CSU Monterey Bay Presents

Fall Research Competition

Undergraduate Research Opportunities Center
Thursday, November 3rd, 2022
University Center Living Room
2:30 to 6:00pm
Created in 2015, the Fall Undergraduate Research, Scholarship, and Creative Activity Competition is designed to highlight scholarly work at California State University, Monterey Bay. Modeled after the CSU Student Research Competition, students, under the guidance of one or more faculty members within their department, or multiple departments for interdisciplinary projects, are eligible to submit a project to be considered for the competition.

All presenters, especially winning presenters, will be strongly encouraged to apply for the statewide CSU Student Research Competition, held each spring to promote and recognize outstanding student accomplishments throughout the 23 campuses of the CSU system.

Please visit the [CSU Student Research Competition](#) webpage to learn more.

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### UROC Fun Facts

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<tr>
<th>58</th>
<th>950+</th>
<th>82%</th>
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<tbody>
<tr>
<td>UROC student have won prestigious national scholarships &amp; fellowships including:</td>
<td>Of UROC students have been from traditional underrepresented groups including:</td>
<td>Number of funded undergraduate research opportunities for CSUMB students.</td>
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<tr>
<td>• 26 NSF Graduate Research Fellowship Program (GRFP) awards and 10 honorable mentions</td>
<td>42% Traditionally underrepresented minority</td>
<td>950+</td>
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<td>• 1 Ford Foundation Fellowship</td>
<td>45% First-generation in college</td>
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<td>• 20 Sally Casanova Pre-doctoral Scholars and 6 honorable mentions</td>
<td>44% Pell Grant recipients</td>
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<td>• 8 Goldwater Scholar and 7 Honorable Mentions</td>
<td>41% Transfer students</td>
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<td>• 3 CSU Trustee of Outstanding Achievement Awards</td>
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Number of students who have been in UROC professional development programs.

1,500+

850+ Student research presentations on campus

525+ Presentations at national conferences

25+ Peer reviewed journal articles

Students have presented in all 50 states

80+ delegates sent to CSU Research Competitions
### Opening Remarks | 2:30 - 2:40
Dr. John Banks, Director of UROC & Dr. Doug Smith, Interim Dean of Graduate Studies and Research

### Maria Navarro & Kyle Parker | 2:40 – 2:55
Exploring a Post-Pandemic World: How has COVID-19 Impacted Students' Perceptions of Specific Knowledge, Skills, and Abilities Learned During the Pandemic?

### Ingrid Martinson | 2:57 – 3:12
Oiled-marsh Restoration Study: The Reintroduction of Fauna into Systems

### Sonia Kortenkamp | 3:14 – 3:29
Vegetative Cover and Water Quality in Summer 2022 at Tottino II Wetland in Moro Cojo Slough

### Brittany Zetko | 3:31 – 3:46
Exploring Antagonistic Competitive Interactions Among Soilborne Streptomyces from the TriCounty region

### 10-minute Break | 3:46 – 3:56

### Zachary Vayder | 3:56 – 4:11
The Genetic Mystery of Chelaethiops Fishes of the Congo River

### Daran Towns | 4:13 – 4:28
The Effects of Giant Kelp on Ocean Acidification

### Paige Siegel | 4:30 – 4:45
Cannery Row: A Refuge for Pisaster ochraceus

### 10-minute Break | 4:45 – 4:55

### Pepper St. Clair | 4:55 – 5:10
Analysis of Antibiotic Pressure on Conjugation Efficiency of Antimicrobial Resistance Genes in E.coli

### Emily Locke-Paddon | 5:12 – 5:27
Genetic Characterization of Environmental Streptomyces spp.

### Paul Stephens | 5:29 – 5:44
Neurophysiological Responses to Cognitive Load During Learning and Memory via Eye Tracking Technology

### 6-minute Break | 5:44 – 5:50

### Awards and Closing Remarks Parker | 5:50 – 6:00
Provost Katherine Kantardjieff

**Live Streaming on Zoom:** [https://csumb.zoom.us/j/89421774436](https://csumb.zoom.us/j/89421774436)
Each fall, CSUMB undergraduate researchers are invited to enter the competition with the goal of being selected as one of the ten chosen to present their work orally at the Fall Research, Scholarship, and Creative Activity Competition. Presenters will give a 10-minute oral presentation followed by a brief Q&A (questions and answers) period. Judges will ask questions first and if time remains, the floor opens to the audience to ask questions. This competition prepares undergraduate researchers to become research delegates to enter the statewide undergraduate and graduate CSU Student Research Competition held every spring at one of the 23 CSU campuses.

