



Undergraduate Research Opportunities Program

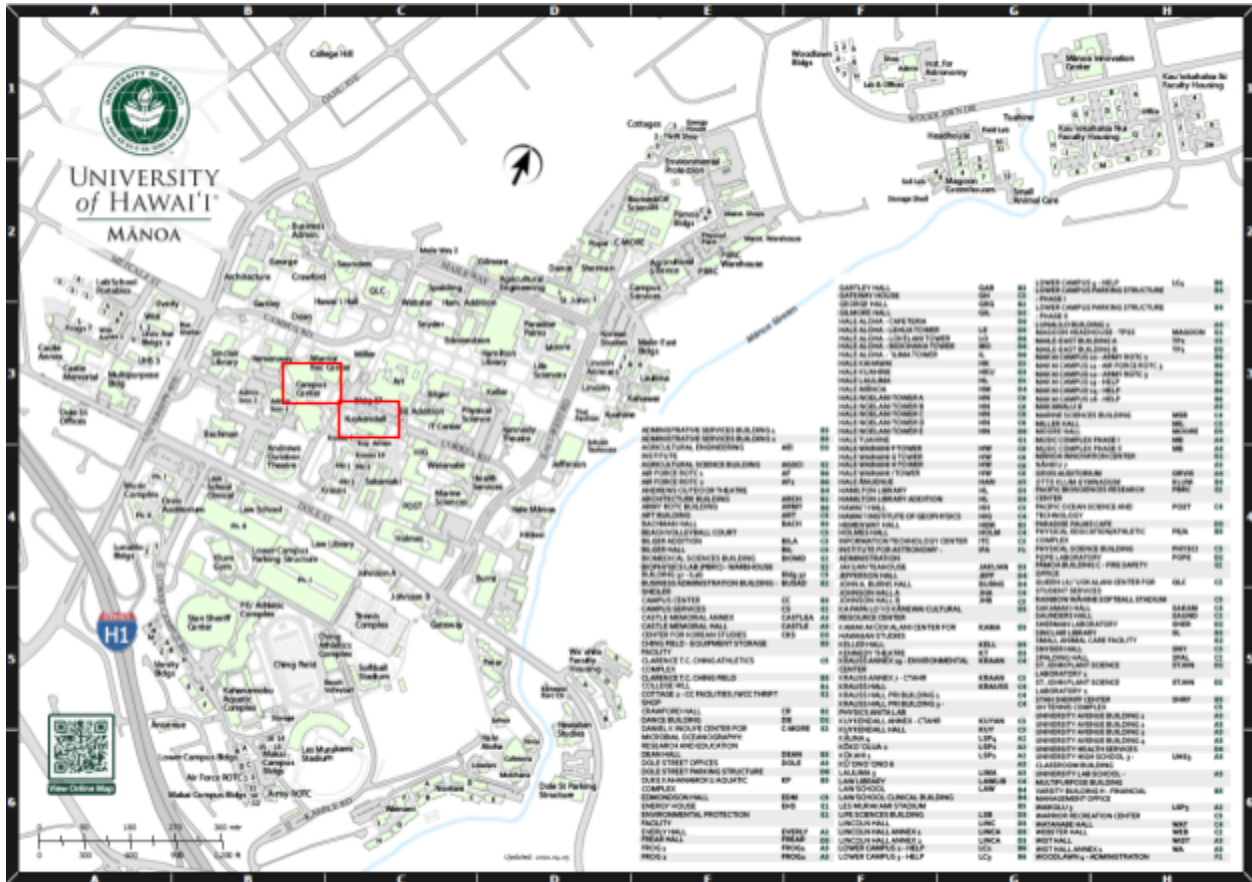
Office of the Vice Provost for Research & Scholarship
University of Hawai'i at Mānoa



SUMMER UNDERGRADUATE
RESEARCH EXPERIENCE

2023 SURE SYMPOSIUM

In-Person SURE Symposium Venues: Campus Center Ballroom and Kuykendall Hall



Overview of the Program

2023 Summer Undergraduate Research Experience (SURE) Symposium

AUGUST 4, 2023

9:00 am – 1:00 pm HST

Campus Center Ballroom, Kuykendall Hall, and Zoom

<u>Time</u>	<u>Activity</u>	<u>Location</u>
9:00 – 9:30 am	Registration	Campus Center Ballroom
9:30 – 9:35 am	Oli	Campus Center Ballroom
9:35 – 9:40 am	Welcome Remarks Chris Sabine Interim Vice Provost for Research and Scholarship	Campus Center Ballroom
9:40 – 9:45 am	Guest Speaker Michael Bruno Provost	Campus Center Ballroom
9:45 – 9:50 am	Event Overview Elinor Cruz UROP Program Coordinator	Campus Center Ballroom
9:50 – 10:00 am	Transfer to Kuykendall Hall	
10:00 – 11:00 am	Oral Session I	Kuykendall Hall Room 207 and Zoom
	Oral Session II	Kuykendall Hall Room 210 and Zoom
	Oral Session III	Kuykendall Hall Room 305 and Zoom
	Oral Session IV	Kuykendall Hall Room 306 and Zoom
	Oral Session V	Kuykendall Hall Room 307 and Zoom
	Oral Session VI	Kuykendall Hall Room 310 and Zoom
11:00 – 11:15 am	Transfer to Campus Center Ballroom	
11:15 – 11:30 am	Snacks	Campus Center Ballroom
11:30 am – 1:00 pm	Poster Session	Campus Center Ballroom
1:00 pm	End	Campus Center Ballroom

Overview of the Oral Sessions (I – VI) at the Kuykendall Hall

Session No.	Oral Session I	Oral Session II	Oral Session III	Oral Session IV	Oral Session V	Oral Session VI
Room assignment	Kuykendall Hall 207/Anuenue Zoom Room	Kuykendall Hall 210/Breadfruit Zoom Room	Kuykendall Hall 305/Coconut Zoom Room	Kuykendall Hall 306/Dragonfruit Zoom Room	Kuykendall Hall 307/Elapaio Zoom Room	Kuykendall Hall 310/Fern Zoom Room
Zoom link	https://hawaii.zoom.us/j/99459322384	https://hawaii.zoom.us/j/96326105193	https://hawaii.zoom.us/j/95905877944	https://hawaii.zoom.us/j/93446924084	https://hawaii.zoom.us/j/95419185329	https://hawaii.zoom.us/j/93509309593
10:00am-10:15am	“An Inquiry Into the Benefits of Esports Programs at Japanese Educational Institutions in Tokyo.” Madeline Gilbert, UHM	“Identifying Linguistic Anti-Patterns in Data Science Projects: An Exploratory Study.” Carol Wong, UHM, Micah Tilton, UHM	“Using ArcGIS Tools to Analyze Land Use Change in Pu‘uloa.” Austin Allen, UHM (Zoom)	“Study of LED Light Treatments on Garden Cress, Arugula, and ‘Cherry Belle’ Radish for Optimal Growth.” Katelyn Amoroso, UHM (Zoom)	“Nitrogen Fixation in Kō.” Quinn Leggett, UHM (Zoom)	“Automatic Radioactive Seed Localization using Movable Sensor Barriers.” Hugh Ishikawa, UHM

Session No.	Oral Session I	Oral Session II	Oral Session III	Oral Session IV	Oral Session V	Oral Session VI
10:15am-10:30am	<p>“Pūpūkahiki i Holomua: The Ugly Truth About the School to Prison Pipeline in Hawai‘i, and Creating Alternative Conditions in its K-12 Education.” Danna Andrade, UHM (Zoom)</p>	<p>“Formal grammars for the Hawaiian language.” Ellen Hughes, UHM (Zoom)</p>	<p>“Use of and Evidence for Psilocybin-Assisted Therapy for Treatment-Resistant Depression Among Adults; Protocol for a Systematic Review.” Alyshia Munoz, UHM (Zoom)</p>	<p>“Distance to nearest neighbor nest impacts reproductive success of the Hawaiian Stilt (<i>Himantopus mexicanus knudseni</i>).” Kaylee Monroe, UHM</p>	<p>“Hawaiian ‘Uala (<i>Ipomoea batatas</i>) Cultivar Resources.” Stacy Lucas, UH West Oahu</p>	<p>“Fabrication of Microbioreactors for Live-Cell Imaging in a Soil-Like Environment.” Michael Kawasaki, UHM (Zoom)</p>

Session No.	Oral Session I	Oral Session II	Oral Session III	Oral Session IV	Oral Session V	Oral Session VI
10:30am-10:45am	“Exploring Ways to Increase Student Participation in Academic Courses Through PickOn, an Up and Coming Open-Source Software.” Alanna Mellor, UHM, Levi Bringman, UHM, Maxen Donate, UHM	“North Korean Science Fiction: Marine Resources and Futurity of a Nation.” Yejun Kweon, UHM	“Enhancing the Bus Stop Experience in Hawaii through Design.” Michelle Lee, UHM, Joyce Lin, UHM, Natalie Ou, UHM, Ghia Belarmino, UHM (Zoom)	“Variability of Chlorophyll and Oxygen Driven by the Deep Phytoplankton Community.” Marlon Velasco, UHM	“Ingested Marine Debris Cataloging and the Viability of Phthalate Ester (PAE) Extractions in Cetacean Blubber for Analyses as Plastic Tracers in the Ocean.” Tamako Delfino, UHM	“Application of AlphaFold in Structure Prediction of a Novel Degron - the Destabilized Green Fluorescent Protein.” Yimin Yuan, UHM (Zoom)
10:45am-11:00am	“Creating A Culturally Responsive Education System and Equitable Outcomes through Hawai’i-Based Learning Opportunities.” Tristan Fleming-Nazara, UHM, Sarah Rice, UHM	“Assessing Silica Dust as a Non-Toxic Pest Control for Tephritidae Fruit Flies.” Colby Suzuki, UHM	“FogVision: A Machine Learning Method for Detecting Fog in Mountain Trail Camera Images.” Joel Nicolow, UHM	“Analysis of prey DNA to determine diet of short-finned pilot whales and spinner dolphins.” Nicole Makar, UHM	“Calibration of a UV-VIS Detector for Space-Bases Observation of Ozone and Nitrous Oxide.” Yan Shan Liu, UHM (Zoom)	“Transcriptomic Analysis of Sea Cucumber Vision.” Anneke Wirth-Yap, UHM

Overview of the Poster Session at the Campus Center Ballroom

Poster#	Poster Presentation Title	Poster#	Poster Presentation Title
1.	"Weaving Cultural Narratives into Art: Character Design Inspired by Hawaiian Mo'olelo." Adam Joseph Parrilla, UHM, Matthew Wong, UHM	17.	"Establishing an awareness of ideal plant phenotype based on environmental challenges." Amanda Nitta, UHM, Joseph Carmelo Averion, UHM, Tai Maaz, UHM, Authors: Amanda K. Nitta*, Joseph Carmelo M. Averion*, Abigail H. Ana, UHM, Roma B. Amor Malasarte, UHM, Zeus Gean Paul Miguel, LCC, Ethan S. Morrell, UHM, Stephenie Andriana Santos, UOG, Kayla-Marie A. Torres, UHM, Keilah C. Wilkes, UHM, D. Jaden Yamagata-Santos, UHM, Rishi Prasadh, Mentor, UHM, Michael Kantar, Mentor, UHM, Tai Maaz, Mentor, UHM, Michael Muszynski, Mentor, UHM, Nhu Nguyen, Mentor, UHM
2.	"When a Book is More than a Book: Exploring Book Arts from Cuneiform to Codex." Maggie Strehorn, UHM, Esther Tang, UHM, Sarah Nakashima, UHM, Jean Thoulag, Mentor, UHM	18.	"Towards improving food security: maize resiliency to changing environment." Stephenie Andriana Santos, University of Guam, Zeus Gean Paul Miguel, Leeward Community College, Tai Maaz, UHM, Abigail H. Ana, UHM, Joseph Carmelo Averion, UHM, Roma Amor B. Malasarte, UHM, Ethan S. Morrell, UHM, Amanda K. Nitta, UHM, Kayla-Marie A. Torres, UHM, Keilah C. Wilkes, UHM, Danielle Jaden Yamagata-Santos, UHM, Rishi Prasadh, UHM, Michael Kantar, UHM, Michael Muszynski, UHM, Nhu Nguyen, UHM

