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Research Abstracts

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ORAL PRESENTATIONS: SESSION 1

Analysis of the Spatial and Temporal Patterns of Urchin Recruits on the Monterey Bay Peninsula
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Urchin population dynamics in the Monterey Bay play a major role in the health and vitality of local kelp forest ecosystems. Larval recruitment of urchins in Monterey Bay, California plays an important role in the fluctuations and settlement patterns of local purple and red sea urchins (*Strongylocentrotus purpuratus* and *Mesocentrotus franciscanus,* respectively). Urchins, like many marine invertebrates, have a marine pelagic larval stage that allows for the distribution of urchin recruits.Variations in oceanographic features can affect the range, survival rates, and final settlement location of recruits. We did an in depth analysis of different oceanographic abiotic features from both public and collected data at two sites - Monterey Bay (MB) and Stillwater Cove (SW) - in order to compare urchin recruitment. Urchin recruitment, water temperature levels, wave action information, and current direction were measured between the two sites. MB faces the bay and has little protection while SW faces the open ocean and has a higher level of protection. Preliminary data shows MB has 60 times more urchin recruits than the SW site. This study aims to investigate temperature, wave height, and current patterns leading to these recruitment differences between the two study sites. Having these answers will give a clearer understanding of the factors impacting urchin recruitment on the Monterey Peninsula. Being able to understand the local oceanographic differences between MB and SW will give valuable insight into the environmental factors affecting local urchin larval recruitment and potentially impact local kelp forest conservation.

Population-Specific Plasticity of Purple Sea Urchins
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Given the rapid pace of climate change, phenotypic plasticity and local adaptation will likely increasingly shape the fitness and ecosystem impacts of purple sea urchin, *Strongylocentrotus purpuratus*. These sea urchins are increasingly exposed to dynamic coastal upwelling, characterized by compounded reductions in temperature, pH, and dissolved oxygen (DO), all of which impact their physiology and behavior. Yet, the short-term plasticity of such responses following acute pulses of upwelling and the degree to which they vary by population has yet to be fully investigated. To correct this, we simulate an acute upwelling event and compare response trajectories between populations of sea urchins from strong and relatively weaker upwelling regions. We incrementally lower the water temperature, pH, and DO to levels mimicking historically observed upwelling minima for 3 days, a typical duration for a natural acute upwelling event. We collect repeated measurements of resting respiration rates prior to upwelling exposure, during peak exposure, and periodically thereafter to analyze the metabolic costs of maintaining homeostasis (RMR) during upwelling. To estimate impacts of these metabolic dynamics on rates of herbivory, we correlate RMR with repeated measures of per capita grazing rates. Preliminary results indicate that both populations will return to their original levels of respiration and grazing, with the population of sea urchins from the strong upwelling region recovering from stress on their metabolisms more quickly than the sea urchins from the weak upwelling population. This research broadens our understanding of herbivore plasticity, upwelling impacts on herbivory, and potential consequences for kelp forests.

Effect of Photoperiod on Reproductive Development in *Strongylocentrotus purpuratus* for Improved Roe Enhancement
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Kelp forests generate an annual average of $500 billion dollars globally in ecosystem services. However, the increasing occurrence of sea urchin barrens, whereby sea urchins consume nearly all macroalgae in a location, and persist for decades, threatens these ecosystems and their services. While urchins are fished commercially for their roe, urchins from barrens are typically emaciated and hold no commercial value. Additionally, these urchins are frequently found to be spawning, which affects their gonadal quality. A solution to incentivize the removal of overpopulated urchins and restore kelp forests is to collect these urchins, enhance their roe quality using aquaculture and sell them commercially. However, to achieve suitable gonadal growth and quality, certain culture conditions need to be optimized. Photoperiod has been shown to influence urchin reproductive cycles, leading to unfavorable commercial traits for the roe. In this study, the effect of three different photoperiods (0 hours, 12 hours and 24 hours) on feed intake, gonadosomatic index, roe color, texture and firmness of *Strongylocentrotus purpuratus* collected from barrens in Monterey Bay were investigated. We expected the urchins exposed to the 24 hour photoperiod to have the most improvement across all measures. Sea urchins were cultured in replicated tanks for 10 weeks at three different photoperiods. A midpoint measurement was taken at week 5, where half of the specimens were dissected. The rest were examined at week 10. This study aims to optimize roe enhancement conditions for *S. purpuratus* from barrens to incentivize the removal of urchin barrens and restore kelp forests.