Judges will be looking for the following criteria in each of the 10 presentations:

- Clarity of Purpose of the Research
- Appropriateness of Methodology
- Quality of Analysis and/or Interpretation
- Ability to Present the Research or Creative Activity
- Organization of the Presented Materials
- Ability to Handle Questions
- Value of Research or Creative Activity to the Discipline

Based on the recommendations of the judges, prizes will be awarded to the first, second, and third-place presenters.

1st Place: $250
2nd Place: $100
3rd Place: $50
Jose Pablo Dundore-Arias, Ph.D.
Assistant Professor
Department of Biology & Chemistry
California State University, Monterey Bay

JP Dundore-Arias, Assistant Professor of Plant Pathology and the Bob & Sue Johnson Professor in the Department of Biology & Chemistry, where he also serves as the Coordinator of the Agricultural Plant & Soil Science Major. He received his B.Sc. in Agronomy from the University of Costa Rica. He completed his M.S. and Ph.D. degrees in Plant Pathology with a minor in Entomology at Iowa State University and the University of Wisconsin-Madison, respectively. He later received a Postdoctoral Fellowship from the National Science Foundation to conduct research related to agricultural microbiomes at the University of Minnesota. His research interests center on investigating plant-associated microbes, with the ultimate goal of developing practical applications for enhancing plant and soil health, and promoting biological suppression of plant pathogens. In particular, his lab is leading current efforts to advance understanding of the biology, epidemiology, and management of Pythium wilt of lettuce, a disease that poses a major threat to the leafy greens industry in the Central Coast region of California.

George Matsumoto, Ph.D.
Senior Education and Research Specialist
Monterey Bay Aquarium Research Institute

George Matsumoto is the Senior Education and Research Specialist at the Monterey Bay Aquarium Research Institute where he coordinates seminars, manages the summer internship program, and the NSF-funded Adopt-A-Float program. Prior to starting at MBARI, George worked briefly at the Monterey Bay Aquarium and was a NSF postdoctoral fellow at Hopkins Marine Station before taking up a tenure track position at Flinders University of South Australia where he spent three years. After graduating from UC Berkeley with botany degree and scientific diver certification, he worked for the Catalina Island Marine Institute before starting a PhD program at UCLA where he studied gelatinous zooplankton using SCUBA, Human occupied vehicles, and remotely operated vehicles around the world.

George is a native California and third generation Japanese. He has been awarded the QuikScience Ocean Leadership Award for commitment to Ocean Education, and most recently, was selected as part of the first cohort of the AGU LANDInG program to work on DEI initiatives in the Geosciences.
Kelly Medina-López, Ph.D.
Assistant Professor
School of Humanities & Communication
California State University, Monterey Bay

Kelly Medina-López is an Assistant Professor of Composition Studies in the School of Humanities and Communication. She was UROC’s Mentor of the Year in 2019, and she has mentored a number of UROC scholars and researchers in projects that explore Latinx mythology and identity, US/Mexico border politics, critical quiltmaking, language equity, and anticolonial theory and praxis. Her research interests include anticolonial research methods, critical making, chicanx/latinx rhetorics, border studies, and language politics. You can find her writing in Constellations: A Cultural Rhetorics Publishing Space, Querencia: Essays on the New Mexico Homeland, Latinx Rhetoric and Writing Studies, and Decolonial Conversations in Posthuman and New Material Rhetorics.