Poster#	Poster Presentation Title	Poster#	Poster Presentation Title
3.	“Identifying Linguistic Anti-Patterns in Data Science Projects: An Exploratory Study.” Carol Wong, UHM, Micah Tilton, UHM, Anthony Peruma, UHM	19.	“Exploring gene expression in maize genotypes with different responses to drought.” Abigail Ana, UHM, Keilah Wilkes, UHM, Tai Maaz, UHM, Joseph Carmelo M. Averion, UHM, Roma Amor B. Malasarte, UHM, Zeus Gean Paul Miguel, LCC, Ethan S. Morrell, UHM, Amanda K. Nitta, UHM: Stephenie Andriana Santos, UOG, Kayla-Marie A. Torres, UHM, D. Jaden Yamagata-Santos, UHM, Rishi Prasad, Mentor, UHM, Michael Kantar, Mentor, UHM, Michael Muszynski, Mentor, UHM, Nhu Nguyen, Mentor, UHM
4.	“Pohaku: A New Take on Living Walls in Hawai‘i.” D'Elle Martin, UHM, Andrew Kaufman, UHM	20.	“Phylogenetics of Hawai‘i’s endemic chitons.” Ferdous Rahimi, UC Davis, Peter Marko, UHM, Dr. Stephanie Kraft-Terry, Mentor, UHM, Dr. Norine Yeung, Mentor, Bishop Museum, Dr. Ken Hayes, Mentor, Bishop Museum
5.	“Annotation Parsing in Clinical, Real-World Breast Ultrasound Imaging Data.” Kailee Hung, UHM, Peter Sadowski, UHM, Arianna Bunnell, Mentor, UHM	21.	“Phylogenetic analysis of endemic Hawaiian Cerithium boeticum.” Helen Shanefield, Yale University, Peter Marko, UHM, Kenneth A. Hayes, Bernice Pauahi Bishop Museum, Norine W. Yeung, Bernice Pauahi Bishop Museum
6.	“Optimizing Analytical Methods for Intracellular Microbial Polymers in Environmental Applications.” Melissa Zakala-Downs, UHM, Caitlin Niiya, Pitzer College, Zhiyue Wang, UHM,	22.	“Understanding phylogenetic relationships of sea hares (Aplysiidae) in the tropical Pacific using genetic data.” Isabella Ah Moo, Pomona College, Peter Marko, UHM, Norine Yeung, Mentor, Bernice Pauahi Bishop Museum Malacology Department, Ken Hayes, Mentor, Bernice Pauahi Bishop Museum Pacific Center for Molecular Biodiversity, Meagan Haubner, Mentor, UHM
7.	“A Preliminary Investigation of the Understandability of Assertion Error Messages.” Rocky Huang, UHM, Veronica Hodapp, Columbia University, Anthony Peruma, UHM, Taryn Takebayashi, Mentor, UHM, Joseph Carmelo Averion, UHM	23.	“Molecular and Phylogenetic Reassessment of Palisada (Ceramiiales, Rhodophyta): Unveiling Novel Algal Lineages from Hawaiian Mesophotic Reefs.” Jackson Harris, College of the Holy Cross, Alison Sherwood, UHM, Kazumi Allsopp, UHM, Feresa Cabrera, UHM

Poster#	Poster Presentation Title	Poster#	Poster Presentation Title
8.	"Investigating Heat Stress and Unfolded Protein Response-signaling Pathways in Plants." Alena Albertson, UHM, David Christopher, UHM, Rina Carrillo, Mentor, UHM	24.	"Applications of 2D Material Science on N-Carbophenes." Jirui Yang, UHM, Shayla Kaheaku, UHM, Ralph Adra, UHM, Katalynarose Lavarez, UHM, Valeria Diaz, UHM, Chad Junkermeier, UHM
9.	"Evaluating the effects of increasing Adenosyl cobalamine or Hydroxocobalamin concentrations on ovine satellite cell proliferation rates" Amaia Cariaga, UHM, Courtney Rivera, UHM, Caleb Reichhardt, UHM, Jenee Odani, UHM	25.	"FogVision: A Machine Learning Method for Detecting Fog in Mountain Trail Camera Images." Joel Nicolow, UHM, Peter Sadowski, UHM, John DeLay PhD., Mentor, Honolulu Community College
10.	"Relationship Between Snail Abundance and Snail Shells Used by Hermit Crabs at Hale'iwa Ali'i Beach Park." Cassandra Liong, UHM, Peter Marko, UHM, Ken Hayes, Mentor, Bernice Pauahi Bishop Museum, Norine Yeung, Mentor, Bernice Pauahi Bishop Museum, Meagan Haubner, Menter, Bernice Pauahi Bishop Museum	26.	"Documenting Land Use Change in Ke Awalau o Pu'uloa: Historical analyses and application with GIS, creating a tool for Mālama 'Āina Professionals." Lucie Schragger, UHM, Eileen Nalley, UHM
11.	"Digitizing the Seeds of Hawaii." Cody Brahim, UHM, Nate Kingsley, UHM	27.	"Species diversity of endemic nerite snails from Hale'iwa 'Ali'i Beach Park." Naomi Vliet, Montana State University, Peter Marko, UHM, Helen L. Shanefield, Yale University, Kenneth Hayes, Mentor, Pacific Biosciences Research Center, Norine Yeung, Mentor, Bishop Museum, UHM
12.	"The effects of the vitamin D receptor and increasing concentrations of vitamin D3 on ovine satellite cell proliferation." Courtney Rivera, UHM, Amaia Cariaga, UHM, Caleb Reichhardt, UHM, Jenee Odani, UHM	28.	"Scoring Abdominal Profiles of Migratory Shorebirds in Hawai'i: Tracking Visible Weight Gain and Impacts on Migration Patterns." Newt Imig, UHM, Claire Atkins, UHM, Melissa Price, UHM
13.	"Phylogenetic Analyses of Leptastrea Species around Kāne'ōhe Bay." Dakota Kaupu, University of Vermont, Robert Toonen, UHM, Claire Lewis, Mentor, UHM, Chris Suchocki, Mentor, UHM, Claire Bardin, Mentor, UHM	29.	"Efficacy of Oxford Nanopore Sequencing Technology for Genotyping." Simone Murguia, UHM, Jiani Kaniho, UHM, Gernot Presting, UHM
14.	"Assessing the Biodiversity of Marine Amphipods Between Two Different Sites in Oahu, Hawai'i." Emily Christian, Cornell University, Peter Marko, UHM	30.	"Stabilizing Kavalactone Dispersions Utilizing Common Emulsifiers." Stryder Williams, UHM, Kacie Ho, UHM

Poster#	Poster Presentation Title	Poster#	Poster Presentation Title
15.	<p>“Corn conundrum: the differential growth of maize genotypes adapted to different geographic locations.” Ethan Morrell, UHM, Danielle Jaden Yamagata-Santos, UHM, Tai Maaz, UHM, Abigail H. Ana, UHM, Joseph Carmelo M. Averion, UHM, Roma Amor B. Malasarte, UHM, Zeus Gean Paul Miguel, LCC, Ethan S. Morrell, UHM, Amanda K. Nitta, UHM, Stephenie Andriana Santos, UOG, Kayla-Marie A. Torres, UHM, Keilah C. Wilkes, UHM, Danielle Jaden K. Yamagata-Santos, UHM, Rishi Prasad, UHM, Mentor, Michael Kantar, UHM, Mentor, Tai Maaz, UHM, Mentor, Michael Muszynski, UHM, Mentor, Nhu Nguyen, UHM, Mentor</p>	31.	<p>“Efficacy of Psilocybin-Assisted Therapy for Treatment-Resistant Depression Among Adults: Protocol for a Systematic Review.” Alyshia Munoz, UHM, Eric Hurwitz, UHM</p>
16.	<p>“Phenotypic plasticity within a single maize cultivar in response to multiple abiotic stressors.” Kayla-Marie Torres, UHM, Roma Amor Malasarte, UHM, Tai McClellan Maaz, UHM, Dr. Michael Kantar, Mentor, UHM, Rishi Prasad, Mentor, UHM, Abigail H. Ana, UHM, Joseph Carmelo Averion, UHM, Zeus Gean Paul Miguel, LCC, Ethan S. Morrell, UHM, Amanda K. Nitta, UHM, Stephenie Andriana Santos, UOG, UHM, Keilah C. Wilkes, UHM, Danielle Jaden Yamagata-Santos, UHM</p>		

Oral Session Abstracts

No., Title, Student Presenter(s)*, Mentor ^o , Non-presenting Author [†] , Summary
<p>1. “An Inquiry Into the Benefits of Esports Programs at Japanese Educational Institutions in Tokyo.” Madeline Gilbert,* UHM, Sky Kauweloā,^o UHM</p>
<p>This investigation was to understand gaming in Tokyo, and the benefits of gaming and esports (competitive gaming) on educational institutions. Esports has been growing in Japan lately but it has taken a long time before Japan has tried to catch up with competitors such as South Korea, China, and the U.S.. There is very little information or research on esports and especially esports in Japan which is useful to help improve the infrastructure, and provide a better understanding of gaming as a reliable job. Although Japan is lacking in implementing gaming in education, there has been an increase in interest from organizations such as NASEF Japan, JESU, and others. The way that esports is developing in Japan is something the rest of the world can learn from as they are still in the early stages of developing, and have a higher chance of gaining success. We intend to use this research to improve the esports industry and understand the benefits of gaming as well as normalize gaming in education.</p>
<p>2. “Pūpūkahi i Holomua: The Ugly Truth About the School to Prison Pipeline in Hawai‘i, and Creating Alternative Conditions in its K-12 Education.” Dannia Andrade,* UHM, Keali‘i Kukahiko,^o UHM</p>
<p>In 1840, Hawai‘i created a public school system that boasted the world’s highest literacy rate (91-95%). The decline of this academic institution began when the US market-based compulsory education system inserted itself after the illegal overthrow of the Hawaiian monarchy in 1893. The English-Only Law of 1896, successfully eradicated all Hawaiian language medium schools by 1902, and prepared Hawai‘i for US subjugation, illegal annexation (1898) and eventual statehood by carrying out a “bloodless” intellectual coup of the existing education system. This educational policy was responsible for the erasure of an Indigenous open-ontological framework, and the normalization of a US market-based dominant politics of knowledge. Research conducted by the Office of Hawaiian Education (OHE) suggests that there is an active school to prison pipeline in Hawaii. OHE’s application of the Cultural Dissonance Formula (Kukahiko et al, 2020) helped call attention to the impact of implicit bias on the over-representation of Native Hawaiian and Pacific Islanders within negative “lagging” student indicators. The investigation herein tackles the following research questions: (1) What histories explain the dissociative function(s) of the US education and justice systems? (2) What conditions are creating inequitable outcomes? (3) What are the existing P4 that define, identify, and punish socially deviant students that cause an over-representation of one or more student populations in the disciplinary data? (4) Where do datasets intersect between K-12 disciplinary data, adolescent incarceration data, and</p>

No., Title, Student Presenter(s)*, Mentor°, Non-presenting Author†, Summary

3. **“Exploring Ways to Increase Student Participation in Academic Courses Through PickOn, an Up and Coming Open-Source Software.”** Alanna Mellor,* UHM, Levi Bringman,* UHM, Maxen Donate,* UHM, Daniel Port,° UHM, Jiayan Wu,† UHM, Valerie Iinuma,† UHM

The motivation of this research is to investigate ways in which student participation in a variety of classroom settings can be increased through the incorporation of an academic information system and interactive software. Provided by background research, there is a direct correlation between the rate at which a student participates and their performance in a course. Not only does participation increase topic retention, but it also contributes to a cohesive and motivating learning environment. When explored in Oahu’s local communities, instructor and student perspectives alike highlight the lack of tools available to achieve increased participation rates, most notably in courses conducted online. The PickOn research project explores the conceptualization of a new software, “PickOn”, designed to engage students through various tactics. Programmed primarily in PHP and JavaScript, the prototype features four modes centered around the concepts of competition, group collaboration, individual involvement, and anonymity. Each maintains the objective of increasing student comprehension of topics while simultaneously quantifying participation. Hosted by GitHub, the application is an open-source software that invites contributors to partake in its development with unlimited creativity. We invite all those interested in collaboration to explore the software’s repository at <https://github.com/anmell/PickOn> or contact Dr. Daniel Port at dport@hawaii.edu. With the tables turned, we now PickOn you.

