling in a Ph.D. programs and ultimately pursue academic careers. The McNair program is dedicated to the high standards of achievement inspired by Dr. McNair's life.

The PSU McNair Scholars Program is dedicated to honoring Dr. Ronald E. McNair's exceptional legacy of hard work, perseverance, intellectual tenacity, public service, and commitment to excellence.

TRiO

The Ronald E. McNair Post-baccalaureate Achievement Program was established in 1986 by the U.S. Department of Education and named in honor of Challenger Space Shuttle astronaut Dr. Ronald E. McNair. The Ronald E. McNair Post-Baccalaureate Achievement Program is funded by a \$1,600,000 5-year grant from the US Department of Education and Portland State University cost-share funds.

The Ronald E. McNair Scholars Program at Portland State University works with students who want to pursue PhDs. It introduces juniors and seniors who are first-generation and low-income or members of under-represented groups to academic research and to effective strategies for getting into and graduating from PhD programs.

The McNair Scholars Program has academic-year activities and a full-time summer research internship. Scholars take academic and skills-building seminars and workshops during the year, and each scholar works closely with a faculty mentor on original research in the summer. Scholars present their research findings at the McNair Summer Symposium and at other conferences and are encouraged to publish their papers in the online McNair Journal and other scholarly publications.

Portland State University is an equal-opportunity, affirmative-action institution committed to cultural diversity and compliance with the Americans with Disabilities Act.

The contents of this publication were developed under the McNair grant from the Department of Education; however, these contents do not necessarily represent the policy of the Department of Education, and you should not assume endorsement by the Federal Government.

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McNair Seminar Presenters

Mary Vance, Dr. Joan Petit, Eva Marie Willis, Dr. Cheryl Forster, Dr. Melissa Pirie, McNair alumna, Jessica Mehta, Doctoral Candidate and McNair alumna, Jess Millar, Doctoral Candidate and McNair alumna, Erik Funkhauser, McNair alumnus, Dr. Lil Pabon (Ford Foundation)

McNair Selection Committee

Dr. Lorna Tran (LSAMP), Dr. Rosalind Taylor (SSS), Sulema Rodriguez, McNair alumna, Carlos Quatela (EXITO)

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Zayba Afshar

Public Health: Health Sciences | minor: Spanish

Zayba Afshar is an undergraduate student at Portland State University majoring in Public Health: Health Sciences with a minor in Spanish. She started her research career as a sophomore and has worked in the Emergency Department at the Oregon Health & Science University as a Research Assistant. As a Junior, she decided to pursue a certificate in Human Lactation because of her interests in maternal child health. As a senior, she decided to conduct research within a similar realm. For her Honors Thesis, she began researching interpersonal violence screening guidelines for pregnant patients and how it has changed since the beginning of the COVID-19 pandemic and the effect on BIPOC pregnant patients. As a McNair Scholar, this year she started working on a second research project with a non-profit milk bank in her community. Her goal is to go into an MD/MPH program that has a concentration in maternal child health and eventually apply for a Ph.D. program to teach and do research as a physician-scientist within her specialty. She also hopes to one day build a free women's clinic in Afghanistan, where her family is from.

The Social Determinants of Human Milk Banking: Impacts of demographic and geographical factors on human milk donor behavior

Human milk banking is a vital source of milk for infants for a multitude of reasons. Many of which go to medically fragile infants in Newborn Intensive Care Units (NICUs). The purpose of this study is to learn about how the social determinants of health and geographical factors affect human milk donor behavior through GIS (Geographic Information System) mapping to provide recommendations on how to improve overall donor participation. This research was conducted through a partnership with a local human milk bank accredited by HMBANA called Northwest Mothers Milk Bank (NWMMB) located in Tigard, OR. Demographic and geographic data was extracted from their database which was then placed in GIS (Geographic Information System) mapping software to analyze. A geographical lens was used to identify the impacts of the demographic and geographic markers of the donors on human milk banking donor behavior.



Dr. Claire Wheeler

Faculty Mentor | *School of Public Health*

Dr. Claire Wheeler is a former Emergency Medicine physician with a Ph.D. in Clinical Psychology. She has been teaching at Portland State University since 2005, currently as Assistant Professor within the OHSU-PSU School of Public Health. At the SPH, Dr. Wheeler teaches multiple courses each year, primarily at the graduate level. She has developed several new courses for the University, on topics ranging from pathophysiology to eating behaviors to integrative women's health. After leaving clinical practice in 2000, Dr. Wheeler became a faculty member at the Center for Mind-Body Medicine, based in Washington D.C., embarking on decades of public health work in the area of community level trauma resiliency, most recently in Sonoma and Shasta Counties in California, in response to wildfires. She has worked extensively with members of law enforcement, the military, and veterans using CMBM's group model to provide training in stress management, trauma resiliency, and ACES. Dr. Wheeler's research explored the role of dissociation (the freeze response) during traumatic injury events as a risk factor for the development of post-injury PTSD and depression. Dr. Wheeler is the author of three books: *10 Simple Solutions to Stress* (2007, New Harbinger, Oakland), *The Complete Idiot's Guide to Belly Fat Loss* (2013, Penguin/Alpha Books, NY), and *Pocket Therapy Guide to Stress* (2020, New Harbinger, Oakland).



Roselie Agulto

Public Health

Roselie Agulto is a senior majoring in public health and a first-generation college student at Portland State University. Prior to her time at PSU, she received her associate's degree in business at Northern Marianas College in Saipan. Through NMC, she received acceptance into the Child Health Assessment in the Pacific program at the University of Hawaii at Manoa where she investigated differences in eating habits among caregivers and children in Saipan. This has led the way towards now being a BUILD EXITO and McNair scholar. She currently interns at the Oregon Rural-Practice-Based Research Network at OHSU where she supports the outreach, screening, and referral of community resources to improve health outcomes for patients under the mentorship of Dr. Bruce Goldberg and Anne King. In addition to her accomplishments, she was a member of the API Forward Leadership Program where she delivered a winning presentation in collaboration with a team to identify gender and minority pay inequities for the Port of Portland. Roselie anticipates gaining the necessary skills and experiences through the McNair Program to pursue a master's degree in Health Promotion in Fall of 2022. Looking ahead, she plans to obtain her Ph.D. in Public Health to continue research primarily focusing on health issues in the CNMI.

The role of neighborhood and social determinants of health: investigating health-related social needs among the Portland metropolitan area in Oregon

Intersecting factors of social determinants of health have a significant impact on both individual and community well-being, however, a growing body of research highlights disproportionate disparities among neighborhood locations. Accessible resources, clinics, programs, and other community infrastructure are some characteristics that promote a healthy local economy. Locations lacking these aspects are where concentrated areas of poverty are inclined to exist, which often, correlate to higher rates of basic needs and adverse health outcomes. As part of the Accountable Health Communities (AHC) project—a 5-year research study to bridge the gap between clinical and social providers to lower hospitalization and total cost of care—this study will aim to investigate how health-related social needs (HRSN) differ within three urban counties in the Portland metropolitan area in Oregon among Medicaid beneficiaries. Adopting the same materials from the AHC model, a 19-question survey was administered to 17,822 patients assessing for five areas of HRSNs: housing, food, transportation, and safety needs. Patients (n=7,952) residing in Multnomah, Washington, and Clackamas county were filtered from the dataset to compare the proportion of needs for each location and the number of needs per person within the counties. Data will be mapped using Tableau to visualize the spread of HRSNs across the regions. Implications from this research may help to call attention to more tailored resources and programs to fit the needs of residents in efforts of eliminating disparities within these communities.



Dr. Bruce Goldberg

Faculty Mentor | *School of Public Health*

Bruce Goldberg, MD is a Professor at the OHSU-PSU School of Public Health and a nationally recognized consultant on health policy and the organization and delivery of health services. Bruce served two Oregon Governors, as the Director of the Oregon Office for Health Policy, Director of the Oregon Department of Human Services and then was the founding Director of the Oregon Health Authority. In that role, Bruce led Oregon's nationally recognized health reforms transforming Oregon's Medicaid system to one based on a model of coordinated care. His other experiences span time as an administrator of large complex organizations, a practicing clinician, teacher/academician, a county health officer, medical director for a Medicaid managed care organization and Clinical Director for the US Public Health Services in Zuni, New Mexico.



Safia Ali Noor

Biochemistry and Mathematics

Safia Iman Ali Noor is a first generation undergraduate student pursuing a bachelor's degree in Biochemistry and Mathematics. She is a McNair scholar, LSAMP scholar, and a Leader Fellows membra. Safia is also an alumni of Portland Community College where she was inspired to pursue a degree in math and chemistry from her Math Club back in 2018. She will graduate with a Bachelor's of Science in Summer 2021. Safia has developed an interest in teaching and health sciences. She currently teaches math to high school students through a non-profit organization called IRCO. She utilized her students as part of her research study. The research she is working on focuses on mathematical education. Safia is working under the guidance and mentorship of Dr. Sean Larsen and his Ph.D. student Tenchita Alzaga.

Linear Algebra; Mathematical Education in Science and Technology; learning strategies

In general, concepts in mathematics were not invented only to solve new problems; their aim was mainly to find general methods to solve different problems with the same tools in any science field. The main point is incorporated in the classroom so that the students who struggle with math won't be an issue for them. As a result, collecting data from students' work such as exam performances, homework, etc.



Dr. Sean Larsen

Faculty Mentor | *Department of Mathematics and Statistics*

Dr. Larsen is currently a professor in the Fariborz Maseeh Department of Mathematics and Statistics at Portland State University. He was the coordinator of the Mathematics Education Ph.D. program from 2011 to 2019.

He is a three-time winner of the John Eliot Allen Outstanding Teaching Award and a winner of the Outstanding Researcher Award presented by the Columbia Willamette Chapter of Sigma Xi International Scientific Research Society. Dr. Larsen's research focus is the teaching and learning of advanced mathematics. Currently he is a PI of the NSF-funded project ASPIRE in Math and a Co-PI of the NSF-funded project, Progress Through Calculus, in collaboration with the Mathematical Association of America (MAA).



Khaleda Aqaei

Biology | minor: Community Health

KHALEDA AQAEI IS A SCHOLAR in the Ronald E. McNair Scholars Program and S-Stem at Portland State University, where she is pursuing a Bachelor of Science in Biology, and a minor in Community Health. She was born in Kabul, Afghanistan, a war-torn country where women are not allowed to pursue higher education, and grew up as a refugee in Iran for 15 years, where her education was also forbidden. Through these difficult times, she homeschooled herself independently up to 8th grade, and developed a passion for education that has inspired her to make a difference for women in her community. In 2011, she was accepted as a refugee to the U.S., and obtaining her GED at a Portland community college was the catalyst for great change in her life. Khaleda's interest in biology and medicine was inspired by her father, who encouraged her to follow her dreams despite hardship. She aspires to become a physician and create change in underdeveloped countries like Afghanistan by addressing healthcare disparities, supporting minorities, and breaking down systemic barriers in education as an advocate for women's rights. She speaks Farsi, Dari and is interested in learning Turkish. Currently, she works as a medical assistant at the Kartini Clinic to help children with autism and eating disorders, and is an undergraduate researcher in Dr. Brooke Napier's lab. The goal of her research project is to determine the impact of palmitic acid, a dietary saturated fat, on glycolysis within mouse macrophages, and how this alters the cellular response to microbial products. She is interested in understanding how diets high in saturated fats modulate the host response to infections that lead to sepsis.

Understanding the Metabolic Regulation of Trained Immunity by Palmitic Acid

Sepsis is an inflammatory disease that occurs when the body's response to an infection becomes dysregulated, and infection-fighting processes of the body damage tissues via inflammation, resulting in organ failure and death. Currently, the role for diet in regulating sepsis susceptibility and severity is not fully understood. The Western Diet (WD), the most prevalent diet worldwide, is high in saturated fatty acids (SFAs) and sucrose, and low in fiber. Previously, we have used a lipopolysaccharide (LPS)-induced sepsis mouse model to show that mice fed a Western Diet (WD) or a diet enriched only in SFAs (Ketogenic Diet; KD), experience increased systemic inflammatory disease severity and mortality, compared to mice fed a low-SFA diet. It is unclear how dietary SFAs regulate inflammation during sepsis, however many SFAs have been shown to induce inflammation in monocytes and macrophages, key cell types that regulate inflammation during sepsis. Our preliminary data show that a pre-treatment with a specific dietary SFA, palmitic acid (PA), plays a role in amplifying the inflammatory response of monocytes and macrophages to a secondary challenge with numerous microbial ligands. This PA-induced hyper-inflammation resembles a well-known phenomenon called trained immunity. Trained immunity is a long-term immunological memory induced by a primary stimulus, which leads to hyper-inflammation upon secondary stimulation with a homologous or heterologous ligand. It is mediated by epigenetic and metabolic reprogramming that allows for modification of gene expression and cellular function. It is unknown if PA induces similar metabolic changes required for the induction of trained immunity. The goal of this study is to determine the metabolic pathways within macrophages that are perturbed by PA, and lead to enhanced inflammation upon secondary stimulation with LPS. Specifically, we aim to quantify the expression of three key glycolytic genes within bone-marrow derived mouse macrophages treated with PA, followed by LPS. *Slc2a1* encodes for the transmembrane protein GLUT1 that allows glucose to enter the cell, and *Hk2* and *Pkfp* encode for two rate-limiting enzymes in glycolysis. It is known that LPS upregulates glycolysis, and we hypothesize that PA induces trained immunity in macrophages by increasing expression of *Slc2a1*, *Hk2*, and *Pkfp*, and enhancing the inflammatory response to LPS. The capacity for PA to directly impact innate immune metabolism associated with inflammatory pathways may inform dietary interventions and treatments for sepsis patients, and our findings will be important to consider in a high SFA-fed population.