Erin Ramirez, Ph.D
Associate Professor
Department of Education & Leadership
California State University, Monterey Bay

Erin M. Ramirez is an Associate Professor and the Director of Project POPPY in the Department of Education and Leadership. She teaches post-grad courses in English methods, literacy across the content areas, adolescent development, cross-disciplinary methods, and Masters level research methods. She has mentored over 55 Masters’ students through their thesis projects. Most recently she received a 4.89 million dollar Department of Education grant (Project POPPY) to increase the recruitment/retention of BIPOC teacher candidates, increase K-12 student literacy and STEM achievement, and provide professional development to teachers throughout Monterey County. She received her Ph.D. from George Mason University in Teaching and Teacher Education with a secondary emphasis in Research Methodologies. At Mason she was also a Graduate Research Assistant and an Adjunct Professor, and received the university-wide Adjunct Faculty Teaching Excellence Award. Her research interests include: teacher self-efficacy, content-area literacy, secondary literacy instruction, student reading achievement, teacher education, and research methods.
Marylou Shockley, Ph.D.
Interim Dean
College of Business
California State University, Monterey Bay

Marylou Shockley serves as the Interim Dean for the College of Business since July, 2021. Prior this position, Marylou served as Professor and Chair at the College of Business, California State University-Monterey Bay. Her research and consulting interests include diversity, social application of network technologies, leadership, and corporate governance from a social responsibility perspective. She is the author of several books and articles in her areas of interest. She has significant senior managerial experience in the telecommunications industry, working for AT&T and Pacific Bell. She did a career change in 1997 to pursue a doctorate degree in business at Oxford University in England. Dr. Shockley joined the CSUMB in the summer, 2006. Dr. Shockley has served on the Grower Shippers Foundation Board. She also serves on the UC Merced Small Business Development (SBDC) board for the central coast; Marylou has recently been elected as the Board Chair (2022 to 2024).
How has COVID-19 impacted college students' perception of their skills, knowledge, and abilities? As college students switched to an online learning environment due to the pandemic, a question arose whether or not college students' skills and abilities would be affected by the sudden change in learning environment. We collected data from 365 college students during spring 2021, fall 2021, and spring 2022 terms. Participants responded to an online survey that asked them to use a 5-point scale (1-much worse, 3-about the same, 5-much better) to rate how much they had improved or worsened on 34 skills during the pandemic. We used exploratory factor analysis to organize the 34 skills. The analysis revealed four different kinds of skills: foundational, self-management, data analysis, and teamwork. A repeated-measures ANOVA with semester (SP21, FA21, SP22) as the between-participants factor and type of skill (foundational; self-management; data analysis; teamwork), and the within-participant repeated-measure revealed students rated their foundational skills as having improved more than the other three skills, and all four skills had means of at least 3.1, indicating they had either stayed the same or improved slightly over the pandemic. In addition, students rated their skills in SP22 as better than those who rated their skills in SP21. This suggests students did not experience a loss of learning but rather saw their skills improving as the pandemic ended. Assessing students’ perception of their learning during a stressful and unprecedented event like COVID-19 is important because the information can help instructors implement different course strategies.

Fun Facts about Maria
Hometown: Castroville & Salinas, CA
Career Aspiration: To advocate for historically marginalized communities.
3 Fun Facts: Likes to hike; Dreaming of a vacation to tour Italy; and enjoys having bonfires with my kids.

Fun Facts about Kyle
Hometown: Salinas, CA
Career Aspiration: To be a research assistant.
3 Fun Facts: Plays video games; likes to hike; enjoys the winter season.
Coastal marshlands are ecologically critical areas, providing estuarine species with food, refuge, and nursery habitat, that are highly sensitive to oil spills. Replanting native grasses in these areas after a spill is an effective restoration strategy. The ability of local fauna to recolonize a site post-spill partially depends on habitat quality, including grass restoration success. The daggerblade grass shrimp (Palaemonetes pugio) is essential for facilitating the movement of nutrients and energy between salt marsh trophic levels. The goal of this study was to quantify differences in oxidative stress in P. pugio after reintroduction into an oiled salt marsh restored with different strategies by analyzing biomarkers. Shrimp were collected from Leadenwah Creek in South Carolina, then introduced into 20 mesocosms with smooth cordgrass (Spartina alterniflora) modeling an oiled salt marsh. Mesocosms included five replicates of four treatments: control with no replanting, oiled with no replanting, oiled replanted with field transplants, oiled replanted with nursery plants. This study deployed shrimp for a 96-hr period one year post-oiling and 5 months post-replanting to assess residual toxicity. Surviving shrimp were analyzed using lipid peroxidation and glutathione biomarker assays to quantify cellular membrane damage and antioxidant response respectively. No significant differences between replanting strategies was found in either biomarker assay. There was also no significant difference in lipid peroxidation. There was a significant difference between glutathione levels, indicating an elevated antioxidant response in P. pugio. Understanding the implications of organisms recolonizing an oiled environment is essential for effective monitoring and restoration of coastal marshlands.