4. **“Creating A Culturally Responsive Education System and Equitable Outcomes through Hawai’i-Based Learning Opportunities.”** Tristan Fleming-Nazara,* UHM, Sarah Rice,* UHM, Keali’i Kukahiko,° UHM

To initiate and sustain the academic growth of K-12 students in Hawai’i there is an imperative to consider the historical contexts and persistent inequities throughout the islands and within Native Hawaiian and Pacific Islander (NHPI) communities through school-specific practices, projects, programs, and policies (P4). Our team’s research focuses on Hawai’i-based learning and the indicators of increased opportunities promoting equitable outcomes by creating a more culturally responsive education system through analysis of schools that engaged in the ‘Āina Aloha program in the school year of 2022-2023.

Under the guidance of the Office of Hawaiian Education (OHE) within the Hawai’i Department of Education (HIDOE) our team has conducted an analysis of Hawai’i-based education using the OHE Theory of Change: a research model designed from a Hawaiian ontological framework. Our comparative analysis examines the schools’ implementation through the assessment of written narratives, competency surveys, and focus group findings. The findings explore the extent to which engaging in experiential academic and civic opportunities connected students to place, community, culture, and language with a measurable impact on the outlined goals in the DOE Strategic Plan.

‘Āina Aloha allowed for choice and flexibility in application of the \$5,000 grant within a framework of ‘Ōlelo Hawai’i (Hawaiian language), Kuana’ike (Hawaiian perspective), and Pīlina Honua (Relationship to ‘āina) to recognize and support students need for differentiated learning in the growth cycle. The ‘Āina Aloha program created opportunities for students.

No., Title, Student Presenter(s)*, Mentor ^o , Non-presenting Authorst, Summary
<p>5. “Identifying Linguistic Anti-Patterns in Data Science Projects: An Exploratory Study.” Carol Wong,* UHM, Micah Tilton,* UHM, Anthony Peruma,^o UHM</p> <p>Similar to traditional/industrial software applications built by professional software developers, code written by data scientists is also susceptible to bad programming practices that negatively impact system quality and maintenance activities. While previous research has examined code quality from the point of coding standards, there is a gap in understanding the importance of identifier naming, including variables, functions, and classes. In particular, there is limited knowledge regarding the linguistic antipatterns (LA) that data scientists often unknowingly inject into their code. The goal of this research study is to identify naming violations in data science code; this includes identifying LAs specific to data science code. To this extent, we perform a grounded theory-based approach analyzing identifier names within 125 open-source data science Jupyter Notebooks. As part of our initial findings, we propose a taxonomy of 6 LAs. At a high level, we observe that many LAs arise from identifiers not conveying enough information to describe a variable's information or the intended purpose of a function. These issues are commonly observed with identifiers that heavily use abbreviations or documentation that conflicts with implementation. Our results serve as a valuable foundation for creating tools and IDE plugins that provide data scientists with real-time identifier name appraisals and recommendations. Additionally, these results can guide revisions to the existing curriculum, enabling future data scientists to write high-quality and maintenance-friendly code.</p>
<p>6. “Formal grammars for the Hawaiian language.” Ellen Hughes,* UHM, Bjørn Kjos-Hanssen,^o UHM</p> <p>Dr. 'Ōiwi Parker Jones showed that Stochastic Context-Free Grammers (SCFG) are more accurate in predicting stress assignments in Hawaiian words than traditional Context Free Grammars (CFG). With future applications in mind, we recorded the frequency with which syllables occur in different positions in words in Hawaiian literature. There are 189 possible Hawaiian syllables, consisting of a vowel or diphthong, or a consonant or okina followed by a vowel or diphthong. The results of this study will be presented and discussed.</p>
<p>7. “North Korean Science Fiction: Marine Resources and Futurity of a Nation.” Yejun Kweon,* UHM, David Krolikoski,^o UHM</p> <p>This paper examines three North Korean science fiction: <i>Green Seedlings</i> (<i>P'urŭn isak</i>, 1988), <i>Two Arrows</i> (<i>Tugae ūi hwasal</i>, 1989), and “Make the Ocean Blue” (“Padarŭl p'urŭge hara”, 2004). These three texts express the necessity of advancement in medical technology, active international relations, and the restoration of the environment by involving marine resources. North Korean literature is often viewed as propaganda due to its ties to the party's ideals and national campaigns. However, by examining North Korean science fiction that deal with marine settings, I argue that some writers commonly challenge the idea of collectivism and emphasize the significance of women's role upon further development of marine industries. In <i>Green Seedlings</i>, scientists try to cultivate rice plants to treat and prevent cancer. In <i>Two Arrows</i>, specialists from North Korea are working in South Africa to develop useful marine resources that could boost the country. In “Make the Ocean Blue,” different ways seaweed can benefit the country are specified: as reagent energy for factories and as a method to rehabilitate the polluted environment. I propose that these three examples of North Korean science fiction texts address contemporary issues while expressing apprehensions about the future. Providing subjectivity and agency throughout the narrative, the authors challenge and complicate party ideals. Moreover, the significance of the marine setting in North Korean science fiction is to point out the ongoing scientific and environmental problems of the nation the readers should be aware of as well as the key roles the ocean can play in North Korea.</p>

No., Title, Student Presenter(s)*, Mentor°, Non-presenting Author†, Summary
<p>8. “Assessing Silica Dust as a Non-Toxic Pest Control for Tephritidae Fruit Flies.” Colby Suzuki,* UHM, Ikkei Shikano,° UHM</p> <p>Silica powder is widely used in pest management to kill insect pests through desiccation. Amorphous silica powder removes the waxy cuticle of insects, which induces rapid dehydration, and consequently death. Tephritidae fruit flies are major agricultural pests. They lay eggs in fruits and their larvae develop inside causing the fruit to rot. There are several methods to control sexually immature adult flies but not for sexually mature females that carry eggs. We are developing a bait station method with silica to target these mature females. The bait stations attract males using chemical lures. These males are exposed to silica dust in the bait stations, and transfer this silica dust to females during courtship and mating. This transfer of insecticides between individuals of the same species is known as horizontal transfer, and could be integral for the effectiveness of silica dust as a control agent for tephritid fruit flies. In my study I will be exposing melon flies to small amounts of silica dust to determine how much will kill them, and how long it will take to kill the flies. I plan to develop a bait station that will auto-disseminate the silica and examine whether male melon flies can transfer the silica to sexually mature females. Developing a passive auto-disseminating device of silica dust to control sexually mature melon flies will save farmers time and costs of spraying environmentally harmful pesticides.</p>
<p>9. “Using ArcGIS Tools to Analyze Land Use Change in Pu‘uloa.” Austin Allen,* UHM, Eileen Nalley,° UHM</p> <p>Ke awa lau o Pu‘uloa (Pearl Harbor) offers an example of how waterways, watersheds, and estuaries can accumulate contaminants. This project observes the changes in land use types and how contaminants may have been released into water systems. This project uses historic maps dating back to 1825 to examine land use changes. Using ESRI ArcGIS, the maps are downloaded and geo-referenced. Polygons were then created to record the four land use types of agriculture, urban, conservation, and military. If an area was labeled as a subcategory of a land use type, it was consolidated into the larger category. Throughout the translations, the polygons only reflected what is shown and didn't assume the land use based on previous maps. Points of interest, which are labeled on the maps, are listed due to their significance in the area. The data is then shared as layer and shape files so they can be used for further research and community involvement. While analyzing these maps, many land use types and points of interest were consistent in locations where contamination could have been introduced. For example, sugar mills in 'Aiea, Hālawā, and 'Ewa were constructed as agricultural practices started in surrounding areas; these mills were often built near streams that drain into the Pearl Lochs. Polygons and data can be compared to show the changes that have occurred across periods. Using this approach, we can see the region develop and change as land uses are introduced.</p>

No., Title, Student Presenter(s)*, Mentor ^o , Non-presenting Authorst, Summary
<p>10. “Use of and Evidence for Psilocybin-Assisted Therapy for Treatment-Resistant Depression Among Adults; Protocol for a Systematic Review.” Alyshia Munoz,* UHM, Eric Hurwitz,^o UHM</p> <p>Major depressive disorder is a significant public health burden among adults in the United States. Consequently, when first-line therapeutic options fail to diminish depressive states, patients are diagnosed with Treatment-resistant depression, a subdivision of Major depressive disorder. Depression affects the quality of life through persistent energy loss or interest in daily activities. Additionally, adults are at a higher risk if they have experienced significant life changes or other medical comorbidities. While depression treatment varies, typical methods include psychotherapy or medications for individuals to reach remission. Presently, psychedelic therapeutics, such as Psilocybin-assisted therapy, is an alternative method to treat Treatment-resistant depression. Psilocybin is found in psilocybe mushroom species and serves as a serotonin receptor agonist when digested. Psilocybin-assisted therapy with psychological support is a breakthrough treatment among adults with Treatment-resistant depression. This systematic review will aim to determine the efficacy of Psilocybin-assisted therapy for Treatment-resistant depression individuals. An internet search using PubMed, PsycINFO, and Google Scholar databases and a detailed search strategy will be conducted to identify all clinical studies published in English that meet the inclusion and exclusion criteria. Additionally, tables will be designed to summarize the evidence, and study quality will be assessed using validated critical appraisal tools. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement will be used to ensure complete reporting of all components of the review.</p>
<p>11. “Enhancing the Bus Stop Experience in Hawaii through Design.” Michelle Lee,* UHM, Joyce Lin,* UHM, Natalie Ou,* UHM, Ghia Belarmino,* UHM, Ashok Das,^o UHM</p> <p>This research is about improving the designing of bus stops in Honolulu by exploring bus-riders' experiences and needs, and related interdisciplinary research. It proposes possible design enhancements in three ways: 1) safer and more comfortable transit environments, especially for vulnerable groups (women, children, the elderly); 2) civic design that reflects Hawaii's sociocultural milieu; and 3) enabling affordability and sustainability through materials, techniques, technologies, etc. The project pursued these ends by conducting literature reviews, precedent studies, interviews, transect walks, and observations—locally and internationally. Knowing about extant research was vital to appreciating contemporary wisdoms, debates, and innovations in transit design. Purposively sampled semi-structured interviews gleaned perceptions and experiences of users and non-users alike about how bus-stop design impacts ridership. Transect walks and observations allowed our designer-researcher team to appreciate the untapped potential for context-appropriate design enhancements.</p>
<p>12. “FogVision: A Machine Learning Method for Detecting Fog in Mountain Trail Camera Images.” Joel Nicolow,* UHM, Peter Sadowski,^o UHM, John DeLay,† Honolulu Community College</p> <p>Fog is hydrologically and ecologically important to tropical montane cloud forests like the one on Mt. Ka'ala, the highest mountain on the island of O'ahu. Measurements of temperature and relative humidity on the windward slope suggest that fog is frequent above 900 m but the precise relationship between fog frequency and elevation remains uncharacterized. This study uses stations with trail cameras located at multiple elevations to collect images at fifteen-minute intervals and detect fog. These images are classified as either having fog present or not. To automate this classification task, a machine learning model is trained to perform this task. The model takes visual features extracted from the images and predicts a binary classification (fog present, clear of fog). 24,256 images from 13 stations were hand classified by fog presence. Using a leave-one-station-out strategy the model's ability to generalize to new sites was evaluated. The average accuracy was 86% and the area under the receiver operating characteristic curve was 94% on the held-out test data.</p>