Dr. Brooke Napier

Faculty Mentor | *Department of Biology*

B. A. Napier, Ph.D. is an Assistant Professor within the Biology Department at Portland State University. She teaches Cell Biology and Immunology courses at PSU and serves as Editor at the FEMS journal Pathogens and Disease. Her laboratory is using a multifaceted approach to uncover the role of diet in reprogramming the immune response to infection and is necessary to

develop efficacious dietary strategies to reduce metabolic inflammation and dietary interventions that improve outcomes of infection, acute inflammatory shock, and sepsis. Currently, Dr. Napier serves as the Graduate Student Mentorship Facilitator in Equity and Inclusion (CIMER Program) at PSU and active mentor for NIH EXITO and McNair Scholars.



Thy Bach

Health Science: Health Studies (pre-med track)

Thy Bach is majoring in health science: health studies with a pre-med track. She is currently a McNair Scholar at Portland State University and is also a part of the Pulmonary and Critical Care Medicine at Oregon Health & Science University as a research assistant working on COVID-19 related cases. Thy is also a volunteer for Providence Medical Center helping to distribute vaccines to her community. Her research interest includes learning more about the chronic inflammatory skin disorder called psoriasis and adverse childhood experience (ACEs). She believes that with further research surrounding the topic of psoriasis, it can improve patients' future mental and physical health care and can add knowledge to known stress related triggers with psoriasis. She will continue her Bachelor's of Science Degree, graduate in Spring of 2022, and will furthermore apply to medical school to pursue internal care or dermatology.

Measuring the correlation between Adverse Childhood Experience and the Severity of Psoriasis within Portland State University Community

Psoriasis is a chronic inflammatory skin condition with different types of triggers, one being stress. Psoriasis affects the personal and social lives of patients, which can result in psychological strain. With the Adverse Childhood Experience it is reported to impact a person's mental health problems severely due to the toxic stress from violence, abuse, emotional neglect, sexual abuse, or substances misuse. This study explains the correlation between psoriasis and Adverse Childhood Experiences with the intent of showing how a patient that suffers from ACES can potentially have worsen skin condition. This is important because there is a need in addressing the importances of psychological effects of psoriasis with hopes for better understanding and treatment of patients.



Dr. Claire Wheeler

Faculty Mentor | *School of Public Health*

Dr. Claire Wheeler is a former Emergency Medicine physician with a Ph.D. in Clinical Psychology. She has been teaching at Portland State University since 2005, currently as Assistant Professor within the OHSU-PSU School of Public Health. At the SPH, Dr. Wheeler teaches multiple courses each year, primarily at the graduate level. She has developed several new courses for the University, on topics ranging from pathophysiology to eating behaviors to integrative women's health. After leaving clinical practice in 2000, Dr. Wheeler became a faculty member at the Center for Mind-Body Medicine, based in Washington D.C., embarking on decades of public health work in the area of community level trauma resiliency, most recently in Sonoma and Shasta Counties in California, in response to wildfires. She has worked extensively with members of law enforcement, the military, and veterans using CMBM's group model to provide training in stress management, trauma resiliency, and ACES. Dr. Wheeler's research explored the role of dissociation (the freeze response) during traumatic injury events as a risk factor for the development of post-injury PTSD and depression. Dr. Wheeler is the author of three books: *10 Simple Solutions to Stress* (2007, New Harbinger, Oakland), *The Complete Idiot's Guide to Belly Fat Loss* (2013, Penguin/Alpha Books, NY), and *Pocket Therapy Guide to Stress* (2020, New Harbinger, Oakland).



Angel Bui

Biochemistry

Angel Bui is majoring in biochemistry and a member of Anne Thompson's Blue Water Microbial Lab at Portland State University, currently focusing her research on photosynthetic cyanobacteria. She is a current McNair and BUILD EXITO scholar. Her research interests are in fields of marine natural products, medicine, nanotechnology, and in general, finding sustainable solutions to coexist with the natural world. She believes that nature, through evolution, has solved many problems that cause or contribute to human diseases and that there are many things we can learn when we pay close attention. She enjoys hearing about other areas of research and finds it fascinating how communities can work together as a dynamic connective mesh, passing information on from one end of the world to the other working towards a common goal. She sees herself as a lifelong learner. In the near future, she plans to pursue a Ph.D. in marine chemistry and geochemistry to continue to ask questions and build knowledge to share with the world.

Niche Partitioning and utilization of different nitrogen sources by marine cyanobacteria *Synechococcus*

The Cyanobacterium *Synechococcus* plays a major role in the ocean's biochemical processes and is responsible for a significant amount of primary production, especially around coastal areas. *Synechococcus* has a wide geographical distribution that includes both polar and high-nutrient waters. Within the genus, there are defined subpopulations that are ecologically distinct that allow them to niche partition the dynamic oceans. To further explore niche partitioning of *Synechococcus*, this project combines a bioinformatic and culture-based approach. I examined data along the North Pacific Subtropical Front (NSPF) to analyze the community structure. This analysis demonstrated that a particular ecotype identified as clade II (WH 8109) dominated the warmer, nutrient poor waters of the NSPF and was virtually absent in northern, cooler, nutrient-rich areas. This led to the hypothesis that clade II prefers warmer temperatures and nutrient-poor environments. To test this in the lab, representative cultures of clade II were grown in different media that contained variations of nitrogen and nutrient concentrations to reveal their response in growth patterns. These results will further explain the utilization of nitrogen sources and how ecotypes of *Synechococcus* are partitioned among related ecotypes.



Dr. Anne Thompson

Faculty Mentor | *Department of Biology*

Anne Thompson is a Research Assistant Professor in the Biology Department at Portland State University. Thompson received her Ph.D. from the MIT- Woods Hole Oceanographic Institution Joint Program in Biological Oceanography and has held positions at UC Santa Cruz, BD Biosciences, and the Institute for Systems Biology prior to PSU. Thompson's work illuminates the ecology of microorganisms in the Earth's vast open oceans and how they contribute to energy and carbon flow on our planet.



Red Burkett

Geography

Red Burkett is currently pursuing a degree in geography at Portland State University. His interest in the field stems from his childhood exposure to the larger world through his grandmother's extensive collection of maps and books describing far off places and people. Currently, Red is conducting spatial analysis research on urban gentrification and demographic shifts among Portland neighborhoods east of the Willamette River, in the hopes of exploring the effect of racial capitalism on the urban ecology of inner-city and suburban neighborhoods. His professional aspiration is to earn a Ph.D. and teach at the collegiate level. Red believes that the increased presence of indigenous faculty correlates with increasing enrollment and graduation rates among Indigenous students. Navigating the complicated channels of academia can be difficult and Red has been lucky to have met passionate and knowledgeable mentors to advise him along the way. Through a career in academia, Red intends to invest his knowledge and learned experience into the next generation of low-income and underrepresented students. Red looks forward to doing research that focuses on decolonization, counter-mapping, and Indigenous land claims, while working to increase the mainstreaming and empirical legitimization of Traditional Knowledge Systems developed by Indigenous societies over the centuries. The photo above is a cedar tree Red replanted during his time as a gardener at the PSU Native Center.

Spatial Analysis of African American Residency in Multnomah County according to the 2010 US Census

This project builds on the urban studies work of Dr. Gibson by comparing currently available US Census data to see if the shifting demographic trends first observed in Bleeding Albina are still being reproduced in the contemporary urban space of Portland, Oregon. GIS software is employed to model principles of spatial analysis in the form of the Moran's I and Getis-Ord clustering algorithms to the currently available 2010 US Census data of Multnomah County. This project has a more expansive spatial focus than Bleeding Albina, in that it will look at demographic shifts across Multnomah County, in addition to census tracts within the Albina neighborhoods. By looking at a larger area, we see the inflow of Black residents into other Portland neighborhoods in addition to their outflow from Albina. This study analyzes the dispersion of the African American residents from the historically segregated Albina neighborhood into the rest of Multnomah County to determine if spatial analysis of the data shows modern clustering effects or if the demographic movement out from the Albina diaspora has been to statistically randomized regions. By doing so we can better learn how economic factors such as gentrification cause ongoing demographic shifts within urban areas. Additionally, this project demonstrates a method by which future research produced with these models, using a broader scope of racial and income data over a longer period, can be employed by urban planners to track neighborhood demographics for purposes of ensuring equitable distribution of public resources within the urban built environment..



Dr. Jola Ajibade

Faculty Mentor | *Department of Geography*

Dr. Idowu Jola Ajibade is an Assistant Professor of Geography at Portland State University. Her research lies at the intersections of climate adaptation, urban development, resilience planning, societal transformation and multiple dimensions of justice. She applies a political ecology lens to study how individuals, communities and cities respond to climate change and their different capacities for adaptation and transformation. Specifically, she examines the politics of adaptation, demonstrating how historical injustices, state practices, relocation programs, and utopian solutions to climate change intertwine with exclusionary planning policies and development patterns to undermine disadvantaged and marginalized communities. Dr. Ajibade emphasizes the articulation of multiple solutions and alternative pathways to climate adaptation that includes partnering with grassroots coalitions, frontline communities, indigenous groups, cooperatives, social entrepreneurs, and small businesses. Her research has been published in the *Journal of Global Environmental Change*, *Climatic Change*, *Climate and Development*, among other outlets. Dr. Ajibade has also been featured in Science Friday, NPR, Yale Environment 360, New Internationalist, and Vice. She published two books on climate relocation, managed retreat and social justice.



Charlie Carr

Geology | minors: GIS and Geography

Charlie Carr is majoring in geology with minors in Geographic Information Systems and Geography. She is a part of the Active Tectonics Lab at Portland State University. She is a McNair Scholar, President of the Coriba Geology Club, and a part of the Association of Environmental and Engineering Geologists – PSU Student Chapter. Throughout her life, Charlie has shown a passion for increasing public information and education regarding hazard management. She believes that further research and investment into geohazards can make safer, and more resilient, communities. Charlie plans to complete a Ph.D. in Geophysics. In her free time, Charlie enjoys learning about traditional ecological knowledge and political science. She enjoys gardening, kayaking, hiking, and biking with her two children and partner.

A Paleoseismic study of the Twin Lakes Fault, Mount Hood fault zone, Oregon

Recent geologic mapping on high-resolution topography from lidar has led to the discovery of a zone of active faults on Mount Hood. The Mt. Hood Fault Zone consists of four separate faults, and stretches ~55 km from south to north, and crosses the summit of Mount Hood. The focus of this study is the northern section of Twin Lakes Fault, which lies directly south of Mount Hood and adjacent to OR35 and the White River. Lidar topography reveals the west side down normal displacement on the Twin Lakes fault. The highest tectonic seismicity rates in the Mount Hood area occur along faults that are south of the summit, and suggests the faults are active. This research seeks to further understand the possibility of recent tectonic activity along the Twin Lakes Fault with an in-depth paleoseismic investigation of the study area. Using lidar data in ArcGIS, I have mapped the faults and geology of the study area, measured vertical separation across the fault, and have excavated a paleoseismic trench across the fault, in a small wetland. Our paleoseismic study has revealed sedimentary units offset by the fault, stratigraphic units that postdate the most recent faulting event, and has confirmed the west side down dip normal style of earthquake deformation for the Twin Lakes Fault. For future research, carbon samples from offset stratigraphy have been submitted to constrain the timing of the most recent earthquake. Faults that have generated large earthquakes with Holocene (~11 ka to present) displacement are considered active faults and a seismic hazard. This study provides new age data on the timing of the last large earthquake on the Twin Lakes fault that formed the fault scarp visible in lidar derived topography.



Dr. Ashley Strieg

Faculty Mentor | *Department of Geology*

My research focuses on answering questions about active faults and folds, earthquakes and associated hazards, earthquake frequency and magnitude. I am currently interested in whether recurrence intervals for forearc faults in the Pacific Northwest are intrinsically linked with the long recurrence of Cascadia subduction zone events.

I am also currently working with students, DOGAMI, and USGS, to map faults along Mt. Hood with a goal of improving our understanding of the timing and magnitude of past surface rupturing earthquakes along these previously unmapped faults. I use geologic mapping and paleoseismology to answer these questions. I attended University of Oregon for my Ph.D., and received a National Science Foundation Postdoctoral Fellowship in Earth Science prior to arriving at PSU as a faculty member of the Geology Department.