Fun Facts about Ingrid
Hometown: Denver, CO
Career Aspiration: Pursue a PhD in marine science and research the effects of anthropogenic threats in marine environments and solutions.
3 Fun Facts: Fluent in Croatian; likes to crochet; owns lots of plants.
Vegetative Cover and Water Quality in Summer 2022 at Tottino II Wetland in Moro Cojo Slough

Sonia Kortenkamp\textsuperscript{1}, Andria Greene\textsuperscript{1,2}, Valeria Rodriguez\textsuperscript{1}, Valerie Li\textsuperscript{1}, Alexander Greene\textsuperscript{2,3}, & Nicole Foster\textsuperscript{2,4}

\textsuperscript{1}Department of Applied Environmental Science, California State University, Monterey Bay
\textsuperscript{2}Climate Aware
\textsuperscript{3}Feffer Geology Consulting, Inc.
\textsuperscript{4}University of Adelaide

Tottino II Wetland is a newly created restoration site, previously agricultural land, where our team of undergraduates conducted research during the summer of 2022. This restoration site contains five man-made ponds that connect to the Moro Cojo Slough, a tributary of the Elkhorn Slough. Our team installed permanent transects to determine the percent cover of each plant species, water, and ground cover at the site. While studying the percent cover, we compared the species CAL-IPC ratings to determine the percentage of native species compared to invasive or non-native plant species. We also collected water samples from seven locations across this site to add to our understanding of water quality, which we analyzed at the Moss Landing Marine Labs (MLML). While conducting research surrounding water quality and vegetative cover at the Tottino II Wetlands restoration site, we found that there were high nutrient levels above EPA guidelines coming from an agricultural pump into the site and more than 60% of ground cover was native plants. The agricultural runoff was contaminating the site with high concentrations of ammonium and urea as well as nitrate levels above EPA guidelines. However, these levels dispersed throughout all other locations, indicating nutrient attenuation by wetland microbes, and fall below EPA standards. As for vegetative cover, high native cover and a manageable level of moderately invasive cover is a good indication of site transition from agricultural land to salt marsh aided by Central Coast Wetland Group's plantings. Creating this baseline of water quality and vegetative data for this new restoration site is vital to the success of this site and others like this, as well as how to support other restoration efforts.

Fun Facts about Sonia

Hometown: Redondo Beach, CA
Career Aspiration: Pursue conservation research or work with an environmental consulting firm.
3 Fun Facts: Grew up on a sailboat; loves to read; and crocheting since the age of 12.
Exploring Antagonistic Competitive Interactions Among Soilborne Streptomyces from the TriCounty region

Brittany Zetko & Dr. Jose Pablo Dundore-Arias

Department of Biology & Chemistry, California State University, Monterey Bay

Agricultural soils are home to an immense amount of microorganisms that play a variety of ecological roles that influence plant and soil health. Soilborne microorganisms such as Streptomyces, are known as prolific producers of antimicrobial compounds, and are of great interest in agriculture as potential biocontrol agents to inhibit plant pathogens. However, little is known about the frequency and drivers of antagonistic competitive interactions among soil Streptomyces, and their relationship with plant pathogen suppression in agricultural soils. This project aims to examine species interactions among Streptomyces populations from agricultural soils, with a particular focus on antibiotic inhibitory and resistance interactions among sympatric (co-existing) and allopatric (from different location) isolates. Streptomyces were collected and isolated from soil samples (n=27) from four fields under different production systems throughout the TriCounty region. A subset (n=12) of these isolates have already been assessed for their antibiotic inhibitory profiles, and their capacity to inhibit one another for all possible pairwise isolate combinations. Preliminary results from these trials have shown that 42% of Streptomyces isolates inhibit one or more other Streptomyces isolates, while 58% showed no inhibition of isolates. Future analysis will compare patterns of inhibition between sympatric and allopatric isolates, determine the frequency of resistant isolates, and assess whether antibiotic inhibitory phenotypes were more abundant at particular locations. This research will provide further understanding of the factors that influence the selections of antibiotic inhibitory phenotypes in the soil, and shed light into strategies to harness the pathogen suppressive capacities of local soil microbiomes.