No., Title, Student Presenter(s)*, Mentor ^o , Non-presenting Authorst, Summary
<p>13. “Study of LED Light Treatments on Garden Cress, Arugula, and ‘Cherry Belle’ Radish for Optimal Growth.” Katelyn Amoroso,* UHM, Kent Kobayashi,^o UHM</p> <p>In a controlled environment, there are no pests or diseases that could harm the produce, and factors such as light can be modified to provide the optimum growing conditions to increase yields and improve the quality of the crops. More research has been done over the years to study the effects of colored light (light wavelength) on plant growth. However, there has been a lack of research done on the impact of switching the color of light during a plant’s photoperiod. This study aimed to investigate the effects of different LED light treatments on the growth and chlorophyll content of garden cress, arugula, and ‘Cherry Belle’ radish. The light treatments included 100% red light, 100% blue light, full-spectrum light, a mixture of red and blue light (50:50), and 6 hours of 100% blue light followed by 6 hours of 100% red light over a 12-hour daylength. To ensure that the effects on the plants were due to only the color of light, each light treatment was set to similar light intensities. In a preliminary experiment, the ‘Cherry Belle’ radish, garden cress, and arugula seeds were planted in Oasis foam cubes and placed under high output fluorescent lights to observe how they would germinate, and nearly all of the seeds germinated successfully. Although the experiments are still in progress, the anticipated results could potentially drive further research on optimizing light distribution for increasing yields and improving crop quality.</p>
<p>14. “Distance to nearest neighbor nest impacts reproductive success of the Hawaiian Stilt (<i>Himantopus mexicanus knudseni</i>).” Kaylee Monroe,* UHM, Melissa Price,^o UHM, Jaime Botet-Rodriguez,† UHM, Jessica L. Idle,† UHM</p> <p>Competition for desirable nesting habitat can lead to birds nesting near each other, which may negatively impact reproductive success due to intraspecific (between the same species) or interspecific (between different species) aggression. Moreover, proximity to neighboring nests may impact the likelihood of nest predation or nest abandonment. The Hawaiian Stilt (<i>Himantopus mexicanus knudseni</i>) is a ground-nesting waterbird endemic to the Hawaiian Islands. Hawaiian Stilts nest in wetlands across the Hawaiian Islands and often share nesting habitat with two other Hawaiian waterbird species, the Hawaiian Coot (<i>Fulica alai</i>) and Hawaiian Gallinule (<i>Gallinula galeata sandvicensis</i>). In this study, we examined the impact on Hawaiian Stilt reproductive success from nesting in close proximity to other stilt nests, as well as gallinule nests, and coot nests. We used nesting data from 2018 to 2023 collected in wetlands across O’ahu with differing degrees of waterbird nesting densities. Logistic regression models were used to examine the impact of distance to the nearest neighbor nest on the probability of nesting success, nest predation, and nest abandonment of Hawaiian Stilt nests. In one wetland with a high density of nesting stilts we found that nests that were further from other stilt nests had higher probability of success. We also found that in a wetland with high densities of all three nesting waterbirds, stilt nests in close proximity to coot nests had a higher probability of nest abandonment. This research helps to provide a better understanding of the factors that impact Hawaiian Stilt nesting success and will help inform management of waterbird nesting habitat.</p>

No., Title, Student Presenter(s)*, Mentor ^o , Non-presenting Authorst, Summary
<p>15. “Variability of Chlorophyll and Oxygen Driven by the Deep Phytoplankton Community.” Marlon Velasco,* UHM, Sara Ferron,^o UHM, Benedetto Barone,† UHM</p> <p>Phytoplankton in the ocean is responsible for approximately half of the primary production on Earth. In the oligotrophic subtropical gyres nutrient concentrations are low, and the lower portion of the euphotic zone is characterized by a maximum in chlorophyll concentration. Phytoplankton at these depths have adapted to photosynthesize at low light levels by increasing pigment concentrations, utilizing the input of nutrients coming from deeper water. It is thought that the deep phytoplankton community plays a vital role in the export of carbon, which is linked to the removal of carbon dioxide from the atmosphere, highlighting the importance to investigate their characteristics and understand how they contribute to Earth’s climate regulation.</p> <p>By measuring fluorescence, sensors on autonomous underwater vehicles (AUV) allow us to detect the high pigmentation of deep phytoplankton. The data collected by these sensors are transmitted to the shore while cruising thousands of kilometers away from the coast. AUVs can measure other water quality parameters such as oxygen concentration which is used to determine the amount of photosynthetic activity and carbon removal.</p> <p>In this project, I am analyzing a large data set of measurements collected by Seagliders (a type of AUV) at Station ALOHA to study the variability of chlorophyll and oxygen in the layer inhabited by deep phytoplankton. By studying this variability in chlorophyll and oxygen, this project aims to determine the factors that influence phytoplankton growth at subsurface ocean environments, enhancing our understanding of the dynamics around carbon removal, and the ocean’s role in Earth’s climate.</p>
<p>16. “Analysis of prey DNA to determine diet of short-finned pilot whales and spinner dolphins.” Nicole Makar,* UHM, Kristi West,^o UHM, Ilse Silva-Krott,† UHM, Connor Humann,† UHM</p> <p>Cetaceans play a crucial role in the overall health of the ocean and by understanding their trophic interactions we can better protect and preserve these species. Obtaining reliable data on diet composition is challenging in animals that forage below the ocean’s surface. However, DNA-based methods have broadened our ability to assess trophic interactions in marine systems and can be used to better understand diet composition. We investigated the amounts of prey DNA recovered in the feces of stranded short-finned pilot whales and spinner dolphins. Meta-barcoding of prey DNA was then used to identify prey types in these species. Our analysis identified prey species from the digestive systems of 6 short-finned pilot whales and the feces of 10 spinner dolphins. We will present meta-barcoding of prey DNA results summarized by the types and number of prey species identified in short-finned pilot whale and spinner dolphin feces. This study is important for researchers studying diet composition as prey can be accurately identified to species and the approach is not dependent on prey pieces surviving digestion. Beyond this study, prey DNA is an important tool that can be used as a non-invasive way to assess individual diet and trophic interactions of large mammals.</p>
<p>17. “Nitrogen Fixation in Kō.” Quinn Leggett,* UHM, Noa Lincoln,^o UHM</p> <p>This project focuses on studying the fixation of nitrogen in sugarcane. Samples will be taken on Hawai’i island from sugarcane growers and examined in a lab for their ability to fix nitrogen.</p>

No., Title, Student Presenter(s)*, Mentor ^o , Non-presenting Author†, Summary
<p>18. “Hawaiian ‘Uala (<i>Ipomoea batatas</i>) Cultivar Resources.” Stacy Lucas,* UH West Oahu, Aurora Kagawa-Viviani,^o UHM, Michael Kantar,† UHM, Theodore Radovich,† UHM</p> <p>Historically botanical knowledge was common among the Hawaiian people and ‘uala was one of the highest yielding vegetables with hundreds of cultivars grown in Hawai‘i (Rooke, 1855). However, today only seven cultivars are grown throughout the islands (Arakaki et. al., n.d.). From as early as 1855 to as late as 1940, approximately 300 names of ‘uala cultivars have been collected (Kagawa-Viviani, 2016). Today, less than 40 cultivars are grown throughout the botanical gardens in Hawai‘i. The goal of this project was to collect the names of Hawaiian cultivars of ‘uala by comparing historical and contemporary sources of descriptions in order to create a guide on how to identify Hawaiian cultivars. A dichotomous key is the main tool to do this, in order to maximize the utility of the key, historical and contemporary sources describing Hawaiian ‘uala cultivars must be compared. Further, an easily accessible database of information on ‘uala traits for identification, historical references on names and growing locations, and photographs of living collections was created to allow interested growers outside of the context of academia to care for and educate themselves on ‘uala. With access to well-synthesized information on Hawaiian ‘uala, more people will have the knowledge they need to grow and maintain Hawaiian ‘uala collections as well as grow ‘uala at the optimal conditions documented from a period when ‘uala cultivation was widespread, hopefully leading to more widespread cultivation of ancestral varieties of ‘uala.</p>
<p>19. “Ingested Marine Debris Cataloging and the Viability of Phthalate Ester (PAE) Extractions in Cetacean Blubber for Analyses as Plastic Tracers in the Ocean.” Tamako Delfino,* UHM, Kristi West,^o UHM, Cody Clifton,† UHM, Jana Phipps,† UHM</p> <p>The presence of anthropogenic pollution and persistent plastics in the ocean is a growing threat to marine wildlife. Plastics can enter the marine food web through accidental direct or indirect ingestion, causing negative impacts on organisms, including things on the macro scale like internal blockages, or the micro scale where particulates can leach chemicals that disrupt many critical endocrine processes. Among these chemicals are phthalate esters (PAEs), plasticizers that have been known to act as androgen blockers and inhibit many reproductive processes. Recent studies have used these PAEs as environmental biomarkers to detect plastics in ocean ecosystems. Our study seeks to investigate the presence of plastics and PAEs in two cetaceans that stranded on Kaua‘i, both with significant amounts of marine debris in their digestive tracts, a short-finned pilot whale (<i>Globicephala macrorhynchus</i>) in 2017 and a sperm whale (<i>Physeter macrocephalus</i>) in 2023. Debris will be identified and cataloged by type, size, and weight. Samples of blubber taken from each individual will be homogenized and extracted using hexane and dichloromethane, prior to GC-MS analysis in collaboration with the Bioinstrumentation and BioMEMS Laboratory of UC Davis. This study will help assess the presence of plastics in cetaceans and evaluate methods for the extraction of PAEs, expanding research into areas that will allow for critical observations of plastic exposure in marine life, ultimately providing methods of testing free-ranging marine animals with non-invasive methods.</p>

No., Title, Student Presenter(s)*, Mentor^o, Non-presenting Authorst, Summary

20. **“Calibration of a UV-VIS Detector for Space-Bases Observation of Ozone and Nitrous Oxide.”**
Yan Shan Liu,* UHM, Peter Englert,^o UHM

The Variability in Atmosphere - Solar Energetic Event study (VIA-SEEs) mission utilizes a solid-state radiation detector telescope (SEE) and spectrophotometer (AvaSpec-Mini2048CL) to measure the reflectance of ultraviolet-visible (UV-VIS) spectrum wavelengths in the atmosphere. The instrument calibration process is critical to determine whether the detector’s ability to measure the desired spectra, absorption and reflectance peaks in atmospheric gasses, particularly ozone and nitrous oxide. The testing apparatus includes a calibration chamber that contains gasses in an airtight, dark environment with five connections: a spectrophotometer, gas input/output, fiber optic cable, and light source. Initial testing of the spectrometer validated the device for use in UV light spectroscopy testing, which is required as a baseline. Additional testing was performed to calibrate the spectrometer for use in the detection of specific gasses (e.g. air, CO₂, CH₄, N₂O). Its use in the collection and analysis of research data will be useful in support of the VIA-SEEs project and other atmospheric research missions with CubeSats.

21. **“Automatic Radioactive Seed Localization using Movable Sensor Barriers.”** Hugh Ishikawa,* UHM, Peter Berkelman,^o UHM

Radioactive seed localization (RSL) has emerged as a valuable technique for accurately localizing cancerous tumors. However, the current manual method utilizing a gamma probe radiation detector often leads to imprecise results, necessitating a more refined approach. In this study, we propose the development of an innovative automated system, employing robotics to streamline the localization process and significantly improve precision.

The core of our system lies in a linear three-axis mechanism, driven by a system of stepper motors. To achieve accurate localization, each axis incorporates a barrier strategically positioned in front of the sensor to dictate the direction of the emitter. By partially blocking the sensor, this barrier guides the sensor’s movement until its reading reaches a near-balanced state, signifying proximity to the source. This dynamic barrier manipulation effectively directs the sensor toward the emitter’s location, maximizing accuracy.

For the sake of simplicity, the study adopts a longer wavelength analogue, specifically infrared, to pinpoint the emitter’s location. The choice of infrared comes from the relative availability and safety of infrared radiation. As infrared is an electromagnetic wave like gamma radiation, the sensors can be switched out to sterile Geiger counters if required.

This experiment exclusively focuses on designing and implementing the robotic system to augment the precision and efficiency of the localization procedure. By automating the process utilizing robotics, the proposed system promises to revolutionize the field of radioactive seed localization, facilitating more effective cancer treatment planning and execution.