Phoebe Cordova

Applied Linguistics | minor: Spanish

Phoebe Cordova is majoring in Applied Linguistics with a minor in Spanish, and, as a lover of language, she is also learning Russian. Currently she is a McNair scholar and a tutor in the Applied Linguistics department. Her research interests include the prosody-pragmatic interface and the intonation production of multilingual speakers. Her utilization and examination of naturalistic data facilitates the opportunity to investigate how L2 prosodic structures arise from actual language use. Further, she believes that in the future this approach and area of research could help reduce the discrimination and negative social attitudes that multilingual speakers experience based on their speech production patterns. Phoebe will graduate from Portland State University in the summer of 2021 and hopes to commence a doctoral program in the fall of 2022 to continue her exploration of L2 prosodic phenomena.

Making use of prosodic resources in a new language: Self-repetition in wh-questions in talk-in-interaction

There is a growing body of research being conducted on L2 prosodic acquisition, production, and variation. The studies have analyzed data from a variety of L1s and have primarily focused on the impact of age of acquisition and proficiency level on L2 prosody. Additionally, almost all of these studies have investigated this area using spoken language elicited in highly controlled experimental settings that make use of read-aloud tasks designed to elicit a particular response, which weakens the ecological validity of the studies. In contrast, this study collected naturalistic language data of an L1 Mandarin speaker of English and analyzed it using principles from interactional linguistics to account for the interactional context of the language in the analysis. Specifically, it asked: 1) how does a novice language user make use of prosodic resources in wh-questions for interactional work? and 2) do those prosodic resources change over time as the language proficiency changes? In total, 40 wh-questions were collected including 24 self-repeated questions which were then analyzed for prosodic and sequential structure using methods from acoustic phonetics, phonology, and interactional linguistics. It was found that, interactionally, the repeated questions fell into two categories: repetition for self and repetition for others. Further, the repeat questions in these distinct interactional contexts were accompanied by consistent prosodic and semiotic modifications and the employment of such modifications changed as her proficiency increased. This not only offers additional insight into the ways that L2 speakers make use of prosody, at a particular proficiency level and across time, but provides support for an interactional prosody framework because the prosodic contributions to the utterance meaning cannot be separated from the sequential features of the talk.



Dr. John Hellermann

Faculty Mentor | *Department of Applied Linguistics*

John Hellermann received his Ph.D. from the University of Wisconsin in 2002 and has worked in the Department of Applied Linguistics at Portland State since 2003. During that time, he has conducted research on language in social interaction in classrooms and among small groups navigating city streets with a mobile phone. At Portland State, he has been affiliated with the Literacy, Language, and Technology Research group, the 503 Design Collective, and Language around Metropolitan Portland and is currently getting back to his research focus in graduate school: the role of prosody (intonation and rhythm) in organizing language use. He has published over 40 journal articles, chapters, or books, is a former editor of *Applied Linguistics*, and has been a mentor for three McNair scholars.



Brenda Escalera Acosta

Psychology | minor: Spanish | certificate: Chicano/Latino Studies

Brenda Escalera Acosta is a third-year student at Portland State majoring in psychology with a certificate in Chicano/Latino studies and a minor in Spanish. She is currently a McNair Scholar and a mentor for the GANAS enrichment program, which has allowed her to mentor first-generation Latino students. Brenda is focusing on studying mental health in Latino/Hispanic communities. She believes Hispanic/Latino communities are widely underrepresented in healthcare institutions, including mental health services. Upon completion of her undergraduate studies, Brenda plans to apply for graduate school to continue her studies in psychology and mental health.

Analyzing The Use of Mental Health Services by Latino Students at Portland State University

This study focuses on analyzing trends in racial/ethnic disparities in access to mental health resources among Latino students at Portland State University. This study aims to examine how often Latino students access mental health services on campus. The hypothesis of this study is that the research will show disparities among the number of Latino students who access mental health services at Portland State. This will be examined using data collected from Portland State University's Center for Student Health And Counseling (SHAC). If the hypothesis is supported, this study will find that Latino students at Portland State access mental health services at fewer rates than white students. These findings could help improve the mental health resources provided by universities and help encourage future research on the mental health of university students.



Dr. Jessica Rodriguez-Jenkins

Faculty Mentor | *School of Social Work*

Jessica Rodriguez-JenKins, Ph.D., LICSW (she/her/hers/ella) is an Assistant Professor in the School of Social Work. She joined PSU in 2017 after receiving her doctoral degree in Social Welfare from the University of Washington's School of Social Work in Seattle, Washington. Dr. Rodriguez-

JenKins has experience teaching across the social work curriculum, both undergraduate and graduate courses. The courses she teaches include: the generalist practice sequence, introduction to privilege and oppression, and field seminar. Her pedagogical approach is grounded in social constructivism and critical race theory, centering the voices of minoritized communities. In her research, teaching, and service Dr. Rodriguez-JenKins is dedicated to advancing the field of social work in a way that gives voice to the history, politics, culture, legacies, and the current urgent needs of both Latinx communities and all marginalized peoples.



Shanthia N. Castro Espinosa

Public Health Studies | minor: Child, Youth, and Family Studies

Shanthia N. Castro Espinosa is majoring in Public Health Studies with a concentration in Community Health Promotion and minoring in Child, Youth, and Family Studies. As a first-generation Chamorro-Mixed race, she was raised on Saipan, a small island a part of the Commonwealth of the Northern Mariana Islands. Shanthia is currently a BUILD EXITO and McNair scholar, working alongside Dr. Alma M.O. Trinidad at Portland State University, School of Social Work. Currently, Shanthia is interning in Dr. Lisa Marriott's lab at Oregon Health and Science University, School of Public Health. She previously interned at the Oregon Rural Practice-based Research Network under Dr. Melinda Davis's lab. Shanthia is dedicated to improving public health concerns among youth and families, and Pacific Islander (PI) communities. Her research interests include examining social determinants and health disparities among underrepresented minorities and PI populations, community health, and social change. In the future, she intends to pursue a dual degree in Public Health and Social Work (MPH-MSW) to broaden her experience in exploring equity and accessibility, integrating both public and social concerns of underrepresented and PI communities.

Motivational Factors and Opportunities to Science, Technology, Engineering, and Mathematics (STEM) majors among Native Hawaiian and other Pacific Islanders (NHPI)

Higher education is a contentious space that poses challenges and barriers to the science, technology, engineering, and math (STEM) fields. This study explores the motivational factors and opportunities to STEM fields among Native Hawaiian Pacific Islanders (NHPI). A qualitative method was used in this study, examining public archival data (e.g., videos, recordings, digital information, etc.) of self-identified NHPI scientists, scholar-activists, leaders, and their narratives of entering the STEM fields. Specifically, the portrayal of needs and promotion of NHPI representation and access were examined, including messages that inspire and encourage STEM interest among NHPI youth. This study explores motivation, opportunities, and challenges to decolonize STEM education and community-based work offering unique perspectives of Pacific Islanders visibility in STEM-related careers. Implications on culturally responsive strategies and approaches for NHPI in STEM will be discussed.



Dr. Alma Trinidad

Faculty Mentor | *School of Social Work*

Alma M. Ouanesisouk Trinidad, Ph.D., MSW is an associate professor in the School of Social Work at Portland State University (PSU). As a first generation college graduate and professional, born and raised on the island of Molokai, Hawai'i with family roots of Filipino immigration through the sugar and pineapple industries, she describes her voyage of serving the people and community as becoming a Pinay (Filipina) scholar warrior and guardian of kapu aloha (sacred love)/mahalaya (love and freedom). She earned her Ph.D. in social welfare from the University of Washington, Seattle, her MSW from the University of Michigan, Ann Arbor, and her BSW from the University of Hawai'i, Manoa. She is a macro social worker and scholar activist. She brings an array of scholarly work and practice in community development and organizing, policy analysis, organizational culture and processes, and collective impact in the areas of health promotion and education among diverse communities, and building strong children, youth, and families. Her scholarly work focuses on critical Indigenous pedagogy of place youth empowerment, social determinants of health and education, youth and family participatory action research, social movements, and leadership and mentorship for social change. Other research and teaching interests include critical humanist design thinking, community practice, and culturally responsible research methods. Alma has passion for the arts, creative work, nature, and spirituality. Having mentored, informally and formally, youth to new colleagues in the field, Dr. Alma finds this work to be life changing and relational, always striving to build strong communities.



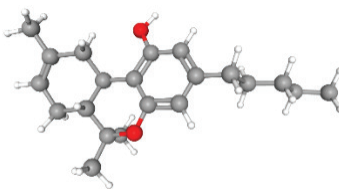
Michael Fernando

Biochemistry

Michael Fernando is a biochemistry major and honor student at Portland State University. He was an NSF-funded S-STEM scholar and is a U.S. Department of Education Ronald E McNair scholar. Michael joined the Strongin Group whose principal investigator is Dr. Strongin, a Professor of Organic Chemistry at PSU. Michael is a part of a team examining degradant toxicant formation in vaping. He was assigned to assess a semi-synthetic THC derived from hemp drug-type inflorescence. In the future, Michael intends to pursue a Ph.D. in Medicinal Chemistry.

Examining Δ 8-THC Vaping Degradant Toxicant Formation

States prohibiting recreational and medical use of cannabis are seeing a rise in synthetic THC usage. This article will explore Delta-8-Tetrahydrocannabinol, a phytocannabinoid with reported psychotropic effect. Δ 8-THC is biosynthetically produced in Cannabis sativa plants. However, its concentration is minimal and needs to be semi-synthetically derived from hemp inflorescence to achieve substantial quantities. CBDA, a legal precursor to Δ 8-THC synthesis, is extracted from female drug-type flowers containing less than 0.3% Δ 9-THC. CBDA can be interconverted to Δ 8-THC in the presence of a Lewis acid cyclization to form the defining benzopyran ring of THC analogs. Δ 8-THC is mixed into cartridges for vaping and edible foods. The aim of this research was to analyze degradant toxicant formation in dabbing and handheld vaporizers.



Delta-8-Tetrahydrocannabinol



Dr. Robert Strongin

Faculty Mentor | *Department of Chemistry*

Dr. Robert M. Strongin is a Professor of Organic Chemistry at Portland State University. He received his B.A. degree in Chemistry (Honors) from Temple University. Upon graduation he worked as an industrial chemist at FMC Corporation and later at SmithKline Beecham (now GlaxoSmithKline). He then enrolled in the University of Pennsylvania where he earned his Ph.D. in Organic Chemistry. Dr. Strongin began his independent career upon receiving his doctorate as a member of the faculty in the Department of Chemistry at Louisiana State University. At LSU he rose steadily through the ranks to the level of endowed professor. In 2007 he was recruited by the Portland State University chemistry department, where he currently has an active research program focusing on tobacco and cannabis vaping, disease diagnostics, pharmaceutical design and synthesis and biomolecular mechanisms of disease. He is a founder of two biotech startup companies, and regularly chairs NIH study sections and an NIH/FDA panel on electronic nicotine delivery system (ENDs) toxicology. Dr. Strongin is an ardent supporter of underrepresented groups in STEM. He was the founding director of the IMSD Program at LSU and has also served as director of LSAMP at PSU. He has written four books and has co-authored over 150 peer-reviewed manuscripts that have been cited over 10,000 times. He has received research and teaching awards throughout his career. At PSU these have included the Presidential Career Research Award and the John Eliot Allen Teaching Award.



Tabitha Grow

Biology and Public Health

Tabitha Grow is a student at Portland State University dual majoring in biology and public health. With a passion for health equity, her goal is to become a naturopathic practitioner to help communities thrive. She believes natural and botanical medicine, as well as preventative care, are keys to successful health outcomes. In her spare time, she is a volunteer with the Oregon Health Authority helping individuals apply for the Oregon Health Plan. Her focus with the McNair research scholarship is to study how curcumin impacts clinical symptoms in asthmatic patients. Her passion is driven by a family member being diagnosed at an early age and watching their continuous struggle. Her goal is to bring awareness to medical communities about the implications of using curcumin as a complementary supplement to standard care. As a single mother of a young child, she understands the value of family time and the importance of healthcare decisions. In her spare time, she is hiking the Portland trails looking to identify plant species or reading up on new scientific discoveries. She is passionate about the crux between gastroenterologic and immunologic systems, and will be pursuing further research in her graduate program.