Fun Facts about Brittany

Hometown: Clearwater, FL & Sacramento, CA

Career Aspiration: Work in the plant pathology field.

3 Fun Facts: Earning a major in biology; works in a plant pathology lab; and bartends when not in school.
Current knowledge and literature on genus *Chelaethiops* fish are simply lacking, and require more research. The goal of this project is to address this problem, by investigating evolutionary relationships within the *Chelaethiops* Congo River cyprinid fishes, especially with regard to a proposed new species, *C. luluae*. *C. luluae* has only been described from morphological differences, and this study represents the first investigation of genetic differences between *C. luluae* and other lineages, including *C. congicus* and *C. elongatus*. The results obtained from our DNA sequence analyses (using the COI mitochondrial gene) show a strong disconnect between putative species ID, based on morphology, versus genetic groupings on the phylogenetic tree produced. Consistent clustering was observed based on geographical location, regardless of the original morphological ID. Several samples showed a strong genetic disconnect from anything on record. Sample “CL15”, for example, matched none of the *Chelaethiops* species on GenBank, and is so far separated from the rest of the samples genetically, that it could quite possibly be a new species. The remaining samples clustered together well based on geographical location, and match literature sequences well, but still show a great amount of taxonomic disorganization within this genus, as well as possible mitochondrial introgression/hybridization and/or plasticity. These results call into question how *Chelaethiops* species are currently defined, and if there are more species than currently known. The next steps in this research are to analyze nuclear genes, and possibly another mitochondrial gene, to not only better construct phylogenetic trees, but also to see any hybridization that may have occurred between *Chelaethiops* species.

**Fun Facts about Zachary**  
**Hometown:** Sacramento, CA  
**Career Aspiration:** Research in Marine Biology, especially in relation to climate change and pollution.  
**3 Fun Facts:** Loves the outdoors; makes music on his computer to express creativity; and loves chemistry.
The Effects of Giant Kelp on Ocean Acidification

Daran Towns¹, Matthew Hess², & Dr. Michael Graham²
¹Department of Marine Science, California State University, Monterey Bay  
²Department of Phycology, Moss Landing Marine Laboratories, San Jose State University

For years the ocean has kept our environment and climate at an equilibrium by absorbing the CO2 in the atmosphere. However, the ocean cannot keep up with our constant CO2 and gas emissions and it is causing worldwide crises. Our increase in CO2 gas emissions has produced a climate problem, raising the temperatures of otherwise cooler environments and ruining land ecosystems. The increase in atmospheric CO2 also causes an increase in the oceans pH. The more acidic water has brought death to many fish habitats like the corals and in turn heavily affected ocean ecosystems all over the globe. Unlike most of the ocean however, ocean acidification does not negatively affect Giant Kelp. Instead, with the dissolution of CO2 into sea water that causes the ocean to acidify it actually nurtures the algae. Giant kelp uses the carbon in CO2 to store energy and in turn, produces oxygen. This knowledge may help scientists to be able to come up with a practical way to reduce ocean acidification by using giant kelp to absorb the CO2. This pilot experiment will be the first step to better understand how significant giant kelp is in reducing CO2 levels in sea water. I will test this question by trickling CO2 into my experiment tubs to lower the pH significantly. I will then add giant kelp and test how pH changes over time. This experiment will demonstrate the capacity of giant kelp to act as an environmental buffer against low pH. This will help science understand the limits of the plant’s buffering capacity, aid us in understanding giant kelp better and give us more insight on how it can be used to benefit our oceans.