No., Title, Student Presenter(s)*, Mentor^o, Non-presenting Authorst, Summary

22. **“Fabrication of Microbioreactors for Live-Cell Imaging in a Soil-Like Environment.”** Michael Kawasaki*, UHM, Wei-Wen Su,^o UHM, Zhenlin Han,† UHM

Currently, conducting live-cell imaging in a soil environment poses numerous challenges due to the difficulty of performing this approach in an opaque medium such as soil. As a result, current methods lack the ability to observe how the cell reacts to different chemical treatments overtime. To address these challenges, an idea to create an array of microbioreactors for live-cell imaging in a soil-like environment has been proposed. Currently, microfluidics offers an efficient method for studying cells in a liquid-like environment. However, in order to closely resemble a soil-like environment, a transparent soil was used. This transparent soil was made out of a suspension of Cryolite and Ludox. The objective of this summer project is to create a 3D-printed microfluidic device that will allow for live-cell imaging in a soil-like environment using confocal microscopy. By utilizing 3D-printing-based fabrication methods, we have successfully fabricated a plethora of prototypes due to the low cost associated with 3D-printing-based methods. Currently, two designs are being utilized. The first design utilizes a physical membrane while the second design utilizes 3D-printed microstructures that will act as a filter. At the time of this report, we are able to confirm the ability to view the cells in real time with the current transparent soil suspension under a confocal microscope. Should this project be successful, the ability to observe the cell's morphology and physiology when exposed to different chemical conditions in a soil-like environment in real time would be possible.

23. **“Application of AlphaFold in Structure Prediction of a Novel Degron - the Destabilized Green Fluorescent Protein.”** Yimin Yuan,* UHM, Wei-Wen Su,^o UHM

Degron is a short protein motif that can be used to tag proteins for degradation. AlphaFold is an AI-based system that can predict a protein's structure from its primary amino acid sequence. ChimeraX is a software for molecular structure visualization and analysis. The objective of our study is to use AlphaFold, which is available on ChimeraX, to model the structure of a novel degron tag - the destabilized green fluorescent protein (dGFP), and its interaction with the Transport Inhibitor Response 1 (TIR1) auxin-receptor F-box protein. The dGFP is created by inserting a mini-IAA7 degron sequence into the superfolder-GFP (sfGFP) to prevent uncontrollable removal of the mini-IAA7 sequence. By tagging a protein with dGFP instead of the mini-IAA7 degron, premature removal of the degron tag from the target protein can be prevented, resulting in more complete protein degradation. Thus far, AlphaFold models successfully predicted the molecular interactions between dGFP and TIR1 to occur within the core degron motif of mini-IAA7 inserted into sfGFP. In-silico amino acid mutations to alanine within the core degron sequence will be conducted to generate additional AlphaFold models of dGFP variants, and the docking of these variants on the TIR1 protein analyzed. Such analysis can suggest potential mutation targets for tuning the intrinsic binding affinity between dGFP and TIR1, which is important for developing an optimal degron system to achieve tighter control of target protein degradation using the dGFP/TIR1 conditional degron system.

No., Title, Student Presenter(s)*, Mentor^o, Non-presenting Author†, Summary

24. **“Transcriptomic Analysis of Sea Cucumber Vision.”** Anneke Wirth-Yap,* UHM, Megan Porter,^o UHM

Opheodesoma spectabilis, is one of few sea cucumbers with eyespots. Despite the morphological and behavioral evidence of their eyespots, little is known about their vision on a molecular level. Vision is a lens through which to understand evolution, and well understood in a variety of animals. Sea cucumbers belong to the echinoderms, a group with evolutionary proximity to early vertebrates. To further investigate sea cucumber vision we will assemble and analyze transcriptomes of *O. spectabilis*. Our goal is to find opsin proteins in *O. spectabilis*, and perform differential analysis between the opsins present in the skin and eyes to understand phototransduction in the species. We collected eye and skin tissue from 7 *O. spectabilis* specimens, and sequenced their RNA. Sea cucumbers are “reef janitors”, due to being voracious eaters, consuming sand for detritus, playing a huge role in ecosystem health, which is vital as coral reefs become more and more threatened. Understanding echinoderm vision is important for understanding their behavior, ecosystem role, and their evolutionary relationships with vertebrates.

Poster Session Abstracts

No., Title, Student Presenter(s)*, Mentor ^o , Non-presenting Author [†] , Summary
<p>1. “Weaving Cultural Narratives into Art: Character Design Inspired by Hawaiian Mo’olelo.” Adam Joseph Parrilla,* UHM, Matthew Wong,^o UHM</p>
<p>This project revolves around the cultural significance of preserving Native Hawaiian mo’olelo (stories) through the art of Character Design. In collaboration with Hawaiian Language Professor Matthew Kainoa Wong, the student has chosen the story of “Ke Kumu ‘Ulu Mua Loa,” which depicts the Hawaiian akua (deity) Kū coming to Hawai’i in human form and raising a family. During a season of drought, he sacrifices his body, unable to return to his family to grow the ‘ulu (breadfruit) tree which has continued to be not only a staple of Native Hawaiians but also a symbol of perseverance and kinolau (embodiment) of Kū to this day. Through creating character designs deeply rooted in Hawaiian culture, the project seeks to inspire a renewed interest in the Hawaiian language and heritage, especially among Native Hawaiians. By bridging traditional narratives with contemporary artistic expressions, the work aims to honor and promote the diverse facets of Hawaiian cultural identity in the modern world, preserving the stories of the past for future generations.</p>
<p>2. “When a Book is More than a Book: Exploring Book Arts from Cuneiform to Codex.” Maggie Strehorn,* UHM, Esther Tang,* UHM, Sarah Nakashima,^o UHM, Jean Thoulag,[†] UHM</p>
<p>This project poses the questions: What is a book? What makes a book “book art”? Book Arts from the creation of paper, to the binding and covering of the book, encompasses the transition of a book becoming a work of art. Ancient, rare and modern books showcase the development of this art form. This project involved analyzing the materials and processes in the creation of books, examining Hamilton Library’s collections for examples of the development of papermaking, printing, book bindings, and casings as well as investigating illustration styles and techniques for examples of the art of books. Combined with hands-on experience using materials to create book arts samples, through this research project, the researchers discovered that book arts encompass every aspect of bookmaking, as each minute detail of a book can be considered art at some point. In studying the history of the book itself and evaluating the creation process, how one defines art and books can be challenged. Examining a book can show its significance beyond its literary and informational significance proving that a book can be a literary tool, a work of art, or both. By understanding the book as a whole, the labor, skill and techniques that go into its creation come into focus to develop the perspective of the book as more than a book but book art.</p>

No., Title, Student Presenter(s)*, Mentor^o, Non-presenting Author†, Summary

3. "Identifying Linguistic Anti-Patterns in Data Science Projects: An Exploratory Study."

Carol Wong,* UHM, Micah Tilton,* UHM, Anthony Peruma,^o UHM

Similar to traditional/industrial software applications built by professional software developers, code written by data scientists is also susceptible to bad programming practices that negatively impact system quality and maintenance activities. While previous research has examined code quality from the point of coding standards, there is a gap in understanding the importance of identifier naming, including variables, functions, and classes. In particular, there is limited knowledge regarding the linguistic antipatterns (LA) that data scientists often unknowingly inject into their code. The goal of this research study is to identify naming violations in data science code; this includes identifying LAs specific to data science code. To this extent, we perform a grounded theory-based approach analyzing identifier names within 125 open-source data science Jupyter Notebooks. As part of our initial findings, we propose a taxonomy of 6 LAs. At a high level, we observe that many LAs arise from identifiers not conveying enough information to describe a variable's information or the intended purpose of a function. These issues are commonly observed with identifiers that heavily use abbreviations or documentation that conflicts with implementation. Our results serve as a valuable foundation for creating tools and IDE plugins that provide data scientists with real-time identifier name appraisals and recommendations. Additionally, these results can guide revisions to the existing curriculum, enabling future data scientists to write high-quality and maintenance-friendly code.

4. "Pohaku: A New Take on Living Walls in Hawai'i."

D'Elle Martin,* UHM, Andrew Kaufman,^o UHM

The project Pōhaku is an ongoing study of Hawaiian dry stack masonry, uhau humu pōhaku, and living walls. The main goal is to find new ways to incorporate planting inside, and outside a building. Doing so, while keeping Hawaiian cultural values intact, and tackling climate change. Consulting a master wall builder in uhau humu pōhaku, I have constructed a 4 ft long by 3 ft wide by 4 ft high moss rock wall. I have planted native plants on the faces of the wall, and set up a micro irrigation system on a timer; to water the plants throughout the day. Temperature readings, measurements of plant growth and rock displacement are being conducted. And with further research and data collection, this project will provide valuable insight into the future of living walls in Hawai'i.

No., Title, Student Presenter(s)*, Mentor^o, Non-presenting Author[†], Summary

5. **“Annotation Parsing in Clinical, Real-World Breast Ultrasound Imaging Data.”** Kailee Hung,* UHM, Peter Sadowski,^o UHM, Arianna Bunnell,[†] UHM

Objective: To establish a pipeline for identifying and parsing annotations in clinical breast US scans.

Introduction: Ultrasound (US) is a viable imaging modality for the detection of breast cancer in resource-limited settings. Clinical US images often contain informational, though inconsistent, annotations from sonographers that contain information about scanning protocol and conditions. These text annotations may aid in data cleaning for Artificial Intelligence (AI). In this study, we identify and parse text on breast US data from the Hawaii & Pacific Islands Mammography Registry (HIPIMR). We develop our pipeline on over 100,000 breast US scans from the HIPIMR.

Methods: Scans were passed through a pipeline developed from the EasyOCR (Jaided AI; Bangkok, Thailand) optical character recognition tool to identify structured scanning protocol (laterality, probe position, distance from nipple, axilla presence, clock position) and miscellaneous physical/procedure descriptions. A variety of regex patterns were also employed to account for incomplete text.

Results: The text recognition pipeline was verified on a hand-labeled, randomly selected subset of 2,000 breast US scans. A total of 1684 scans in the dataset specified laterality, with laterality identified correctly in 1631 and missed in 53 (96.85% sensitivity and 100% specificity).

Conclusion: These results show the efficacy of our domain-specific text recognition pipeline and may improve breast US data for AI model development.

6. **“Optimizing Analytical Methods for Intracellular Microbial Polymers in Environmental Applications.”** Melissa Zakala-Downs,* UHM, Caitlin Niiya,* Pitzer College, Zhiyue Wang,^o UHM

Polyhydroxyalkanoates (PHAs) are intracellular polymers with promising applications in various industries as a substitute for standard petroleum-based polymers due to their biodegradability. 3-hydroxybutyrate (3HB), 3-hydroxyvalerate (3HV), and 3-hydroxyhexanoate (3HH) are three common monomers of PHA, the accurate quantification of which is essential for optimizing the production processes of PHA. This research aims to develop an optimized analytical method for the quantification of PHA in forms of 3HB, 3HV, and 3HH through variation of processing parameters. To quantify PHA, the polymer(s) must first be extracted from biological cells and then depolymerized to their monomer form(s). The monomers simultaneously go through a methylation process, which attaches a methyl group to improve their detectability in gas chromatography with flame ionization detection. Quantification of monomers can be done with calibration curves normalizing to initial dry mass. A series of temperatures (60°C - 140°C) and heating times (30 min - 2.5 hr) were then tested to determine the optimum conditions for PHA yield. It was found that the optimum length of the methylation and depolymerization stage was 1 hour, and the optimum temperature was 120°C. PHA yield was minimal for processing times less than 1 hour, and slightly lower for times exceeding 1.5 hours. Temperatures less than 100°C did not fully process the samples, and temperatures above 120°C degraded a significant portion of the PHA, leading to less desirable yields.

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7. “A Preliminary Investigation of the Understandability of Assertion Error Messages.”

Rocky Huang,* UHM, Veronica Hodapp,* Columbia University, Anthony Peruma,^o UHM, Taryn Takebayashi,[†] UHM, Joseph Carmelo Averion,[†] UHM

A fundamental technique in ensuring the quality of a software system is unit testing, which involves programmers writing code to verify the system's behavior. In writing unit tests, programmers use assertions to verify their test cases' actual and expected output. To help troubleshoot test case failures, programmers can provide an optional message explaining the failure of the test and other pertinent information to help diagnose and replicate the failure. While the research community has examined the quality of test cases from multiple viewpoints, little is known about the quality of these assertion error messages.