Efficacy of Curcumin in Asthma: A Systematic Review and Meta Analysis

Over 23 million people are affected by asthma in the United States and 262 million individuals globally. Asthma, if poorly controlled, is associated with significant morbidity as well as increased risk for mortality. Asthma involves several complex inflammatory pathways and processes including an increase in immune cell activation. Curcumin, the active constituent found in turmeric, has been studied in numerous in-vivo and in-vitro studies to generate anti-inflammatory effects in pulmonary diseases and, more recently, an increase in clinical data has become available. Since the most recent review assessing the role of curcumin in pulmonary disorders, additional clinical trials have been published and we are the first to provide a meta-analysis evaluating the efficacy of curcumin supplementation in asthma from clinical trials. We searched PubMed and Google Scholar for eligible studies up to June 30, 2021, using medical subject headings and keywords for asthma. We included any clinical trial design, conducted in humans, assessing the efficacy of curcumin on asthma related symptoms and lung functioning. Two authors, using predefined criteria, independently screened, extracted data, and assessed risk of bias from included articles using predefined criteria. Random effects meta-analysis was performed for each outcome, with effect size reported as mean difference (MD) or as a standardized mean difference. 1,216 studies were screened, 8 included for review (n = 509) and adequate data from 3 trials (n = 203) included for meta-analysis. The majority of participants were of female sex (52.2%) and the mean age (SD) of participants was 39.23 (14.7) years. The forced expiratory volume in one second (FEV1%) improved with curcumin supplementation (3 studies; pooled MD = 3.70 (1.00, 6.41), p=0.007, I2=0%) compared to control. Efficacy of curcumin supplementation on asthma symptoms more generally were discordant and safety data was only reported in two trials. Supplementation with curcumin may provide small improvements in FEV1%, however conclusions are limited by the small number of studies and sample sizes, poor methodological quality, inconsistent reporting of asthma related outcomes and high risk of bias of included studies. Additional, high-quality, human trials are needed to more robustly assess the efficacy of curcumin supplementation in asthma.



Dr. Adam Sadowski

Faculty Mentor | *Postdoctoral Researcher*

Dr. Adam Sadowski, ND, MS obtained his Doctorate of Naturopathic Medicine and Master of Science in Integrative Medicine Research from the National University of Natural Medicine (NUNM) where he is currently a first-year resident and postdoctoral researcher with NUNM's Helfgott Research Institute. At NUNM he provides primary care services and conducts research on complementary and integrative health practices. He has published in several peer-reviewed journals as well as presented research at national conferences. He helped PSU student and McNair Scholar, Tabitha Grow, conduct the first systematic review with meta-analysis assessing the efficacy and safety of curcumin supplementation in asthmatics.



Julie Ha

Public Health Studies and General Science

Julie Ha is a second-year undergraduate double-majoring in public health studies: pre-clinical health sciences and general science. She is currently a part of the McNair Scholars Program at Portland State University. Julie was previously involved in the URSA Engage program at Oregon State University, where she worked with Dr. Yumie Takata to study the effects of vitamins and mineral supplements on non-small cell lung cancer. As a McNair Scholar, her focus is exploring the impact of interpersonal trust on health outcomes in rapidly gentrified neighborhoods in Portland, Oregon. Her research interest encompasses identifying different social determinants and how they can affect the well-being of individuals in deprived neighborhoods. As an Asian-American and first-generation college student, Julie is passionate about advocating for more accessible and equitable health care for low-income BIPOC communities. She is planning to attend medical school after acquiring her Bachelor's of Science Degree and pursue a career in family medicine. Julie strongly believes in the importance of establishing a healthy community and is committed to pushing for a better public health infrastructure.

Exploring the Impact of Interpersonal Trust on Health Outcomes in Rapidly Gentrifying Neighborhoods in Portland, Oregon

Social determinants have been recognized to be significant factors contributing to the overall health outcomes of individuals. However, there is limited research on how these factors have directly impacted the mental and physical wellness of people in neighborhoods who are experiencing rapid gentrification. The objective of this study is to determine whether the level of interpersonal trust present between individuals in neighborhoods is associated with the mental and physical health outcomes among its residents. This quantitative study uses the Albina-Rockwood Neighborhood Promise Survey, which uses data from a random sample of families living in two rapidly gentrified neighborhoods in Portland, Oregon. We will explore the relationship between neighborhoods using self-related mental and physical health questions. We hypothesize that trust will positively be related to better overall health results. Residents with a higher degree of trust, will have greater physical and mental health outcomes. We will also look at the impacts of trust on different demographics and across class strata. These findings suggest that future studies should examine how race and social class can affect the magnitude of trust in a neighborhood.



Dr. Yves Labissiere

Faculty Mentor | *School of Public Health*

Yves Labissiere is a social psychologist who works to understand how race, identity, language, difference, power, and privilege play a role in education and health systems. His aim is to develop strategies that heal and empower individuals and transform systems. He has studied the health effects of gentrification and residential displacement on Black men in Portland, OR. He has worked on curriculum for Portland State University's BUILD EXITO Program, which works to build infrastructure to support underrepresented students interested in the health sciences. He worked on a project with the Portland Police Bureau to test how positive police-community interactions might help address crime and build trust. He is also working on a new project with Portland police to better understand how police work with, or could better work with, mental health professionals when they encounter calls that involve people who may need mental health help.



Adrian Jovany Hernandez

Biology | minor: Chemistry

Adrian Jovany Hernandez is majoring in biology with a minor in chemistry. He is part of the Courcelle Lab at Portland State University. He is currently a S-STEM Scholar, McNair Scholar, and a student in the Honors College. His research interests are in DNA replication. He will be finishing his bachelor's degree in spring of 2022. In the future, Adrian would like to attend medical school and obtain a Doctorate in Medicine.

The Characteristics of *rmuC(yigN) xonA recA* and *rdgC xonA recA*

Escherichia coli K-12 is one of the top utilized organisms in molecular biology research. However, numerous essential assets for functional genomics and systems biology studies of this organism are still needed. *E. coli* BW25113 is the lab-derived parent strain of the Keio collection accounting for virtually 3985 single-gene mutations (Baba, 4). The mutants: *rmuC*, *recA*, *rdgC* and *xonA* are all from the same common strain background—*E. coli* BW25113 and have a FRT(FLP recognition target)-flanked kanamycin cassette in their coding region. We will be working with these single-deletion mutants and attempt to construct double mutants to then construct and learn about the triple mutants. The triple mutants we will be looking to make are *rmuC xonA recA* and *rdgC xonA recA*. When constructing the triple mutants, we will be checking for viability and their growth compared to the initial strains. We will also examine if these combinations are orthologous to the NBS1 (Nibrin) protein—a key component of the MRN complex. The MRN complex which is composed of Mre11, Rad50, Nbs1 recruits and activates ATM, which initiates damage signaling and DNA repair.



Dr. Erin Shortlidge

Faculty Mentor | *Department of Biology*

Dr. Erin Shortlidge is an Assistant Professor in the Department of Biology and is the head of the Biology Education Research (BER) group at PSU. The BER group is largely interested in understanding and testing best practices in biology teaching and learning. She also leads her own research lab: The Shortlidge Biology Education Research Group. The lab studies how students learn, how instructors teach, what generally works and for whom in biology, as well as at the intersection of biology and other disciplines.



Yuliana Hernandez Paniagua

Health Sciences (pre-med track) and Pre-Clinical Health Sciences

Yuliana Hernandez Paniagua is double majoring in health sciences, on the pre-med track, and pre-clinical health sciences. She is currently a McNair Scholar as well as a BUILD EXITO Scholar. She is also a mentor for GANAS, which is a program dedicated to helping students who are first-generation, low income, and/or from diverse and multicultural backgrounds. Currently, Yuliana's research interests include how policies affect BIPOC women's sexual reproductive health and how, therefore, it affects them so that they are more susceptible to low birth and preterm babies. Her hope is to gain more knowledge regarding maternal health because that's her main focus overall and correlates with her career goals as well, considering she wants to be an obstetrician. She will begin her research in the summer of 2021, and in the future hopes to become a practicing provider as a clinician but also to be part of the knowledge production as an academic clinician. She wants to be able to prevent women of color from suffering anymore by the hands of doctors who are ignorant, lack the connection, patience and knowledge that people of color are owed.

A Comparative State Policy Analysis of Sexual Health Bills in the US Concerning Abortion, Maternal Mortality, Postpartum Depression, and Medicaid

Purpose: Women of color (WOC) have faced a long history of sexual health injustice. Racial inferiority has exacerbated discriminatory health care practices and state policies negatively affecting access, eligibility, and resources. WOC may be most vulnerable to constraints on reproductive rights as they face additional barriers in accessing high-quality reproductive health care free from race bias and discriminatory policies.

Research Question: We documented and analyzed the landscape of all 50 U.S. bills from 2019-2020 related to women's sexual health. We asked, what bills use racial/ethnic language to address women's sexual health and what bills exist in regards to four categories: abortion, maternal mortality, postpartum depression, and Medicaid.

Methods: Using the official legislative websites for each of the 50 states we searched for bills using the following key terms: abortion, maternal mortality, postpartum depression, Medicaid, sexual health, pregnancy, women of color, and health. We documented a total number of bills that were introduced, passed, and/or vetoed by the governor for each of our four categories.

Results: For abortion, a majority of the states introduced punitive and restrictive bills. For maternal mortality, 15 bills in 7 states were introduced and 4 states passed bills for creating a committee to investigate the racial/ethnic disparities in their states. There was more limited attention to PTSD. A total of 20 bills were introduced and only one passed in the state of Texas to address postpartum depression. Overall, we found the least number of bills under Medicaid as it relates to women's sexual health. A total of 4 passed. 3 provided Medicaid coverage for key resources such as lactation, doula and 1 extended resources during the postnatal period.

Discussion: Similar to previous research, we found a higher number of abortion bills that are restrictive and punitive. Interestingly, none of the bills use racial/ethnic language outside of the maternal mortality category. There is an opportunity for a greater number of states to use a racial/ethnic language given the strong evidence documenting racial disparities among BIPOC women. Overall, there was a lack of attention to immigrants, LGBTQ+, socioeconomic factors, and women who suffer from disabilities. State government officials have a long way to go in order to develop more inclusive sexual health bills and ultimately pass policies that address

the needs of all women.

Dr. Cirila Estela Vasquez Guzman

Faculty Mentor | Department of Family Medicine at OHSU



Dr. Vasquez Guzman is an Assistant Professor in the Department of Family Medicine at Oregon Health & Science University. Estela trained at the University of New Mexico, where she specialized in medical sociology, race, and ethnicity. Dr. Guzman

has specific interest in social-cultural-structural-humanistic curriculum for medical students and residents as well as investigating inequities in medicine, health, and health delivery among Native American and Latinx communities. As a first generation Latina immigrant indigenous scholar, she aims to bridge the gap between theory and practice from an equity and inclusion perspective because we all win when we have a compassionate, representative, and humanistic healthcare system.



Bruce Jenks

History (concentration: American History)

Bruce Jenks is a McNair Scholar and history major, focusing on American history. He pursued his education at Portland Community College and Portland State University while working for Multnomah County Library. His interests tend towards inequality and conflict in human relationships. During his studies at PSU, he examined the American West through many overlooked lenses, including Indigenous, labor, and female perspectives. He is just beginning his grad school search to pursue a Ph.D. while also exploring projects in public history in order to contribute to a more complete and inclusive historical conversation. He has written several papers about Northwest peoples, such as the Chinook Indian Nation and the Confederated Tribes of Grand Ronde. In examining these stories, how they appear in the historical record, and how they impact real people's lives and our culture today, he is convinced that what applies to the West, applies to America: much of its history remains unwritten.

American Apartheid in the Walamt Valley: The Creation of Grand Ronde and the struggle to assimilate in a segregated society

Throughout its history the United States government professed the goal of assimilation of North America's indigenous peoples. Whatever words Americans used to frame this social project, it was clearly the result of a view of Native societies as inferior to those of their European forebears and perhaps some Asian cultures of what they referred to as "the Old World." This view of Native people as inferior led to the demand that they assimilate to a republic that habitually violated its own laws regarding land acquisition in the "New World." It also compelled American officials to rationalize instituting race-based legislation that specifically prohibited Native people from doing exactly that. Many of the stories of those who were removed to the Grand Ronde Reservation demonstrate this. In investigating the events surrounding the colonization of the Willamette Valley in the 1850s I will argue that apartheid, rather than assimilation, was the goal and the result of American colonization in Oregon. Working back from the text dictated to anthropologist Melville Jacobs in the 1920s by a Tualatin man named Louis Kenoyer about his childhood in Grand Ronde, I will examine appearances in the historical records of his father, Peter Kinai, his grandfather, Kamatc, and his great uncle, treaty chief Kiakuts to better illustrate the effects of historic events on real people.



Dr. Katy Barber

Faculty Mentor | *Department of History*

Katy Barber is a Professor of History at Portland State University where she teaches courses in Western and public history. Her most recent book is *In Defense of Wyam: Native-White Alliances and the Struggle for Celilo Village* (University of Washington Press, 2018), which chronicles women's leadership in the struggle to protect Indian homes at Celilo Village on the Columbia River. Other books include *Death of Celilo Falls* and *Nature's Northwest: The North Pacific Slope in the 20th Century* (with William Robbins). Public history projects include a multi-faceted, collaborative effort with the Chinook Indian Nation to document their history through archival research and oral histories (chinookstory.org) and a project on the long history of residential segregation in Oregon in partnership with the City of Portland, Clackamas County, the Community Alliance of Tenants, and Vanport Mosaic. Her award-winning article about settler sovereignty formation in Oregon was published in the Oregon Historical Quarterly's special issue on white supremacy in Winter 2019.