Fun Facts about Daran
Hometown: Bakersfield, CA  
Career Aspiration: To be a marine science researcher and National Geographic Explorer.  
3 Fun Facts: Dived in a cenote in Mexico; likes musical theater; and holds the title, African American Aquarium of the Pacific Scholar.
Spatial Variability and Recovery of Sea Stars along the Monterey Peninsula Post Sea Star Wasting Disease

Paige J. Siegel & Dr. Alison Haupt

Department of Marine Science, California State University, Monterey Bay

Understanding species population dynamics is crucial to make predictions about changes due to disturbances and create effective conservation policies. *Pisaster ochraceus*, a sea star common in the rocky intertidal in Central California, is a keystone predator that controls the population of mussels, ultimately increasing the diversity of the primary substrate holders within the intertidal. Within the last decade, *P. ochraceus* populations have declined dramatically due to sea star wasting disease which causes rapid body and muscle deterioration. While this disease still impacts sea star populations, recovery is occurring. However, it is unknown what is driving this recovery. During the summer of 2022 we surveyed 6 sites along the Monterey Peninsula to assess the spatial variation in recovery of *P. ochraceus* along with determining distinct attributes that may aid in this recovery. Quadrats, transects and time searches were used to determine abundances and population size structure of intertidal *P. ochraceus*. It is clear that recovery is not even across sites around the Monterey Peninsula. One particular site, Cannery Row, has significantly more individuals compared to all other sites surveyed. This site is unique as there are extensive mussel beds, low visitation, and metal debris littering the intertidal. Understanding how these attributes play a role in *P. ochraceus* recovery can allow marine ecologists to identify other areas with similar attributes and therefore begin to monitor and protect these areas to further aid in recovery.

Fun Facts about Paige

**Hometown:** Murrieta, CA

**Career Aspiration:** Conduct research for policy makers so more effective marine conservation laws can be established.

**3 Fun Facts:** Earning a statistics minor; runs cross country & track for CSUMB; and loves to make art out of sea glass.
Analysis of Antibiotic Pressure on Conjugation Efficiency of Antimicrobial Resistance Genes in E. coli

Pepper St. Clair¹, Sage Chavez¹, Caison Warner², Dr. Simon Titen¹, Dr. Gerardo Cortés-Cortés², & Dr. Manel Camps²

¹Department of Biology & Chemistry, California State University, Monterey Bay
²Department of Microbiology & Environmental Toxicology, University of California, Santa Cruz

The World Health Organization lists antimicrobial resistance in the top ten global public health threats. Horizontal gene transfer by plasmid conjugation is a major mechanism responsible for the spread of antimicrobial resistance genes (ARGs) in Escherichia coli. Here we compare the efficiency with which the bacteria can transfer ARGs by means of conjugation, depending on the number of antibiotics used for selection. To ensure the relevance of this work for the clinic, we used clinical strains as donor strains.

We performed conjugation assays using 39 sequenced clinical E. coli strains as donors and a plasmid-free recipient strain (LMB100). The transfer of ARGs and replicons known to be present in the plasmid was detected by polymerase chain reaction.

We tested the effect of antibiotic selection on conjugation efficiency by selecting transconjugants using combinations of one, two or three different antibiotics matched to the resistance markers of the donor’s known plasmid genotype. When we used one antibiotic (carbenicillin) for selection we were able to recover 21 conjugative strains, while selection with two (carbenicillin + ciprofloxacin) and three (carbenicillin + ciprofloxacin + gentamicin), both decreased the conjugation rates dramatically to zero transconjugants under tested conditions. The implication is that treatment with a combination of beta-lactam and aminoglycoside or beta-lactam and fluoroquinolone suppress the spread of antibiotic resistance by interfering with conjugation. These findings are relevant to identify new strategies that could help to contain or reduce the horizontal dissemination of ARGs among bacteria and thereby reduce the prevalence of drug resistant bacterial strains in humans.

Fun Facts about Pepper
Hometown: Paradise, CA
Career Aspiration: To be a genetic counselor.
3 Fun Facts: Loves to indigo dye; has traveled to over 10 different countries; and works as a marketing and promotions manager.
Genetic Characterization of Environmental Streptomyces spp.