To this extent, in this study, we perform a grounded theory-based approach to understand how programmers semantically construct assertion error messages by manually analyzing the test cases of several open-source Java projects. As an initial study in this area, we propose a preliminary understandability taxonomy of assertion error messages. Our taxonomy consists of three high-level categories -- Understandable Features, Obfuscating Features, and Ambiguous Features. Furthermore, we also identify subcategories that provide a more granular view of the assertion error messages.

We envision our findings incorporated into software applications that provide programmers with an automated mechanism to check the quality of their test cases by identifying low-quality assertion messages. Furthermore, our work can also be used by academia to better instruct students on the importance of assertion messages and the features of high-quality messages. Our future work involves surveying professional programmers to gain feedback on our taxonomy and identify other categories for inclusion.

8. “Investigating Heat Stress and Unfolded Protein Response-signaling Pathways in Plants.” Alena Albertson,* UHM, David Christopher,^o UHM, Rina Carrillo,[†] UHM

Global warming induces heat stress in plants, leading to decreased crop yields. Heat stress causes protein unfolding, triggering endoplasmic reticulum (ER) stress and activating the unfolded protein response (UPR). Unfolded proteins cannot perform their necessary functions. The UPR activates specific genes, such as protein disulfide isomerase 9 (PDI9) that aid in protein recovery by facilitating their folding via cystine bond catalysis. The ER membrane enzyme, inositol-requiring enzyme-1 RNase-kinase, IRE1, senses ER stress and initiates UPR. IRE1 splices a small intron from bZIP60 mRNA, enabling bZIP60 to activate PDI9 gene expression during the heat rescue response. This study tests the effects of IRE1A and IRE1B knockout mutants and the role of PDI9 on the UPR. The IRE1A/IRE1B knockout was confirmed using genomic PCR, while PDI9 overexpression (OE) was validated by immunoblot analysis using a PDI9-specific antiserum. UPR will be measured in Arabidopsis protoplasts using laser scanning confocal microscopy of GFP fluorescence from the unique bZIP60-intron-GFP-bioreporter, with proper wild-type (WT) controls. The influence of PDI9 on the UPR will be analyzed by reintroducing PDI9 (the mcherry-PDI9 fusion) into the double mutant, *pdi9/pdi10*, with and without UPR induction, and visualized via confocal microscopy of the bZIP60-intron:GFP-bioreporter to measure UPR. PCR genomic mapping confirmed the absence of bands in *ire1A/ire1B* mutants compared to WT IRE1A/IRE1B genes. The TDNA insert was verified in each *ire1A/ire1B* locus, validating gene knockouts. Immunoblot analysis revealed a 4X increase in PDI9 concentration in the PDI9 OE lines compared to WT samples, with protein loading confirmed by Coomassie-staining and quantification.

No., Title, Student Presenter(s)*, Mentor^o, Non-presenting Author[†], Summary

9. **"Evaluating the effects of increasing Adenosyl cobalamine or Hydroxocobalamin concentrations on ovine satellite cell proliferation rates."** Amaia Cariaga,* UHM, Courtney Rivera,* UHM, Caleb Reichhardt,^o UHM, Jenee Odani,[†] UHM

In ruminants, vitamin B12 is synthesized from cobalt via microbial fermentation. Tropical pastures are known to be cobalt deficient, suggesting that ruminant livestock may need supplements to increase growth. The primary mechanism for postnatal muscle growth is via hypertrophy of existing muscle fibers provided by satellite cells. Supplementing cobalt to ruminant livestock to increase growth has been inconclusive. The objective of this trial was to determine the effects of increasing concentrations of the active vitamin B12 metabolites on ovine satellite cell (OSC) proliferation rates. Primary OSC were isolated from two 9-month-old commercial hair sheep wethers and grown in culture. Each isolation was replicated four times. Once cultures reached 75% confluency they were treated with 1% fetal bovine serum (FBS), and 888 pM, 592 pM, or 296 pM adenosyl cobalamine (AC), or 888 pM, 592 pM, or 296 pM hydroxocobalamin (HC). Increasing concentrations of AC did not increase proliferation rates compared to control cultures. However, 296 pM and 592 pM HC increased P < 0.04 proliferation rates compared to CON cultures. There was no difference between 296 pM and 592 pM HC. This suggests that if animals are receiving physiologically adequate concentrations of vitamin B12, growth is not negatively impacted. Future work is needed to address differentiation and protein synthesis rates of OSC.

10. **"Relationship Between Snail Abundance and Snail Shells Used by Hermit Crabs at Hale'iwa Ali'i Beach Park."** Cassandra Liong,* UHM, Peter Marko,^o UHM, Ken Hayes,[†] Bernice Pauahi Bishop Museum, Norine Yeung[†], Bernice Pauahi Bishop Museum, Meagan Haubner,[†], Bernice Pauahi Bishop Museum

The intertidal zone is subject to the constantly changing tide, resulting in specialized morphological and physiological adaptations in response to variable conditions. The use of empty snail shells is an adaptation in hermit crabs (Superfamily: Paguroidea) to protect the soft portion (abdomen) of their bodies. Snail shells used by hermit crabs in Hawai'i include those of the families Rissoidae Turbinidae. Here, I investigated the relationship between snail abundance and shell usage by hermit crabs at Hale'iwa Ali'i Beach Park. Snails and hermit crabs were collected and examined to identify both the species of hermit crabs and species of snail shells used by crabs. DNA barcoding was used to verify the hermit crab species identifications. This research could further elucidate whether hermit crabs have preferences towards the shells of certain snail species depending on size or availability.

No., Title, Student Presenter(s)*, Mentor^o, Non-presenting Author[†], Summary

11. **“Digitizing the Seeds of Hawaii.”** Cody Brahim,* UHM, Nate Kingsley^o, UHM

Seed banks are critical resources for ex-situ conservation and biological research. They are one of the most prevalent and practical approaches to conserving resources used for habitat restoration and the conservation of wild species. Despite seed collection's utility for research, limitations in terms of accessibility do exist. Travel restrictions, such as time and funding, might impede researchers from accessing seed collections for in-person visits. Further, many seed collections across seed banks and herbaria are not digitized (i.e., imaged or databased) or are photographed insufficiently for identification. However, technological advances, such as Z-stacking software that can bring into focus an entire specimen with an increased depth of field, have been applied to quantify morphological traits like size and shape. At the Harold L. Lyon Arboretum in Honolulu, Hawaii, a curation project was started in 2021 to image all 141 genera across 63 families currently held in the Lyon Arboretum Seed Lab to serve as a valuable reference to researchers for identification and source for seed morphological data. This involved: updating the names in the collection to the current taxonomy, photographing the seeds at different focal planes and combining them to increase the depth of field, uploading the images onto a newly developed website, SeedsOfHawaii.org, and promoting the utility of this new, digital collection. Seed banks that digitize their collections through modern imagery can expand their utility and use for reference further than physical collections by increasing their visibility through online availability.

12. **“The effects of the vitamin D receptor and increasing concentrations of vitamin D3 on ovine satellite cell proliferation.”** Courtney Rivera,* UHM, Amaia Cariaga,* UHM, Caleb Reichhardt,^o UHM, Jenee Odani,[†] UHM

In recent studies, research suggests that vitamin D plays an important role for skeletal muscle during times of growth. The primary mechanism for postnatal muscle growth is via hypertrophy of existing fibers provided by satellite cells. However, micronutrient requirements and supplement strategies for optimal livestock production are poorly understood. The first objective of this trial was to determine the effects of increasing concentrations of vitamin D3 on ovine satellite cell (OSC) proliferation. The second objective was to gain a better understanding of the role of the vitamin D receptor in OSC proliferation. Primary OSC were isolated from two 9-month-old commercial hair sheep wethers and grown in cultures. Live animal procedures were approved by IACUC. Each isolation was replicated four times. Once cultures reached 75% confluency, they were treated with 1% fetal bovine serum (FBS) and with vitamin D3 in concentrations of 48nM, 96nM, or 144nM. ZK159222 was used as the vitamin D receptor (VDR) inhibitor. Inhibition of the vitamin D receptor increased proliferation rates of OSC compared to control cultures $P = 0.01$. All vitamin D3 concentrations evaluated decreased proliferation rates of primary OSC. Although these results indicate that the VDR plays a pivotal role in skeletal muscle growth, future work is needed to address differentiation and protein synthesis rates of OSC.

No., Title, Student Presenter(s)*, Mentor^o, Non-presenting Author[†], Summary

13. **“Phylogenetic Analyses of *Leptastrea* Species around Kāneʻohe Bay.”** Dakota Kaupu,* University of Vermont, Robert Toonen,^o UHM, Claire Lewis[†], UHM, Chris Suchocki,[†] UHM, Claire Bardin,[†] UHM

Coral taxonomy and systematics have had a long and confusing past. Classifications based on morphology disagree with molecular clades because of the extreme plasticity of coral morphology misleading early taxonomic efforts. This is exacerbated by difficulty finding useful molecular markers because of the slow accumulation of mutations in the mitochondrial genome, the traditional barcoding region. This study focuses on the genus *Leptastrea*, a diverse group of stony corals with four species found in Hawaii. Understanding this genus' phylogenetic relationships and evolutionary history is crucial for elucidating the mechanisms underlying their diversification and adaptation to different environmental conditions; especially for a coral found to be resistant to coral bleaching events. Coral speciation shows a fragile balance between extreme plasticity and speciation, highlighting the need for comprehensive phylogenetic work. In this study, we conducted a phylogenetic analysis of *Leptastrea* using molecular data to unravel the evolutionary relationships of a putative cryptic species.

We collected samples of *L. purpurea* specimens from various locations around Moku o Lo'e (HIMB), from two different environments, light and dark; with different morphological features; fleshy and exposed polyps in the dark, and increased skeletal features and less soft tissue in the light. Samples were collected in light and dark pairs and light conditions were recorded simultaneously. DNA was extracted from these samples and PCR targeted both the COX1 and rDNA regions for sequencing. Using sequence data and phylogenetic analyses, we can determine the similarity among these two morphs and further explore *Leptastrea* diversity in the Hawaiian islands.

14. **“Assessing the Biodiversity of Marine Amphipods Between Two Different Sites in Oahu, Hawai'i.”** Emily Christian,* Cornell University, Peter Marko,^o UHM

The order Amphipoda (Crustacea; Malacostraca; Eumalacostraca; Amphipoda) is comprised of small, many-limbed crustaceans, commonly known as “sand-fleas.” Despite their significance as keystone organisms in ecosystem nutrient cycling and food chains, there is limited research on marine amphipod biodiversity in the Mid-Pacific. This research examines the cryptic biodiversity of marine amphipods between two distinct coastal field sites in Oahu, Hawai'i, using the cytochrome oxidase subunit 1 (CO1) and 18S ribosomal RNA (18S rRNA) gene loci. Along with morphological assessment, specimens were identified and subsequently mapped on a phylogenetic tree to determine relatedness. Sequencing CO1 and 18S from 30 individuals unveiled substantial genetic divergence (primarily <95% matches) from known amphipod sequences on GenBank, underscoring relatively high levels of amphipod diversity, including the potential discovery of novel species. These findings suggest the importance of implementing genetic tools in marine biodiversity assessments, which is a critical step towards effective conservation in an era marked by rapid anthropogenic change.

No., Title, Student Presenter(s)*, Mentor°, Non-presenting Author†, Summary

15. **“Corn conundrum: the differential growth of maize genotypes adapted to different geographic locations.”** Ethan Morrell,* UHM, Danielle Jaden Yamagata-Santos,* UHM, Tai Maaz,° UHM, Abigail H. Ana,† UHM, Joseph Carmelo M. Averion,† UHM, Roma Amor B. Malasarte,† UHM, Zeus Gean Paul Miguel†, LCC, Ethan S. Morrell,† UHM, Amanda K. Nitta,† UHM, Stephenie Andriana Santos,† UOG, Kayla-Marie A. Torres,† UHM, Keilah C. Wilkes,† UHM, Rishi Prasad, UHM,†, Michael Kantar,† UHM, Michael Muszynski,† UHM, Nhu Nguyen,† UHM

Geographic location plays a crucial role in the growth and development of agricultural crops. Maize Zea mays is a staple crop that serves multiple uses, such as livestock feed and food production for human consumption. Thus, it is important to investigate how different maize genotypes perform when grown outside the location to which they were originally adapted. We seek to understand whether maize genotypes that are adapted to the same regions share similar shoot and root traits. Data for shoot and root traits were collected from a genetically diverse collection of maize genotypes and analyzed according to their region of adaptation. We will use an analysis of variance to explore phenotype differences and then employ machine learning techniques to classify genotypes by region of adaptation. We expect that maize genotypes that were originally adapted to the same regions will exhibit similar growth patterns and characteristics when grown in the same controlled setting. An understanding of the similarities and differences between maize genotypes from the same regions can be used to select traits of interest that may increase the ability of maize to succeed in different environmental conditions.