Courtney Ledford

Biology

Courtney Ledford is in pursuit of a Bachelor's of Science degree in Biology. While studying at the University of Alaska, Anchorage, she gained acceptance into the BUILD EXITO research program. She transferred to Portland State University as a BUILD scholar, where she merited admission into the Honors College and the McNair Scholar program. Her interests are in pharmaceutical research to aid mental health, and specifically, substance abuse disorders. Courtney believes in developing holistic approaches to benefit individuals seeking addiction therapy. She is currently working in Dr. Ozburn's lab at the Veterans Affairs Portland Alcohol Research Center. The lab studies the molecular mechanisms contributing to alcoholism and addiction to develop more efficacious treatments. She intends to apply to a neuropsychopharmacology-related Ph.D. program and begin graduate school in Fall of 2022.

The Effect of Apremilast on Circadian Rhythm in the Ventral Tegmental Area

Chronic binge drinking negatively impacts society and is a leading cause of preventable deaths. The purpose of the experiment is to determine if regulation of circadian rhythms in the ventral tegmental area (VTA) will contribute to less ethanol consumption. The VTA plays a major role in addiction. A simple genetic animal model examines iHDID-1 mice and their binge-like drinking intake. The mice undergo Drinking in the Dark (DID) for 6 weeks prior to administration of apremilast or saline treatment at weeks 7 and 8. The mice are exposed to DID and sacrificed at two separate time points (ZT 3 and ZT 15) to account for the peaks and troughs of circadian rhythms. Apremilast treatment has shown evidence to support amelioration of circadian rhythms leads to a decrease in ethanol intake. If circadian rhythms are increased in the VTA, then the amount of ethanol consumed will decrease.



Dr. Angela Ozburn

Faculty Mentor | *Department of Behavioral Neuroscience at OHSU*

Dr. Ozburn is a Ph.D. Assistant Professor in the Department of Behavioral Neuroscience at Oregon Health & Science University. Research in my laboratory contributes to the understanding of the molecular mechanisms that underlie addiction and to improved treatment of substance use disorders. Despite advances in neuroscience and psychiatry, we have much to gain in our understanding of substance use disorders and the development of more effective treatments. Our specific goals are to: 1) identify mechanisms mediating circadian gene effects on drug- and mood-related behaviors, and 2) identify how altering specific brain activity can alter alcohol-related behaviors and identify transcriptional mechanisms that underlie lasting reductions in binge-like drinking.



Catherine Lefevre

Anthropology

I'm currently a senior at Portland State University studying anthropology. I was born and raised in Honolulu, Hawaii. I grew up in a town called Manoa valley, noted for its heavy rainfall (not too dissimilar from PDX). Growing up in Hawaii, I was exposed to a wonderful array of cultural heritage, traditions, and cuisines. I enjoy perusing Powell's bookstore while here in Portland and love anything non-fiction or written by Joseph Campbell. I've interned at Outside-In, a local Portland non-profit working to bridge healthcare and access related disparities among uninsured and economically marginalized folks. I'm passionate about the intersections of indigenous identity, contemporary iterations of indigeneity, and the adaptive and integral role of culture, folklore and diaspora.

A Cyber-Anthropological Interrogation of East Asian Parenting Styles and Kinship Systems

Cyber-anthropology is a crucial, and perhaps underexplored, aspect of contemporary anthropological research. Cyber-anthropologists seek to analyze and comprehend the seemingly complex reciprocal relations that exist between humans and computer driven realities. Cyber-anthropology is certainly applicable to ethnographic research and analysis. Dr. Amy Chua dissects the East-Asian cultural phenomenon of the “Tiger Mom” and the relatively strict parenting style often associated with Tiger Mothers and East-Asian cultural communities. This research paper examines East-Asian parenting styles, specifically the concept of the “Tiger Mom” and the correlatives that exist regarding academic performance, mental health and the disparities that often present themselves when examined via a western perspective. East-Asian parenting dynamics, anecdotes and outcomes are examined via cultural histories and the anecdotal experiences of Asian Identified folks within cyberspace communities formed via the internet, thus providing critical insights into the culture of “tiger moms” and its correlative outcomes regarding mental health and academic performance.



Dr. Charles Klein

Faculty Mentor | *Chair of the Anthology Department*

Charles Klein is an applied medical and urban anthropologist with over 25 years of research experience in Brazil and the United States. He earned a BA in Economics at the University of California, Berkeley, a J.D., from Stanford University, and a Ph.D. in Anthropology from the University of Michigan.

Dr. Klein has been part of the faculty at PSU since 2012 and is currently an Associate Professor and Chair of the Anthropology Department. He has received grants from the National Institute on Minority Health and Health Disparities, the National Science Foundation, the Fulbright-Hays program, and the Social Science Research Council. His current research focuses on developing a sexual health promotion app for transgender women in the United States and examining intersectional cultural politics in São Paulo, Brazil. Uniting his work is a commitment to supporting healthy communities through community-engaged research and understanding the complex interactions between public policy, politics and everyday life.



Oliver Lumbad

Applied Health & Fitness

Oliver Lumbad is a recent graduate of Portland State University's Applied Health & Fitness at the OHSU-PSU collaborative School of Public Health. At Portland State, I focused my academic coursework in human anatomy and physiology, exercise testing and prescription, and exercise physiology. I am particularly interested in the use of physical activity to manage and prevent chronic diseases. I was one of 72 students selected to be a part of the highly competitive NIH BUILD EXITO Program in 2019 and the Ronald E. McNair Postbaccalaureate Achievement Program in 2021 – where I engaged in two years of undergraduate research at OHSU's Knight Cancer Research Building on adherence of cancer survivors and their partners to a resistance training program. Ultimately, I intend to pursue a Doctor of Physical Therapy, and engage in work that involves the use of sports medicine to serve individuals in underserved communities.

Reporting Adherence to Resistance Training in Cancer Survivors and their Partners: A Comparison Between Prescribed and Received Training Dose

Resistance training is increasingly recognized as a behavioral strategy that can negate the adverse effects of cancer treatment. The exercise prescriptions were derived from trial method reports which may not reflect the actual dose of exercise in relation to study outcomes. It is possible, therefore, that the dose of exercise necessary to evoke a particular benefit may differ from published recommendations. Purpose: To report exercise adherence and dose in a resistance training program for cancer survivors and their partners. Furthermore, we aim to assess tolerability, compliance, and strength outcomes by comparing received training volume. Methods: Preliminary data from 25 participants enrolled in the EXERCISING TOGETHER© trial (NCT03630354), included breast cancer survivors (n=13) and their partners (n=12) was used for this analysis. Participants completed strength training sessions twice weekly for 6 months in one of two study arms: partnered group or separate survivor/spouse group exercise. We examined the prescribed volume for two exercises, chair stands and step-ups, and compared to self-reported volume, collected in participant exercise logs. Prescribed training volume and received training volume was calculated (sets x repetitions x load in kg). Here, we report adherence of prescribed training volume and received training volume in the overall sample as well as adherence based on role (survivor/spouse), and study arm. Comparisons between role and study arm were completed using two sample t-tests. Results Within person adherence to prescribed dose averaged 72.6% of classes for chair stand and 70.5% of classes for step ups. There was not a significant difference in adherence between survivors and partners. Stratified analysis suggests survivor adherence improves and partner adherence decreases when in class together, but the study was underpowered to see significant differences between study arms. Conclusion: Preliminary results suggest that breast cancer survivors may benefit when partners are involved in exercise, but that, in turn, may reduce the partners own benefit from exercise. Future analysis can examine the achieved dose of exercise in relation to participant benefits to determine the full implications of these observations.



Dr. Kerri Winters-Stone

Faculty Mentor | *Exercise Scientist and Professor at OHSU*

Dr. Kerri Winters-Stone, is an exercise scientist and Distinguished Professor at Oregon Health & Science University. She is also co-director of the Knight Community Partnership Program and Co-program leader of the Cancer Prevention and Control Program for the OHSU Knight Cancer Institute, an NCI-designated comprehensive cancer center. As a scientist, Dr. Winters-Stone's research focuses on the effects of cancer treatment on musculoskeletal health and cancer recurrence risk and the ability of exercise to improve health and longevity in cancer survivors. Just recently, Dr. Winters-Stone received new NCI funding to determine the patterns and predictors of chemotherapy-induced neuropathy and mobility impairment during neurotoxic chemotherapy and several NCI supplements to integrate digital technology as a tool for continuous passive monitoring of mobility in aging cancer patients.



Benji Mahaffey

Philosophy

Benji Mahaffey is a first-generation student majoring in philosophy. His academic background is nontraditional; he graduated high school in 2005, and after a few brief stints in community college, dropped out to work for the next decade. He enrolled at Portland Community College in 2018 after becoming interested in the philosophical and scientific studies of the mind, consciousness, and their connections to the brain. Of particular concern to him are the phenomenal effects of mind-altering drugs on the human mind, the phenomenon of addiction, and the qualitative experience of conscious, nonhuman animals. He is a member of the 2021 McNair Scholars cohort and has maintained a position on the President's List each term since enrolling. He won scholarships offered by the Portland State Philosophy Department: the Newhall Scholarship and the Tom Seppalainen Award. Benji believes that consciousness will ultimately prove analyzable via the methods of science and hopes to earn a Ph.D. in either philosophy or cognitive science after completing his undergraduate education in order to continue probing the mysteries of the mind.

Is Addicted Phenomenology Just Human Phenomenology?

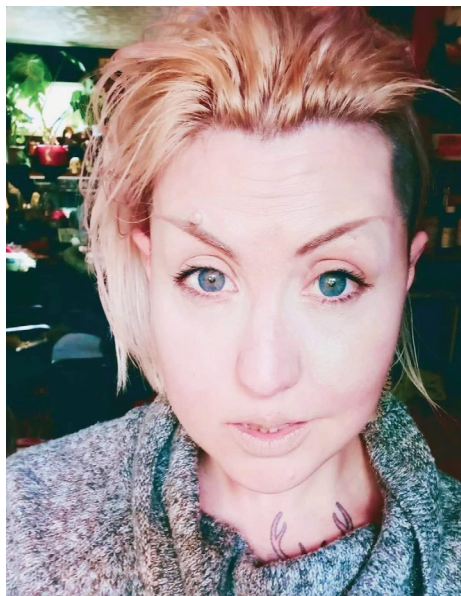
The phenomenon of addiction precedes, by millennia, our scientific inquiries into its psychological manifestations and neural bases. We did not need psychiatrists to ‘discover’ it; we have long been aware of its dark shadow lurking in our psyches. The discernable, often troubling behaviors of addicts notwithstanding, addiction is not the kind of phenomenon one observes; addiction is experienced, from the first-person perspective. Its defining features are qualitative: a subjective loss of control, an obsession, a compulsion. The overwhelming phenomenological salience of these features—especially of “compulsion”—has led addicts, philosophers, and psychiatrists alike to imagine that addiction is a discrete (phenomenological, natural, psychological) kind. In my research, I argue that addicted phenomenology is different only in degree from ordinary human experience, and not in kind. This conclusion’s major premise derives from our present-best neuropsychological theories of addiction; together, they successfully explain the defining phenomenological features of addiction while applying, *mutatis mutandis*, to garden-variety experiences of compulsion. I distinguish between essential and contingent features of addicted phenomenology, which allows for ontological clarity around what it is, exactly, we are talking about when we talk about addiction and demonstrates that the identity-criteria of what we call “addiction” are not phenomenally immanent, so to speak, but are external, contextual and—ultimately—contingent.



Dr. Tom Seppalainen

Faculty Mentor | *Department of Philosophy*

Tom Seppalainen is an Associate Professor at Portland State Philosophy where he teaches Philosophy of Science and Philosophy of Mind. His research interests include philosophy of perception and human empiricism.



Cassandra Mathieson

Public Health Studies and General Science | minor: Biology

Cassandra Mathieson is currently completing her junior year at Portland State. She is a first generation college student and a double major in public health: pre-clinical health sciences and general science, with a minor in biology. Cassandra is a non traditional student who returned to school in adulthood. Prior to transferring to PSU, she spent time studying at Portland Community College, where she developed a strong appreciation for the financial accessibility and quality instruction available through public college education. Cassandra is currently assisting Ph.D. candidate organic chemistry research in the Strongin Lab at PSU, and is a current McNair Scholar. When not engaged in academic or research pursuits, Cassandra is passionate about her community volunteer work in animal rescue. She is also employed full time as a shelter and housing case manager for a Clackamas County based nonprofit, serving survivors of domestic and sexual violence who are experiencing houselessness. After successfully completing her baccalaureate degree, Cassandra hopes to successfully matriculate to a dual MD/Ph.D. program to train as a medical scientist. It is her hope that through a combination of research efforts and clinical practice, she might work to decrease the gap in access to competent care for marginalized populations in Oregon.