Emily Locke-Paddon & Dr. Jose Pablo Dundore-Arias
Department of Biology & Chemistry, California State University, Monterey Bay

My work seeks to characterize Streptomyces spp. found in agricultural soils in the Salinas Valley. Streptomyces are a filamentous bacteria present in soil that are capable of producing antibiotics. These antibiotics are used by the bacteria to inhibit growth of other microorganisms and have been used for various applications within agricultural and medical fields. The broader goal of this research is to identify which species of Streptomyces are present within Salinas Valley soils with a particular focus on identifying pathogen-suppressive and plant-growth promoting populations that can be used to develop synthetic communities of soil probiotics.

My research focuses on optimizing methods for the genetic characterization of locally-adapted soil Streptomyces spp. To accomplish this goal, I am using a subset of isolates from the Dundore-Arias Streptomyces collection previously characterized for their ability to antagonize plant pathogens of local crops. This process begins with growing the target organism on semi-selective media and combining both solid and liquid media to promote microbial growth. After growth is observed, DNA will be extracted from each organism following standard procedures and quality control steps, and used for amplification through PCR using specific primers. Amplified DNA material will subsequently be sequenced and compared to DNA databases to identify the Streptomyces spp. obtained from local soils, and the identified species will be further categorized based on their plant-beneficial traits. This will further inform research in the lab pertaining to the use of Streptomyces spp. as biocontrol agents in the Salinas Valley.

Fun Facts about Emily
Hometown: Gilroy, CA
Career Aspiration: To be a plant pathologist.
3 Fun Facts: Plans to pursue a Master’s of Science in Plant Pathology; (2) has a growing houseplant collection; and has been a vegetarian since high school.
Neurophysiological Responses to Cognitive Load During Learning and Memory via Eye Tracking Technology

Paul Stephens¹, Leslie Flores²,³, & Dr. Zurine De Miguel⁴

¹Department of Biology & Chemistry, California State University, Monterey Bay
²Department of Biology, University of California, Merced
³Monterey Peninsula College
⁴Department of Psychology, California State University, Monterey Bay

Cognitive load refers to the mental effort required to perform a task, and increased cognitive load is associated with impaired learning, memory, and cognitive performance during healthy aging and brain disease. Here, we focus on validating the use of a cutting-edge eye-tracker system as a new tool to investigate neurophysiological correlates of increased cognitive load. Previous literature combining the use of neurofunctional imaging and eye-tracking technology has shown that changes in pupil size are strongly associated with the neuromodulatory effect induced by increased cognitive load. We aimed at substantiating previous findings showing that cognitive load is associated with pupil dilation by measuring pupil dilation using the eye-tracker during cognitive load induced by the Stroop Color and Word Test (SCWT). Previous studies have shown that participants improve performance on the SCWT with practice. However, no study has yet explored whether the benefits of practice in the SCWT will also be accompanied by a reduction in cognitive load. We hypothesized that pupil size would be downregulated as participants improved performance. A one-way repeated measures ANOVA test for average pupil size showed a statistically significant decrease over trials (F = 69.93 (5, 30), P < .001). Although just a pilot study, these findings suggest that pupil size can be used as an indicator of the learning curve. These results will add to the rapidly-growing body of literature on the use of eye-tracking technology to better diagnose mental diseases, and to support interventions that promote cognitive improvement.

Fun Facts about Stephen
Hometown: Fullerton, CA
Career Aspiration: Orthopedic Surgeon and advocate for significant changes in healthcare policy to fix the rampant downfalls in the current medical system.
3 Fun Facts: Plays several instruments; obsessed with sports; and completed the Big Sur International Marathon last year.
Funding Sources

UROC is funded by the U.S. Department of Education (#P217A170213, #P031C160221); the National Science Foundation (#MA180083; #2122243); the Koret Foundation (#20-0068); the Chancellor’s Office of the California State University; California State University, Monterey Bay; CSUMB METAS (#ED-Grants-122719-001) and private donors. Any opinions, findings, and conclusions expressed in this material are those of the author(s) and do not necessarily reflect the views of our funding sources.