16. **“Phenotypic plasticity within a single maize cultivar in response to multiple abiotic stressors.”** Kayla-Marie Torres,* UHM, Roma Amor Malasarte,* UHM, Tai McClellan Maaz,° UHM, Dr. Michael Kantar,† UHM, Rishi Prasad,† UHM, Abigail H. Ana,† UHM, Joseph Carmelo Averion,† UHM, Zeus Gean Paul Miguel,† LCC, Ethan S. Morrell,† UHM, Amanda K. Nitta,† UHM, Stephenie Andriana Santos,† UOG, UHM, Keilah C. Wilkes,† UHM, Danielle Jaden Yamagata-Santos,† UHM

Access to nutritious and high-quality food is an inherent human right for maintaining optimal health. However, numerous individuals worldwide encounter obstacles in securing sufficient and nourishing sustenance. Maize, a staple crop that sustains over 4.5 billion people, accounts for approximately 30% of global dietary calories. To understand how maize can be grown productively across the globe, we explored genotype by environment interactions across multiple unique environments. In this study, we investigated the response of the B73 maize cultivar to different conditions in six unique environments through measurements of various shoot and root traits. We examined differences in these traits in response to the environmental stressors, and then used the machine learning algorithms to predict the environmental conditions upon which the plants were grown. Our results will help us identify specific plant traits and their interactions that are most responsive to the environment. Utilizing these results could enable us to predict maize productivity under various environmental conditions, which has important implications for improving food security, particularly in the face of climate change impacts.

No., Title, Student Presenter(s)*, Mentor^o, Non-presenting Authorst, Summary

17. **“Establishing an awareness of ideal plant phenotype based on environmental challenges.”** Amanda Nitta,* UHM, Joseph Carmelo Averion,* UHM, Tai Maaz,^o UHM, Abigail H. Ana,† UHM, Roma B. Amor Malasarte,† UHM, Zeus Gean Paul Miguel,† LCC, Ethan S. Morrell†, UHM, Stephenie Andriana Santos,† UOG, Kayla-Marie A. Torres,† UHM, Keilah C. Wilkest, UHM, D. Jaden Yamagata-Santos,† UHM, Rishi Prasadh,† UHM, Michael Kantar,† UHM, Michael Muszynski,† UHM, Nhu Nguyen,† UHM

Malama `Āina: To care for and honor the land. Due to climate change, increasing temperatures and drought threaten Hawai'i's vulnerable ecosystems. However, plant species may respond differently to climate stressors, and therefore, it is important to understand these differential responses to effectively care for the land and our food systems. Maize Zea mays is one of the most abundant and understood food crops in the world, and thus can be used as a model plant to examine the interactions between plant performance and abiotic stress tolerance. We conducted a controlled greenhouse experiment where different maize genotypes were exposed to drought and shade conditions. We first applied an analysis of variance to understand genotypic differences in shoot and root growth traits. We then explored how well root traits predicted shoot traits using simple linear regression. Finally, we used a machine learning classifier to identify common traits that could be used to predict growth under the stress conditions. We found that these conditions impacted plant growth, and explored the potential of machine learning to identify and select the most effective genotype for an area under climate stress. Furthermore, this analysis can be extended to other plants under environmental stress to help us identify plants with the most suitable traits to improve resiliency against the effects of climate change. Future studies in this area could examine the impact of soil type as another factor in determining the optimal genotype for a given environment.

18. **“Towards improving food security: maize resiliency to changing environment.”** Stephenie Andriana Santos,* University of Guam, Zeus Gean Paul Miguel,* Leeward Community College, Tai Maaz,^o UHM, Abigail H. Ana,† UHM, Joseph Carmelo Averion,† UHM, Roma Amor B. Malasarte,† UHM, Ethan S. Morrell,† UHM, Amanda K. Nitta,† UHM, Kayla-Marie A. Torres,† UHM, Keilah C. Wilkes,† UHM, Danielle Jaden Yamagata-Santos,† UHM, Rishi Prasadh,† UHM, Michael Kantar,† UHM, Michael Muszynski,† UHM, Nhu Nguyen,† UHM

Environmental stresses driven by climate change have severe negative impacts on the performance of our most valued crops, such as maize. Studies have shown crop growth is responsive to fluctuating temperature, different levels of solar radiation, and water availability. By investigating how maize responds to environmental stressors, we can better understand which abiotic stressors will be the most limiting to the crop's growth. Three maize inbred lines were grown under three different conditions (control, shade, and drought) in a greenhouse, during which shoot and root traits were measured. An analysis of variance was conducted to examine differences between genotypes and treatments as well as to identify sources of variation. We expected that environmental stressors, such as decreased solar radiation or water, would have a significant impact on different plant traits in the three genotypes. Our results identified the genotypes that were most and least responsive to the different stress conditions. Therefore, understanding genotypic responses to stresses will allow us to better predict and recommend what genotypes will work best for farmers under a changing climate. Future research could examine a wider range of genetically diverse cultivars to better refine these recommendations.

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19. “Exploring gene expression in maize genotypes with different responses to drought.”

Abigail Ana,* UHM, Keilah Wilkes,* UHM, Tai Maaz,^o UHM, Joseph Carmelo M. Averion,† UHM, Roma Amor B. Malasarte,† UHM, Zeus Gean Paul Miguel,† LCC, Ethan S. Morrell†, UHM, Amanda K. Nitta†, UHM: Stephenie Andriana Santos,† UOG, Kayla-Marie A. Torres,† UHM, D. Jaden Yamagata-Santos,† UHM, Rishi Prasadh,† UHM, Michael Kantar,† UHM, Michael Muszynski,† UHM, Nhu Nguyen,† UHM

With climate change worsening across the globe, the need for information regarding the ability of crops to grow in extreme conditions is becoming more critical. Climate change can cause variable rainfall, hotter temperatures, and various stressors that jeopardize survival of our crops. Thus, breeding and selection must prioritize characteristics that will aid in the survival of our crops under these stresses. Through the analysis of the maize *Zea mays* genome, we aim to identify which genes are responsive to stress and might contribute to survival under drought conditions. From a genetically diverse panel of maize inbreds, we selected three genotypes (B73, M162W, and CML333), and collected data for root and shoot traits under drought and well-watered conditions. By comparing the growth, genomic sequence, and gene expression data, we will predict which genes function in response to certain environmental conditions and how they might contribute to a plant's growth rate. We expect that different genes will be highly expressed in one, or both, genotypes, and that the magnitude of a genes' expressions will relate to specific root and shoot growth traits. Ultimately, the predicted function of these genes will aid in the real life applications of successfully breeding maize lines that grow productively in demanding environments.

20. “Phylogenetics of Hawai'i's endemic chitons.” Ferdous Rahimi,* UC Davis, Peter Marko^o, UHM, Dr. Stephanie Kraft-Terry,† UHM, Dr. Norine Yeung,† Bishop Museum, Dr. Ken Hayes,† Bishop Museum

Polyplacophora or chitons are molluscan bioeroders that facilitate Hawaiian coral reef health and create new coral sand. Although the ecological role of Hawai'i's chitons is understood, their evolutionary and biogeographic origins are incomplete, as only a portion of endemics are included in molecular phylogenetic studies. A phylogenetic analysis of Hawai'i's chitons may also reveal unrecognized cryptic species. We used a molecular phylogenetic approach to understand the evolutionary relationships among four endemic Hawaiian chitons *Stenoplax petaloides*, *Acanthochitona viridis*, *A. armata* *Rhyssoplax linsleyi* and their relationships to other species across the Pacific. We sequenced partial cytochrome oxidase I (cox1) and 18S nuclear ribosomal (18s rRNA). This study contributes to research towards taxonomic classifications, identification of new species, and most directly the common origin of Hawaiian endemic chitons.

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21. **“Phylogenetic analysis of endemic Hawaiian *Cerithium boeticum*.”** Helen Shanefield,* Yale University, Peter Marko,^o UHM, Kenneth A. Hayes,[†] Bernice Pauahi Bishop Museum, Norine W. Yeung,[†] Bernice Pauahi Bishop Museum

The Hawaiian Islands are home to an estimated 119 species of endemic marine gastropods, yet many of these endemics are underrepresented in the sequence data. One such example is *Cerithium boeticum*, the only Hawaiian endemic species within the family Cerithiidae. *Cerithium* are horn-shelled, algae-feeding sea snails that inhabit intertidal zones around the world and are abundant across the Indo-Pacific region. At least 12 species of *Cerithium* are found in Hawai'i, but for several, including *C. boeticum*, no sequence data are available for inclusion in phylogenetic analyses. In this study, DNA barcoding will be used to determine the phylogenetic placement of *C. boeticum* within *Cerithium*. Because *Cerithium* is monophyletic, these data will provide a better understanding of the evolution of the single *Cerithium* lineage in Hawai'i. For instance, *C. boeticum* and *C. zebrum* were formerly considered conspecific, but research has shown that they are morphologically distinct. More in-depth phylogenetic analyses on these species will shed light on the diversity of the genus.

22. **“Understanding phylogenetic relationships of sea hares (Aplysiidae) in the tropical Pacific using genetic data.”** Isabella Ah Moo,* Pomona College, Peter Marko,^o UHM, Norine Yeung, Mentor,[†] Bernice Pauahi Bishop Museum Malacology Department, Ken Hayes,[†] Bernice Pauahi Bishop Museum Pacific Center for Molecular Biodiversity, Meagan Haubner[†], UHM

Sea hares are marine molluscs and members of the gastropod family Aplysiidae. These animals benefit marine ecosystems by consuming algae, potentially mitigating the effects of eutrophication. The Aplysiidae are globally distributed across temperate and tropical waters, with 16 known species found in the Hawaiian Islands. The genetic variation of these organisms across the Pacific is severely understudied. This work will address the species diversity of Aplysiidae using specimens collected from Hale'iwa 'Ali'i Beach Park and specimens housed in the Bernice Pauahi Bishop Museum Malacology collection. Tissue samples were collected from both fresh and historical specimens and genomic DNA was extracted according to Qiagen standard protocols. The DNA was subsequently amplified and sequences were obtained for mitochondrial cytochrome oxidase subunit I (COI) and nuclear 18S ribosomal RNA loci, both of which are distinct structures within eukaryotic cells used to identify specific taxa. Using this barcoding approach, the genetic data collected will broaden our understanding of evolutionary relationships and the history of the Aplysiidae and allow us to begin answering more complex questions, such as their role within an ecosystem.

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23. **“Molecular and Phylogenetic Reassessment of *Palisada* (Ceramiales, Rhodophyta): Unveiling Novel Algal Lineages from Hawaiian Mesophotic Reefs.”** Jackson Harris,* College of the Holy Cross, Alison Sherwood^o, UHM, Kazumi Allsopp,† UHM, Feresa Cabrera,† UHM

The red algal tribe Laurencieae currently consists of 12 genera, including the genus *Palisada* K.W. Nam (Ceramiales, Rhodophyta). In previous reports, the six recognized species within *Palisada* in Hawai'i were reported as members of the genus *Laurencia* J.V. Lamouroux. Over the course of its history, the taxonomic classification of the tribe Laurenciaceae has undergone several revisions. However, the assessment of the diversity and distribution of *Palisada* in Hawai'i has not been reevaluated since the numerous taxonomic revisions published in this group during the past two decades. Moreover, studies of Hawaiian mesophotic reefs have revealed a lack of knowledge about this ecosystem and the presence of many undescribed taxa. To address this research gap, the phylogeny of *Palisada* in Hawai'i was reassessed by analyzing the mitochondrial COI and plastid-encoded *rbcL* gene sequence data obtained from collections of algae in both shallow and mesophotic environments from the Main and Northwestern Hawaiian Islands. The phylogenetic analyses unveiled the presence of two distinct lineages specifically associated with mesophotic environments. These lineages will undergo further examination through morphological and taxonomic analysis. These subsequent steps aim to determine whether these lineages represent undescribed diversity and, if so, to formally describe these taxa. This study represents the first report documenting the presence of *Palisada* from mesophotic reefs within the Papahānaumokuākea Marine National Monument.