Nerve Tissue Targeted Fluorophore Synthesis: From Scheme to Administration

Nerve tissue damage as a result of surgical injury is a common negative outcome during many surgical interventions (Rogers et al, 2002). Depending on the site of the injury and the amount of cellular damage, nerve tissue injury may potentially have a life altering effect on the surgical patient. (Hall, 2005). Surgery that is fluorescence guided will aid in the visualization of nerve structure patterns and as a result may significantly improve patient outcomes. In this research, I will synthesize a small set of fluorescent contrast agents which may highlight nerve tissue in real time with great sensitivity and in high contrast. Absorption and fluorescence spectra will be collected as a way to evaluate each agent. Systemic administration of the novel agents in rodents will help define nerve specificity. In order to observe tissue intensity and nerve signal to background ratios, images of the surgical sites will be collected and quantified. The knowledge garnered from this study will greatly help inform nerve tissue specific, clinical grade, contrast agent development.



Dr. Robert Strongin

Faculty Mentor | *Department of Chemistry*

Dr. Robert M. Strongin is a Professor of Organic Chemistry at Portland State University. He received his B.A. degree in Chemistry (Honors) from Temple University. Upon graduation he worked as an industrial chemist at FMC Corporation and later at SmithKline Beecham (now GlaxoSmithKline). He then enrolled in the University of Pennsylvania where he earned his Ph.D. in Organic Chemistry. Dr. Strongin began his independent career upon receiving his doctorate as a member of the faculty in the Department of Chemistry at Louisiana State University. At LSU he rose steadily through the ranks to the level of endowed professor. In 2007 he was recruited by the Portland State University chemistry department, where he currently has an active research program focusing on tobacco and cannabis vaping, disease diagnostics, pharmaceutical design and synthesis and biomolecular mechanisms of disease. He is a founder of two biotech startup companies, and regularly chairs NIH study sections and an NIH/FDA panel on electronic nicotine delivery system (ENDs) toxicology. Dr. Strongin is an ardent supporter of underrepresented groups in STEM. He was the founding director of the IMSD Program at LSU and has also served as director of LSAMP at PSU. He has written four books and has co-authored over 150 peer-reviewed manuscripts that have been cited over 10,000 times. He has received research and teaching awards throughout his career. At PSU these have included the Presidential Career Research Award and the John Eliot Allen Teaching Award.



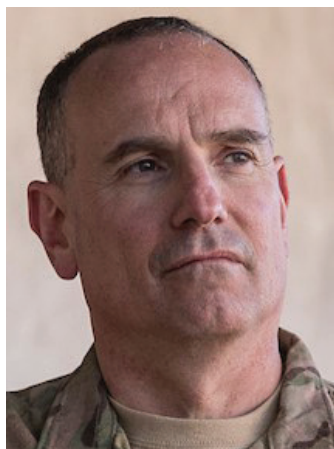
Rosol Hatim Mikail

Science and Public Health: Pre-clinical Health Science

Rosol Hatim Mikail is double-majoring in Science and Public Health Studies: Pre-clinical Health Science. She is part of the Trauma Research Lab at the Oregon Health & Science University. She is currently a McNair and a Build EXITO scholar. Also, she is part of the Middle East, North Africa, South Asia Initiative team with the Cultural Resource Centers at Portland State University. Rosol is a first-generation college student in her family. She is fluent in the Kurdish language and has a good understanding of the Arabic language as well. Rosol values mentoring since she has mentors in her life who support her with her academic and career goals. Therefore, she herself mentors high school students who need assistance with applying to colleges. Rosol aspires to be a doctor and a researcher who works internationally. Her field of interests are in trauma, neuroscience, public and global health.

Using Blood Biomarkers to Predict Traumatic Brain Injury

Traumatic brain injury (TBI) is a serious medical condition that needs a diagnosis to be treated. The neurological exam used for diagnosis is not able to detect all TBIs. Without a TBI diagnosis, a patient is not able to get the necessary medical care in time which could potentially lead to long-term brain damage and mortality. Some blood biomarkers have been investigated and found to have a correlation with TBI. Testing the blood is more accessible to diagnose TBI; this could connect the patient with further medical treatment when a TBI is suspected through the test. In this experiment, the efficiency of two blood biomarkers GFAP and Tau are tested to identify which one is a better predictor for TBIs. Also, the concentration of the biomarkers are compared in three different groups which are; head injury trauma, polytrauma injuries (head trauma + one other trauma), non-head injuries traumas. This is a retrospective study that uses plasma samples and patient data from a study on trauma patients collected by the Trauma Research Lab at OHSU. Tau is analyzed using a multiplex kit and GFAP is analyzed using an ELISA, both from R&D Systems (Minneapolis, MN). The hypotheses are that the GFAP biomarker will be a better predictor for TBI than Tau, and the biomarkers concentration will be higher in the head injury group compared to the polytrauma and non-head injuries group.



Dr. Martin Schreiber

Faculty Mentor | *Chairman of the Trauma Center Association of America*

Dr. Martin Schreiber is the Chief of Trauma and the Chief of the Division of Trauma, Critical Care and Acute Care Surgery at Oregon Health & Science University. He is the Chairman of the Trauma Center Association of America. He is a Colonel in the US Army Reserve and has been deployed to Iraq and Afghanistan and he has served as the Joint Theater Trauma System Director. He is an Adjunct Professor of Surgery at the Uniformed Services University of the Health Sciences. Dr. Schreiber is also the director of the Trauma Research

Laboratory, the Army Civilian Trauma Training Team and the Donald D. Trunkey Center for Civilian and Combat Casualty Care at OHSU. The Trauma Research Lab has been continuously funded by federal sources since 2001. Lab research interests include prehospital treatment of traumatic brain injury, resuscitation of hemorrhagic shock, hemorrhage control and development of novel blood products. Current funding sources include the Department of Defense, the NIH and private industry. The lab is engaged in over 40 investigational protocols at OHSU. Dr. Schreiber is considered a leader in the trauma community and he has been an invited speaker throughout the United States and around the world.



Choomno Moos

Mathematics

Choomno is an undergraduate student at Portland State University majoring in mathematics. He is a first-generation college student from a low-income family, having been raised by a single immigrant mother. Despite the difficult circumstances of his upbringing, Choomno has managed to achieve great success in his studies. In addition to having elected to take numerous graduate mathematics courses, from 2018 onward he has been researching an application of information theory to crystallographic image processing with Professor Peter Moeck in the Nanocrystallography physics group at Portland State and is now working with Professor J.J.P. Veerman on the dynamics of flocks. In recognition of his achievements, Portland State's Fariborz Maseeh Department of Mathematics and Statistics has awarded Choomno their competitive David and Laura Brose Memorial and Dave Fitzpatrick departmental scholarships. Throughout the course of his studies, Choomno has accrued an appreciation for the miracle that is the unreasonable effectiveness of mathematics in the sciences (cf. Eugene Wigner). This has motivated a broad interest in mathematics. Among Choomno's favorite mathematical subjects are dynamical systems, algebraic and geometric topology, functional analysis, and category theory, and he intends to pursue research in at least one of those directions. As such, Choomno plans to start a doctoral program in mathematics in Fall 2022, immediately following the completion of his undergraduate degree. Choomno also has an interest in teaching mathematics and has been working as a mathematics and physics tutor at Portland State's Learning Center since the Fall of 2019.

Flocks, Digraphs, and Oscillator Arrays

A flock is a collective of decentralized, self-propelled agents striving towards altering their motion to adhere to some formation. In this paper, we discuss the mathematical representation of flocks, construct a linear model to approximate their behavior, and study a special case to exhibit a few features of this model. Along the way, we establish connections to the theory of directed graphs, circulant matrices, and control theory.



Dr. Peter Veerman

Faculty Mentor | *Department of Mathematics*

J. J. P. VEERMAN is Professor of Mathematics and Affiliate Professor of Physics at Portland State University in Oregon, USA. He received his Ph.D. from Cornell University in 1986. After postdocs in Spain (1 year) and at Cornell University/Rockefeller University (2 years), he held visiting positions in the U.S. (Rockefeller University, CUNY, Stony Brook University, Georgia Tech, Penn State), as well as in Spain (Aut ´ oma Madrid, Aut ´ onoma Barcelona), Brazil (IMPA, PUC-Rio, UFPe). He came to Portland State University in 2000. He has since held visiting positions in Spain (Granada), Italy (Pisa, Salerno), Greece (University of Crete), and Rockefeller University in NYC. In Fall 2000, he was the Gorenstein Professor of Mathematics at CUNY-Queens. Since 2015, he is Scientific Adviser to the International Center for Nonlinear Dynamics and Complex Systems, “Gabriele d’Annunzio” University, Pescara, Italy. More recently, he was offered the (full year) Fulbright-Czech Distinguished Professorship for 2019-2020 at the Czech Technical University in Prague. These awards are viewed as among the most prestigious appointments in the Fulbright Scholar Program. Portland State University policies rendered it impossible to accept this prestigious award.



Alexandria Murphy

Biology

Alexandria Murphy is majoring in biology. She is a part of the Bartlett Lab and Mackiewicz Lab research team at Portland State University. She is currently a McNair Scholar and SSTEM Scholar. Her research interests include medicine delivery and design as well as gene targeting. She will begin pursuing her Ph.D. in biochemistry and molecular biology in the Fall of 2022.

Hybrid-lipid Coated Silver Nanoparticles as an Antimicrobial

Silver has been known to be an antimicrobial for hundreds of years, but wasn't thought to be useful in the medical field until the 1960's. In more recent years people have been designing different methods of synthesis for silver nanoparticles, yet none of these methods prevent the oxidized silver (Ag^+), which is toxic. As the use of silver nano materials for antimicrobial activity has expanded there has been an increase in interest in the medical field, and how silver nanoparticles can be used as an antimicrobial without having toxic effects. While there is a large availability of silver nanoparticles (AgNp 's) design strategies for controlling the rate of release of Ag^+ is not well defined. Having well defined design strategies for release rate can help provide control for items that need both slow and quick release such as mesh, bandages, catheters, and other medical tubing. Consequently, there is a gap in our understanding of how to control the release rate of silver for the purpose of controlled release of Ag^+ , and therefore be stabilized and used for a range of antimicrobial applications. Because of the critical need for non-toxic antimicrobial agents that can target and kill bacteria in medical implants such as mesh and tubing, this study is of significant interest. With the increased interest in nanoparticles as an antimicrobial this has led us to the research question: How does surface chemistry affect the antimicrobial abilities of AgNp 's? Within this question we have a subset of questions this research should be able to answer; Can the AgNp 's successfully kill without releasing silver? How does shape and size affect the killing ability of the nanoparticles? How does varying Ag^+ release rate affect killing ability?



Dr. Marilyn Mackiewicz

Faculty Mentor | *Assistant Chemistry Professor at OSU*

Dr. Marilyn Mackiewicz is an assistant chemistry professor at Oregon State University. Mackiewicz received her PhD in Chemistry in 2005 from Texas A&M University. Prior to teaching and doing research at OSU, Mackiewicz was a research assistant professor at Portland State University for 11 years. Mackiewicz's research focuses on the various uses of nanomaterials in biomedical, environmental, and commercial applications.



Dr. Michael Bartlett

Faculty Mentor | *Department of Biology*

Dr. Bartlett received his Ph.D. in Cellular and Molecular Biology from the University of Wisconsin-Madison in 1997. He was then an NIH postdoctoral researcher at the University of California, San Diego, and joined the Portland State University biology faculty in 2002. His research concerns the function of basal transcription factors and RNA polymerase from the Archaeal domain and has been funded by the American Heart Association and the National Institutes of Health.



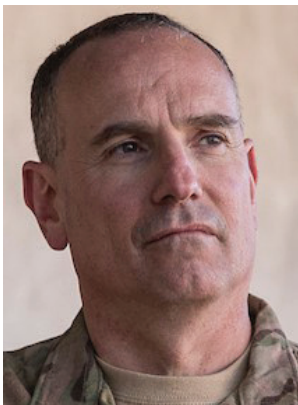
Queen Revollido

Biochemistry

Queen Revollido is a fourth-year undergraduate student pursuing a bachelor's degree in biochemistry as a part of the Honors College, BUILD EXITO Program, and McNair Scholars Program. She was introduced to biomedical research during her time at Clark College where she worked with Dr. Roberto Anitori in finding and identifying antibiotic-producing bacteria by genome sequencing. She now works with Dr. Martin Schreiber at the Trauma Research Center at OHSU where she is exploring the upregulation of the proteins CD40 ligand and TNF-alpha after traumatic injury to observe if elevated levels of the proteins can be predictive of worse patient outcomes. The goal of her current study is to better anticipate post-injury complications in order to initiate treatment earlier. During her time as an undergraduate, Queen realized the disparities in science and that sparked her passion in creating a more inclusive scientific community. Queen aims to attend graduate school for biomedical engineering after her time at Portland State University to help advance medical diagnostics and treatments while helping widen inclusivity within academia.

CD40L and TNF-alpha Levels After Traumatic Injury

The biomarkers CD40 ligand and TNF-alpha are proteins that exhibit proinflammatory and prothrombotic effects. A small clinical study has shown that soluble CD40 ligand may have a role in early coagulopathy and inflammatory complications in severely injured patients. It is known that a CD40 ligand increases the production of cytokines such as TNF-alpha, thus, the current study aims to investigate the kinetics of these biomarkers and the extent of upregulation after traumatic injury. Frozen samples collected from baseline, 8, 24, and 48 hours after admission will be used. CD40 ligand and TNF-alpha levels will be quantified using Luminex that will then be compared to various hemostatic laboratory analyses.