24. **“Applications of 2D Material Science on N-Carbophenes.”** Jirui Yang,* UHM, Shayla Kaheaku,* UHM, Ralph Adra,* UHM, Katalynarose Lavarez,* UHM, Valeria Diaz,* UHM, Chad Junkermeier, ^oUHM

Carbon-based 2D materials have gained significant attention in material science research. We present a study on N-carbophenes, a class of 2D carbon structures composed of alternating units of cyclobutene and cyclohexatriene. Given the urgent need for carbon neutralization in combating climate change, we explore chemically modified carbophene's potential to capture atmospheric gasses like carbon dioxide, molecular hydrogen, and methane. Our computation analysis, employing density functional tight-binding theory (DFTB), reveals that altering functional groups within the carbophene pore leads to changes in dispersion energy levels. We observe different binding energy levels due to hydrogen bonding and van der Waals forces between small molecules and functional group binding sites. These findings support our hypothesis of utilizing carbophene-based 2D materials for atmospheric gas capture. Our study contributes to the emerging field of carbon capture technologies, offering exciting possibilities for addressing environmental challenges. This research contributes to the field by shedding light on the potential applications of carbophene-based 2D materials in addressing carbon neutrality and climate change mitigation efforts. These findings offer promising avenues for developing practical solutions to capture atmospheric gases using novel carbon-derived materials.

No., Title, Student Presenter(s)*, Mentor^o, Non-presenting Author[†], Summary

25. **“FogVision: A Machine Learning Method for Detecting Fog in Mountain Trail Camera Images.”** Joel Nicolow,* UHM, Peter Sadowski,^o UHM, John DeLay,[†] Honolulu Community College

Fog is hydrologically and ecologically important to tropical montane cloud forests (TMCF) including those in Hawai'i. Fog frequency with elevation is an important consideration in quantifying the input of fog to mountain water budgets. The hydrological contribution of fog is often estimated using mechanical gauges and the water balance approach. Trail cameras and image recognition present a potentially easier method of establishing fog presence than the use of meteorological stations. Cameras were deployed at 13 sites on the islands of O'ahu and Maui where fog was being studied as a water resource. Images were manually classified for fog presence to train a supervised machine learning model to perform this task. The model takes visual features extracted from the images and predicts a binary classification (fog present, clear of fog). Using a leave-one-station-out strategy the model's ability to generalize to new sites was evaluated. The average accuracy was 86% and the area under the receiver operating characteristic curve was 94% on the held-out test data.

26. **“Documenting Land Use Change in Ke Awalau o Pu'uloa: Historical analyses and application with GIS, creating a tool for Mālama 'Āina Professionals.”** Lucie Schragger,* UHM, Eileen Nalley,^o UHM

Ke Awalau o Pu'uloa and its surrounding ahupua'a were historically known for abundant dryland māla 'ai, wetland lo'i kalo, and many loko i'a. With colonialism came shifts to land use and the lifeways of the Native Hawaiian people. Consequently, Pu'uloa has become contaminated with agrichemicals, industrial byproducts, toxins resulting from military activity, and other waste. Historic records, maps, contemporary 'Āina inventories, and environmental impact surveys were used to develop a points of interest database for the region. It is imperative to acknowledge that historic maps were originally created in preparation for military and industrial development. This is in opposition to Native Hawaiian view of land as 'āina (that which feeds). As the project continues, documentation such as written texts from Hawaiian scholars and community members, will be used to inform historical maps. Settlement, agricultural, industrial, and military related sites were noted on maps and included in the database with accompanying background information. Noting contaminants and toxicology for former agricultural and industrial sites is a main focus, so too is logging pre-Western, historical sites of significance that may not have contamination concerns; including former loko i'a (fishponds), lo'i kalo (taro lands), Hawaiian settlement areas, heiau, etc. This database chronicles culturally significant lands transitioning between military occupation, industrial use, agricultural intensification, and in some cases, restoration. We hope to advance community involvement by hosting a community workshop. To restore Pu'uloa, it is imperative to be knowledgeable about any threats to the health of humans and wildlife, so appropriate recommendations can be made.

No., Title, Student Presenter(s)*, Mentor^o, Non-presenting Author[†], Summary

27. **“Species diversity of endemic nerite snails from Hale‘iwa ‘Ali‘i Beach Park.”** Naomi Vliet,* Montana State University, Peter Marko,^o UHM, Helen L. Shanefield,[†] Yale University, Kenneth Hayes,[†] Pacific Biosciences Research Center, Norine Yeung,[†] Bishop Museum, UHM

The Hawaiian Islands are a biodiversity hotspot, with a high rate of endemism due to their remote location. Pipipi is the inoa Hawai‘i for two endemic marine snail species, *Nerita picea* and *Neripteron neglectum*. These species are difficult to distinguish morphologically and both inhabit the rocky intertidal. There is also little to no phylogenetic information for these species. In particular, *N. neglectum* has never been included in a phylogenetic study and no DNA sequences for the species are available. For this project, pipipi morphologically identified as *N. neglectum* were collected from Hale‘iwa ‘Ali‘i Beach Park. Genetic sequences were obtained from samples using cytochrome oxidase subunit I (COI) primers. These sequences were then compared to those in NCBI’s GenBank to identify the species and assess phylogenetic relationships with other previously-barcoded nerite species. This will help to place them in a phylogenetic tree and help to infer the evolutionary and biogeographic origins of the species.

28. **“Scoring Abdominal Profiles of Migratory Shorebirds in Hawai‘i: Tracking Visible Weight Gain and Impacts on Migration Patterns.”** Newt Imig,* UHM, Claire Atkins^o, UHM, Melissa Price,[†] UHM

The ecological role of migratory shorebird breeding grounds in Hawai‘i is not fully understood. This project seeks to create an inventory of non-breeding shorebirds utilizing the habitat of Loko l`a o He`eia. He`eia provides a biodiverse ecosystem and preferred habitat for the three species of shorebirds studied. Utilizing a compendium of 1578 photographs from He`eia, `Akekeke (*Arenaria interpres*), `Ulili (*Tringa incana*), and Kōlea (*Pluvialis fulva*) were identified and tagged in a spreadsheet with corresponding time, date, and location of image capture. This data allowed for the creation of a timeline of how the body profiles of studied species shifted from February to June of 2023. An additional purpose of this project is to build a metric to track visible weight gain of migratory shorebirds without handling birds. A “hands-off” approach to body mass monitoring aligns with practical concerns and the preferences of resource managers to minimize the disturbance of shorebirds. This metric was created using abdominal profiles of shorebirds ranging from 1 (concave abdomen) to 3 (bulging). Fat mass in the abdominal cavity of shorebirds has been shown to have a strong correlation with total body mass. By applying this scoring system to documented shorebirds, a connection between apparent weight gain and occupancy trends can be established. Though this scale is not precise enough to accurately predict fat mass, it has the potential through collaboration to become a useful tool in shorebird research.

No., Title, Student Presenter(s)*, Mentor^o, Non-presenting Author[†], Summary

29. **“Efficacy of Oxford Nanopore Sequencing Technology for Genotyping.”** Simone Murguia,* UHM, Jiani Kaniho,* UHM, Gernot Presting,^{o†} UHM

Oxford Nanopore Technologies provides an advantageous next-generation sequencing technology that yields long read DNA for a low cost to gain an overview of a genome. This technique is particularly suitable for organisms that have a deep repository of reference genomes that are sequenced in detail, such as Hawaiian Supersweet #10 (HS10). HS10 is a hybrid form of the Hawaiian Supersweet corn developed by Dr. James Brewbaker in 1970s Hawai'i with the goal of breeding corn that would survive tropical climates and diseases as well as have exceptional sweetness. Maize genomes consist of many types of repetitive elements, which permit multiple avenues of performing whole-genome genotyping. The first aim of the project was to identify the pedigree of HS10 via analysis of the centromeres; well-conserved regions that universally contain one repetitive element called CR2. Genotyping of all ten centromeres was achieved. Another form of whole-genome genotyping is using the non-centromeric repetitive elements to understand inheritance of coding DNA. Long read DNA often spans both genes and repetitive elements, which combined, are a unique marker for a maize lineage. This method is currently being utilized for genes of interest bt1, bt2, sh2, a1, and a2 from Brewbaker's breeding objectives.

30. **“Stabilizing Kavalactone Dispersions Utilizing Common Emulsifiers.”** Stryder Williams,* UHM, Kacie Ho,^o UHM

Piper methysticum, commonly known as kava, is a medicinal herb that is commonly used in traditional ceremonies and medical practices throughout the Pacific. The main bioactive compounds within kava are the kavalactones which can be used for the treatment of insomnia and anxiety; however, they have low bioavailability due to their poor water-solubility. In order to increase the water-solubility of kavalactones, we tested the common emulsifiers, polysorbate 20, polysorbate 80, and lecithin, at different concentrations to determine the ideal kava dispersion system. The dispersion systems (containing 5.8% w/w kava powder) were mixed using a high-shear mixer prior to centrifugation to remove the sediment. The stability for each sample was then determined by measuring the particle size, zeta potential, and polydispersity index (PDI) utilizing a Malvern Zetasizer Nano ZS. As indicated by the results, kava dispersions with a 1.5% (w/w) concentration of polysorbate 80 reduced particle size the most with an average particle diameter of 41.5 nm, which is 196.7 nm smaller than the average control. However, the PDI for this sample was too high to be considered stable. The sample that exhibited the most stability was the 0.5% (w/w) concentration of polysorbate 20. This sample managed to maintain a particle size of 130.4 nm and a PDI of 0.44 over the course of 10 days. These results are a positive indication that nonionic emulsifiers, including polysorbate 20, at lower concentrations are suitable for kavalactone stabilization. As a result, this class of emulsifier has the potential to increase the colloidal stability of kavalactones, which is a prerequisite for bioavailability and subsequent health outcomes associated with ingesting kava.

No., Title, Student Presenter(s)*, Mentor^o, Non-presenting Author[†], Summary

31. **“Efficacy of Psilocybin-Assisted Therapy for Treatment-Resistant Depression Among Adults: Protocol for a Systematic Review.”** Alyshia Munoz,* UHM, Eric Hurwitz,^o UHM

Major depressive disorder is a significant public health burden among adults in the United States. Consequently, when first-line therapeutic options fail to diminish depressive states, patients are diagnosed with Treatment-resistant depression, a subdivision of Major depressive disorder. Depression affects the quality of life through persistent energy loss or interest in daily activities. Additionally, adults are at a higher risk if they have experienced significant life changes or other medical comorbidities. While depression treatment varies, typical methods include psychotherapy or medications for individuals to reach remission. Presently, psychedelic therapeutics, such as Psilocybin-assisted therapy, is an alternative method to treat Treatment-resistant depression. Psilocybin is found in psilocybe mushroom species and serves as a serotonin receptor agonist when digested. Psilocybin-assisted therapy with psychological support is a breakthrough treatment among adults with Treatment-resistant depression. This systematic review will aim to determine the efficacy of Psilocybin-assisted therapy for Treatment-resistant depression individuals. An internet search using PubMed, PsycINFO, and Google Scholar databases and a detailed search strategy will be conducted to identify all clinical studies published in English that meet the inclusion and exclusion criteria. Additionally, tables will be designed to summarize the evidence, and study quality will be assessed using validated critical appraisal tools. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement will be used to ensure complete reporting of all components of the review.

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The research and creative work that students conduct with faculty mentors is often the students' first opportunity to do work in their field of interest. Faculty mentors provide crucial access to resources, works spaces, and information that students may otherwise not be able to attain. Mahalo to all of the mentors for enriching students' academic experiences.

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