Dr. Martin Schreiber

Faculty Mentor | *Chairman of the Trauma Center Association of America*

Dr. Martin Schreiber is the Chief of Trauma and the Chief of the Division of Trauma, Critical Care and Acute Care Surgery at Oregon Health & Science University. He is the Chairman of the Trauma Center Association of America. He is a Colonel in the US Army Reserve and has been deployed to Iraq and Afghanistan and he has served as the Joint Theater Trauma System Director. He is an Adjunct Professor of Surgery at the Uniformed Services University of the Health Sciences. Dr. Schreiber is also the director of the Trauma Research Laboratory, the Army Civilian Trauma Training Team and the Donald D. Trunkey Center for Civilian and Combat Casualty Care at OHSU. The Trauma Research Lab has been continuously funded by federal sources since 2001. Lab research interests include prehospital treatment of traumatic brain injury, resuscitation of hemorrhagic shock, hemorrhage control and development of novel blood products. Current funding sources include the Department of Defense, the NIH and private industry. The lab is engaged in over 40 investigational protocols at OHSU. Dr. Schreiber is considered a leader in the trauma community and he has been an invited speaker throughout the United States and around the world.



Tyler Robin

Chemistry

Tyler Robin is currently finishing their undergraduate degree in chemistry. Tyler is a part of the BUILD EXITO program as well as a McNair scholar at Portland State University. They started college five years after graduating from high school after working seasonally in national parks. During their time in national parks, they saw the effects of climate change first hand which sparked their passion for the environment. Once they started school at Portland Community College, they fell in love with chemistry. While working as the Food Pantry manager at Portland Community College they decided that the connection between social justice and science needs to be bridged. As they continued their education their ambition and drive proved to them that they could do anything they set their mind to. Now with the aim of obtaining a Ph.D., they have never felt so confident and excited about life and supporting the communities that have supported them in the past. Tyler has interests in many areas but is focusing on environmental chemistry, food justice, environmental justice, planetary science, and sustainability. Tyler believes that through the path of environmental research, open-mindedness, and hard work, social and environmental change can be the future.

Comparing heavy metal content found in spinach (*Spinacia oleracea*) grown on the roof and ground sites at Portland State University

As a result of urbanization, fresh, healthy food can be expensive and easily contaminated but space for local farming is limited. Roofs can be underutilized in densely populated cities and can offer a space for local fresh farming. The purpose of this study is to find if growing leafy vegetables on the roof can limit heavy metal exposure from air pollutants. By growing Spinach on five roofs and five ground locations around the Portland State University campus, at varying heights, we can extract the heavy metals found in these greens and compare them to each other. The expected results show that growing leafy greens on the roof will have fewer heavy metals and grow faster, stronger and with fewer growing variables than the ground sites. Evidence that growing vegetables on the roof results in less contaminants can lead to larger-scale local gardens and fresher, healthy vegetables.



Dr. Gwynn Johnson

Faculty Mentor

Department of Civil and Environmental Engineering

While earning her B.S. and M.S., Johnson worked for Environmental Consulting & Technology in Gainesville, Florida, and Larsen and Associates in Miami, Florida. Her field experience inspired her to attain her Ph.D. at the University of Arizona, and she joined PSU's Department of Civil and Environmental Engineering in 2002 after completing her post-doctoral work. Experienced in subsurface hydrology, contaminant transport and fate, environmental chemistry, Johnson fits in perfectly with PSU's strong environmental and engineering faculty.



Dr. Olyssa Starry

Faculty Mentor | Professor of Urban Ecology

Dr. Starry is an associate professor at Portland State University where she teaches urban ecology and other related courses in the Honors College. She also serves as faculty mentor to the College's sustainability scholars and has advised numerous honors thesis projects. Professor Starry studies ecoroofs as model systems for understanding how design and management decisions affect the ecological, social, and political functions of urban open spaces. More specifically, her current externally funded projects address how ecoroof design can affect human health by influencing air quality and also by providing horticultural therapy. Previous publications have explored local and global patterns of ecoroof biodiversity using beetles as indicator species as well as the role of plants in the ecoroof water cycle.



Brianna Ross

Applied Linguistics

Brianna Ross graduated from Mount Hood Community College in her senior year of high school with her AAOT, and has been pursuing her Bachelor's of Art in Applied Linguistics with an interest in Japanese. She is currently a McNair Scholar and the Vice President of the Japanese Student Society. Her work is influenced by the inequalities found in the educational settings and how they are influenced by language policy and multiculturalism. Her research interests are in the use of language in education policy. Brianna believes that continuing research on multiculturalism and education policy can help bridge the gaps in educational settings and promote bilingual educational settings that allow students to express their own identities through their language use without the pressures of assimilation. In the Fall of 2024, she would like to pursue her Ph.D. in Educational Policy to further her knowledge and question the educational systems.

Perceptual mismatch between meso and macro policy at Tokyo International University

Previous studies have aimed at looking at meso and micro policy levels of Japanese educational institutions and their English language teaching programs. Through conducting surveys and interviews, researchers gained knowledge of how, or if, institutions portray their standards to students and staff and how those goals are displayed through curriculum. This research shows a disconnect between the stated goals and in class instruction. While the researchers looked at overall disconnects, none looked at specific universities and their programs. My study aims to fill that gap, focusing on a university known for its English teaching and production skills. The intention is to find if there is a perceptual mismatch between documented university English proficiency standards at Tokyo International University and what is communicated with students. This investigation explores how (or if) their goals are communicated and if the students believe they are able to communicate in English conversational settings.



Dr. Kimberly Brown

Faculty Mentor | *Professor of Applied Linguistics*

Kimberley Brown is Professor of Applied Linguistics/International and Global Studies. She begins her 32nd year here at PSU this fall. Her research interests include intercultural communication, teacher pedagogy, and World Englishes. With her colleague Shawn Smallman, she is the co-author of *Introduction to International and Global Studies*. She completed her MA TESOL and Ph.D. in Second Languages and Cultures Education at the University of Minnesota. She has taught and published about her work in Iran. She is a passionate supporter of McNair and her students.



Zein Sadek

Mechanical Engineering | minor: Mathematics

Zein Sadek is currently a senior at Portland State University (PSU) majoring in mechanical engineering with a minor in mathematics. Beginning as a transfer student two years ago, he quickly took an interest in applied research, securing a position as an assistant in the Wind Energy and Turbulence (WET) Laboratory. Here, his work focuses on renewable energy, with a special emphasis on wind power and offshore, floating wind plants. Zein is a 2021 McNair Scholar, and has been awarded multiple scholarships at the recommendation of PSU's Mechanical and Materials Engineering department, including a scholarship from the National Society of Professional Engineers (NSPE). Having completed his first two years of undergraduate education while still in high school, Zein has proven himself to be a highly motivated student. He is currently enrolled in PSU's Pathways program which allows him to take graduate level courses while completing his bachelor's degree. After graduating with his master's degree in 2022, Zein plans to continue his education by obtaining a Ph.D. in his field.

Mass Consistent, Analytical Near Wake Models for Wind Turbines

A new 3-dimensional, analytical wake model is presented which includes improved 9 wake descriptions near the rotor plane when compared to existing models. Wake structures, including the momentum deficit, hub jet, wake rotation, and flow acceleration around the rotor, are economically described with Ricker wavelets and Gaussian functions. These physics are included through the addition of free parameters, balancing the total degrees of freedom with model fidelity. Large-Eddy Simulations (LES) are used as reference data to build the model. Implementation into the FLOW Redirection and Induction in Steady State (FLORIS) framework provides the opportunity for the perform model validation within a wind farm setting. Analytical modeling of each 17 component of flow allows for mass conservation to be evaluated.



Dr. Raul Cal

Faculty Mentor | *Department of Mechanical and Materials Engineering*

Raúl Bayoán Cal is a professor in the Department of Mechanical and Materials Engineering at Portland State University; a faculty member since 2010. Received his Ph.D. in Mechanical Engineering from Rensselaer Polytechnic Institute in 2006. During 2006 to 2009, he was a postdoctoral fellow at Johns Hopkins University. His area of research is focused on understanding turbulence with emphasis placed on physics related to wall-bounded, free-shear and multi-phase flows as well as wind/solar energy.



Marshall Scheider

Liberal Studies | minors: Philosophy and French

Marshall Scheider is a senior at Portland State University, majoring in liberal studies with minors in philosophy and French. His broadly interdisciplinary research interests include imperialism, incarceration and abolitionist studies, neoliberalism, and modern continental philosophy, as well as critical theories of race and gender. Marshall is currently a McNair Scholar and a Ford Family Foundation ReStart Scholar. His published work has addressed topics such as sovereignty, the biopolitics of immigration control, and the history of neoliberalism. His conference activity has included presentations on diverse topics such as: biopower, sovereignty, postcolonial literatures, and neoliberalism, as well as philosophical and literary figures including Heidegger, Foucault, Hegel and Kafka. Outside of the academy, he volunteers with Critical Resistance, a national grassroots organization aimed at the abolition of the prison industrial complex. Marshall is a French tutor in the PSU department of World Languages and Literatures and a teaching intern at the French American International School. His current research inquires into the role of sacrifice in early modern political theory, and the function of the latter in practices of British settler colonialism. Marshall is looking into Ph.D. programs which will encourage interdisciplinary research at the crossroads of history, politics, and critical theory.

Liberalism, Settlement, Sacrifice: Towards a Genealogy of Sacrificial Politics

In recent years, political theorists have begun to explore the sacrificial dimensions of liberalism and neoliberalism in the global North. Little of this work, however, grapples with the ways settler colonialism informs contemporary political sacrifice or conceptions of the sacrificial. This paper traces a genealogy of contemporary political sacrifice through the archive of early British colonialism in North America. When theorists ignore this archive, they do more than render colonization mute: they also fail to apprehend what I term political sacrifice's differential function—the mechanism by which sacrifice's burdens fall on subordinated groups while its benefits accrue to the socially, politically, and economically powerful. Methodologically, the paper works across disciplines, establishing links between critical analyses of settler colonialism and studies in political theology. If a theological notion of sacrifice underpins modern notions of citizenship, and settler colonization furnishes an historical key to the differential function of modern political sacrifice, then a bridge is formed between two research programs which rarely interact. While the modern liberal state promises a politics founded on the dignity and rights of the abstract citizen, a close examination of the role of sacrifice in liberalism's past and present underscores the limitations of liberal citizenship as a category of analysis. Foregrounding the violent structures of settlement, this genealogy exposes the constitutive character of asymmetrical sacrifice within American liberalism. In so doing, it unsettles some of liberalism's core conceits: the displacement of violence by law, and the saliency of abstract citizenship..



Dr. Adam Culver

Faculty Mentor | *Political Theorist*

Adam Culver is a political theorist whose research explores the intertwined legacies of the emergence of modernity, the elaboration of racial hierarchy, and Black emancipatory politics. Foregrounding the racialized dimensions of modernity, his courses and research critically interrogate such foundational themes as the meaning of freedom, the relationship between history, theory, and politics, the limits of identity and identification as the basis for politics, and the quest for political community. His current book project, entitled *Race and Romantic Visions: A Tragic Reading*, explores a series of creative intersections between romanticism, modern black political thought, and philosophies of tragic possibility through readings of Johann Herder, Immanuel Kant, James Baldwin, W. E. B. Du Bois, Toni Morrison, Friedrich Nietzsche, and Sophocles.



Brett Stinson

Mechanical Engineering

Brett Stinson is majoring in mechanical engineering with a focus on fluid and thermal science. He is a research assistant in Dr. Elliott Gall's Healthy Buildings Research Laboratory at Portland State University (PSU). He is currently a McNair, S-STEM, Green Building, and Ford Family Foundation scholar, vice president of PSU's ASHRAE chapter, and SALP-recognized Student Leadership Fellow. He recently completed his Honors College thesis titled, Modeling Airflows and VOC Source Strengths for an Occupied School and has submitted work to the 2021 PSU Student Research Symposium, 2022 ASHRAE Winter Conference, and Indoor Chemistry 2021 conference. His research interests include indoor air quality, sustainable building design, and energy modeling. Brett is on track to complete his master's degree in fluid and thermal science at Portland State University in Spring 2023, and then plans to pursue a Ph.D. Through his research in building science, he hopes to make the world a healthier, safer place for future generations.

Determining Airflows and Volatile Organic Compound Source Strengths for an Occupied School

Volatile organic compounds (VOCs) are a group of air pollutants that can adversely impact human health, engage in chemistry indoors, and meaningfully degrade indoor and outdoor urban air quality. While extensive research with regard to VOC emission rates from indoor sources has been conducted, it was not until recently that this work began to focus on characterizing emissions from humans and human activity in depth. As buildings are constructed to be increasingly airtight, and the materials utilized are chosen to reduce VOC emissions, it follows that human contributions are poised to become increasingly important indoor sources of VOCs. Utilizing data extracted from a three-month campaign conducted at Harriet Tubman Middle School in Portland, Oregon—an institution built near a busy roadway—this study modeled airflows through the school and quantified source strengths for VOCs over the course of one week in May 2019. We developed an approach to estimate occupant density, outdoor air ventilation rates, and supply air flow rates through the school by analyzing the decay, steady-state, and accumulation periods of CO₂ measured in return air. In total, emission rates for 249 compounds were calculated. Emission rates for seven compounds that are traditionally associated with human metabolism and activity became the study's primary focus, as did source strengths for BTEX compounds (benzene, toluene, xylenes, and ethylbenzene), which are typically associated with traffic-related air pollution (TRAP). Calculated per-person emission rates for VOCs that are associated with human activity or metabolism, e.g., monoterpenes and isoprene, were consistent with estimates in the literature and indicate humans and their activities are an important indoor source of reactive VOCs. This study provides new data concerning VOC source strengths of indoor and outdoor origin to a building, which can enable the modeling of air pollution exposures in schools.



Dr. Elliott Gall

Faculty Mentor | *Department of Mechanical and Materials Engineering*

Dr. Elliott Gall is an assistant professor at Portland State University (PSU) in the department of Mechanical and Materials Engineering. He received his B.S.E. in Environmental Engineering from the University of Florida and his Ph.D. in Civil Engineering from the University of Texas at Austin. At PSU, Dr. Gall leads the Healthy Buildings Research Laboratory, which aims to conduct fundamental and applied research exploring the many factors that impact our exposure to air pollution inside buildings, and an NSF-funded scholarship program on building science. He was acknowledged with the 2018 Yaglou Award from the International Society for Indoor Air Quality and Climate for his work on indoor ozone chemistry. Dr. Gall is active in professional societies, including ASHRAE and the International Society for Indoor Air Quality and Climate. His research at Portland State has been featured in national and local media, including The Atlantic, National Geographic, and The Seattle Times. He occasionally tweets about research and other topics @etgall.



Amirali Veshagh

Biology and General Science

Amirali Veshagh is a recent graduate from Portland State University with a bachelors of science in Biology, General Science, and Liberal Studies. He is a research assistant in the Westbrook Lab, which examines the entorhinal-dentate circuit and how synapses are formed and regulated in the hippocampus. He works on figuring out exercise-induced molecular mechanisms that reshape synaptic or circuit connections and thus enhance learning and memory. His research interests include molecular biology and looking at the underlying genetic mechanisms behind different neurological disorders. Amirali believes that further biological research can elevate the level at which we can help people suffering from neurological conditions. His passion for research extends from his desire to help this patient population regain their sense of self.

The perforant path and activity dependent synaptic plasticity

While it is widely accepted that exercise serves as a beneficial stimulus that helps improve learning and memory, it is important to understand the molecular mechanisms that support this phenomenon. Many of these positive effects can be traced back to an increase in synaptic plasticity and dendritic spine density in the granule cells of the dentate gyrus. The main input to these Hippocampal dentate granule cells is called the entorhinal cortex. There is a strong projection from the Entorhinal cortex to the molecular layer where a neuron will synapse onto the granule cells. This projection is called the perforant pathway and is subdivided into the medial and lateral perforant pathways. The medial perforant path carries spatial information and the lateral perforant path carries contextual and time information. A recent study within the Westbrook and Goodman labs has shown how a single episode of voluntary exercise produced a functional increase in the density of spines in the outer molecular layer. Upon further testing they found that this process was mediated by Mtss1L, an early effector of synapse formation. I will use SIM1-cre mice to visualize the Medial and Lateral entorhinal cortex and their corresponding projections into the molecular layer. Not only will we be able to see which cells are involved in the circuit but using Fos-trap mice (and a retrograde virus injection) we can see how many of those related cells are active as well.



Dr. Gary Westbrook

Faculty Mentor | *Scientist at the Vollum Institute*

Dr. Westbrook received his medical training and did graduate study in Biomedical Engineering at Case Western Reserve University. He was then an intern and resident at Mt. Auburn Hospital in Boston (Internal Medicine) and at the Washington University School of Medicine in St. Louis (Neurology). After clinical training, he spent six years in basic neuroscience research at the National Institutes of Health before moving to the Vollum Institute in 1987. He is a senior scientist at the Vollum Institute and the Rocky and Julie Dixon Professor of Neurology in the School of Medicine. He served as co-director of the Vollum Institute from 2005–2016. Dr. Westbrook has been active in the development of the Jungers Center, a joint effort between the Vollum Institute and the Department of Neurology, as well as in OHSU training activities in disease-oriented neuroscience research. He initiated the Neurobiology of Disease course in the graduate program and served as the director of the Vollum/OHSU Neuroscience Graduate Program from 2008–2018. Dr. Westbrook has been the recipient of several research prizes, including a Jacob Javits Award and a Merit Award from the National Institutes of Health. He is a past editor-in-chief of the Journal of Neuroscience and now serves as a senior editor at eLife. He has served as a member of the Advisory Council of the National Institute of Neurological Diseases and Stroke (NINDS) and the NIH Council of Councils, which oversees the Common Fund.



Ann Wachana

Biology (pre-med track)

Ann Wachana is a senior at Portland State University. She is majoring in biology and on the pre-medicine track. Her interest in medicine began at Benson Polytechnic High School, where she majored in health sciences and was able to get hands-on technical experience while exploring various healthcare careers. Gaining a particular interest in physiology, Ann then went on to explore medicine through research as a BUILD EXITO and McNair Scholar. She is a student researcher in Dr. Holly Hinson's Lab, which focuses on traumatic brain injuries and also works with Dr. Raina Croff on the Sharing History through Active Reminiscence and Photo-imagery (SHARP) Study. After her undergraduate studies, Ann hopes to obtain a medical degree and a graduate degree in global health. In the future, Ann aims to practice medicine and increase healthcare access on a global scale.

Dr. Raina Croff

Faculty Mentor | *Assistant Professor of Neurology at OHSU*

Raina Croff, PhD is Assistant Professor of Neurology at the NIA Layton Aging and Alzheimer's Disease Center at Oregon Health & Science University. She specializes in qualitative methods and applies an anthropological lens to the Black experience to inform asset-based, culturally meaningful approaches to social connectivity, physical activity, and cognitive health. She is Principal Investigator of the Sharing History through Active Reminiscence and Photo-imagery (SHARP) study that uses GPS-linked historical images to engage older Black adults in recorded walking conversational reminiscence in Portland's gentrifying historically Black neighborhoods. A former McNair Scholar herself, Dr. Croff is enthusiastic about serving as a McNair mentor. You can find more about the SHARP study at www.sharpwalkingstudy.org.

Exploring How Gentrification- related Effects Impact the Health of Older Black Adults

Black adults living in gentrifying neighborhoods experience cultural incongruence with new, often younger, high SES and White residents. In addition, older Black adults are losing deep ties to their neighborhood. This is a major loss to their social network and their sense of belonging within their own neighborhoods. Disruption of long-standing social ties can cause changes in mental health and raises concerns about gentrification's potentially disruptive impact on cognitive health and the brain aging process. In order to learn more about the experience of older Black adults within a rapidly changing city, focus group discussions from the Sharing History through Active Reminiscence and Photo-Imagery (SHARP) study were analyzed. The SHARP study engages Black Adults (n=19, ≥ 55 years) who have been residing in Portland, Oregon's historically Black neighborhoods for at least 10 years in a walking program through these gentrifying areas, now home to a predominately White, younger, and higher socioeconomic demographic. Focus group discussions were thematically coded [Croff et al., 2021; Croff et al., 2019]. Themes included "gentrification," "cultural incongruence," and "mental health impact." Within the discussions, participants described generational and cultural differences between them and newer generations, and residents reflected on their feelings and experiences of gentrification. The potential impact that changing neighborhoods have on the mental health of Black adults and the quality of aging is especially relevant since, as a demographic group, they are at an increased risk of cognitive decline and Alzheimer's disease and disproportionately affected by gentrification.



Dr. Holly Hinson

Faculty Mentor | *Associate Director of Clinical Research in the Neurosciences ICU at OHSU*

H. E. Hinson, M.D., M.C.R. is an Associate Professor of Neurocritical Care, Neurology, and Emergency Medicine at Oregon Health and Science University. She serves as the Associate Director of Clinical Research in the Neurosciences ICU at OHSU, a member of the AAN's Science Committee, and serves on the editorial boards of the journals *Neurology*, *Stroke*, and *Neurocritical Care*. She identifies her work as "Computational Neurology"; her research involves developing precision strategies for the treatment of acute brain injuries, such as traumatic brain injury (TBI), by applying integrative approaches that include high dimensional molecular and clinical data to infer predictive models of disease-related phenotypes. Dr. Hinson is a national leader in equity initiatives. She founded the American Academy of Neurology's LGBTQI section in 2017, and served as its inaugural chair from 2018-2020. Dr. Hinson has served on the AAN's Equity, Diversity, and Inclusion Joint Coordinating Council, and is one of two EDI Associate editors for the journal *Neurology*.



Max Wrubel

Biology

Hi, my name is Max and I'm pursuing a B.S. in biology at Portland State University. I'm a part of the Blue Water microbial oceanography lab at PSU's Center for Life in Extreme Environments. I'm interested in the ecology of open-ocean microbes, and their roles in the global carbon cycle. Using the explosion of data produced by next-generation genetic sequencing technology, I believe microbial ecology will be key to addressing issues of human and environmental health in our future. As a Lester Newman Research Scholar, I used network analysis of gene expression in the ecologically critical photosynthetic marine bacterium *Prochlorococcus*. I merged data sets from studies published by others to connect genes to the cells' response to environmental stress, and to improve our understanding of their gene regulation. I'm currently a McNair Scholar, continuing this work with a focus on how *Prochlorococcus* is able to control its depth for optimal sun exposure despite the upwellings and downwellings of the open ocean waters. I plan to deepen my studies of complex biological systems through a masters of science in computational biology before pursuing a Ph.D.

Description of anti-sinking pilus subunits in picocyanobacteria

The picocyanobacteria are the dominant photosynthesizers throughout the world's nutrient-poor open oceans. They not only form the base of the food chain, but also play a crucial role in carbon cycling on a global scale. Their success in harsh environments is due in part to the diversity of ecotypes - subspecies that have adapted to light and nutrient environments specific to a specific strata of the water column. The mechanism of ecotype localization is somewhat mysterious given that many of these cells are non-motile. The nonmotile *Prochlorococcus* sp. MIT9313 and its close relative *Synechococcus* sp. WH7803 can delay their sinking by producing large numbers of type 4 pili (T4P) when growth conditions are favorable. An abundance of these filaments on the cell surface increases the cell's drag and slows its rate of sinking, suggesting a novel use of the structure to maintain depth. However, it is unknown whether anti-sinking pili production is conserved in the lower branches of *Prochlorococcus* or more broadly throughout the order *Synechococcales*. Here a phylogenetic tree of T4P subunit pilA is mapped to identify the conservation of domains associated with anti-sinking activity. 3D protein models are constructed for pilA from *Prochlorococcus* sp. MIT9313 and *Synechococcus* sp. WH7803 to identify common structural features. A gene network is constructed from protein-protein interaction data to uncover regulatory motifs that may distinguish between anti-sinking and conventional types of T4P.



Dr. Anne Thompson

Faculty Mentor | *Department of Biology*

Anne Thompson is a Research Assistant Professor in the Biology Department at Portland State University. Thompson received her Ph.D. from the MIT- Woods Hole Oceanographic Institution Joint Program in Biological Oceanography and has held positions at UC Santa Cruz, BD Biosciences, and the Institute for Systems Biology prior to PSU. Thompson's work illuminates the ecology of microorganisms in the Earth's vast open oceans and how they contribute to energy and carbon flow on our planet.

2021 Ronald E. McNair Program Staff



Toeutu Faaleava | MPA, JD, Ph.D | Director

Toeutu Faaleava specializes in community mobilization and capacity building. His research interests are reclaiming indigenous voices, spaces, scholarship and resistance. He teaches in University Studies and works with Pacific Islander communities in Portland.



Brooke Shea | Teaching Fellow | Graduate Student

Brooke Shea is a 2nd-year Master's student in Speech Language Pathology. She is a Build EXITO alumni with research history in Augmentative and Alternative Communication. She has a high interest in traumatic brain injuries as well as neurodegenerative disorders and their associated communication needs.



Sulema Rodriguez | Teaching Fellow | Graduate Student

Sulema Rodriguez is a 2nd-year Master's student in the Speech and Hearing Sciences program at PSU. She is BUILD EXITO and McNair alumni who has conducted research related to the genetics of stuttering at the NIH. Her primary clinical and research interests include self-disclosure, physiological responses, treatment models, advocacy, and accommodations for stuttering.



Devyn Yan Radke | Summer Fellow | Graduate Student

Devyn Yan Radke is a 2nd-year Master's student in the Book Publishing program at PSU. She is a project manager for Ooligan Press, PSU's renowned publishing press, a graduate teaching assistant, and a freelance editor and website designer. She is currently writing her Master's thesis about decolonizing the book publishing industry.