Behavioral Responses of a Marine Sponge to Water Flow

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Anthropogenic climate change is predicted to alter thermohaline circulation, with downstream effects on fauna and processes of marine ecosystems. Suspension feeders' habits are driven by water flow, so they rely on ocean currents for nutrition and respiration. Therefore, they are likely to be affected by changes to their flow environment. Sponges are suspension feeders that create habitat and cycle nutrients in benthic marine ecosystems. They can coordinate whole-body contractions either rhythmically or in response to environmental conditions, which can have downstream effects on their filter feeding activity, yet little is known about processes that affect sponge filtration behavior in relation to water movement. In this study I investigated the effect of flow direction on behavior of the marine demosponge *Tethya californiana*. Sponges (n=8) were exposed to five treatments: direct and indirect currents from two directions (top and side), and zero flow (still water). Preliminary observations and past literature suggest sponges contract in unfavorable flow conditions. Sponge body size was filmed under each flow treatment for one hour using GoPro time-lapse images taken every two minutes. Sponge body areas were measured using ImageJ and evaluated to determine contraction and expansion behaviors based on the different flow treatments. Preliminary results suggest individual sponges do respond to flow, either positively by expanding or negatively by contracting. Our results will help to understand how sponge ecosystem functions may change as currents and flow environments shift with our changing climate.

Temperature Impacts on the Abundance and Growth Rate of *Pseudo-Nitzschia* Species Local to Monterey Bay, California

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Harmful Algae Blooms (HABs) are a global issue that occur when toxic phytoplankton, like species in the pennate diatom genus *Pseudo-nitzschia* (*PN*), capitalize on favorable water conditions to form dense physical aggregations. Monterey Bay (MB), California has experienced severe HAB events in recent years in conjunction with nutrient-laden upwelled waters and warm sea surface temperature anomalies (SSTs). The most toxic HAB followed the 2015 Pacific "warm blob" anomaly that warmed MB above 15°C. Natural processes like recurring El Niño events and anthropogenic activities can contribute to similar warming, and some models predict a rise in global SSTs by 1-3°C. We seek to understand how the abundance of *PN* species local to MB respond to these forecasted temperature increases to better understand HAB threats. We predict that abundance and growth rates will increase with temperature, given *PN* species dominance during the MB 2015 bloom. This study employs a series of growth rate experiments on individual *PN* species at three temperatures (12°C, 15°C, and 20°C). Each day of the week-long experiment we measured species abundance from cell counts using a Sedgewick Rafter counting chamber. Preliminary results support the hypothesis that *PN* abundance and growth rates were lowest at 12°C. Ultimately, HABs threaten to cost coastal communities millions in fisheries closures and pose a growing hazard to human and marine health. We aim to improve HAB monitoring networks and models for coastal communities, like Monterey, by deepening our understanding of HAB interactions with warming SSTs.

LiDAR Estimates of Wave Reflection and Dissipation at the Steep Interface along Rocky Shores

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Most coastal shores around the world are considered rocky. The morphology of rocky shores is complex, featuring cliffs, boulder fields, and rock pools, which will dramatically influence the wave transformation compared to sandy beaches. Previous studies examining wave energy transformation at low-to-mild sloping sandy beaches found that wave reflection, which results in reduced wave energy dissipation, is positively related to beach slope. Given the steep, often vertical interfaces of rocky shores, empirical wave reflection relationships from sandy beaches suggest that rocky shores will reflect more energy and dissipate less than sandy beaches. However, the rough surface of the steep rocky shore interface may greatly enhance energy dissipation. To date, no direct estimates of wave energy dissipation at rocky shore interface have been completed due to logistical challenges. As such, this study seeks to determine how much energy is dissipated due to wave-driven runup at the steep rocky interface. To do so, the energy balance of incoming and outgoing waves is estimated with sea surface elevations obtained from a scanning, automotive LiDAR mounted on a stationary tripod. These measures provide time and space measures of the sea surface elevation near the shoreline to assess wave reflection and dissipation by separating incoming and outgoing waves. It is hypothesized that despite their steepness, rocky shorelines dissipate more energy than sandy beaches due to their rough surfaces. This research aims to improve our understanding of wave transformation, particularly at the interface of rough, rocky shores that support diverse and sensitive ecological habitats.

Development of Robust Software Aboard the Coastal Profiling Float

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In the development of systems such as the coastal profiling float it is crucial to develop a robust system that can compensate for changes that occur with technologies as well as the needs of the project. In software development there exists the need to adapt to rapid changes within the environment, hardware, and software. Designing a robust development process allows for these changes to occur. Techniques used in Software Engineering allow for development in hardware and software to be adaptive as various needs become apparent. Techniques proposed for this study include: Understand the Problem, Do Research, Design a Solution, and Test Code Thoroughly. In the context of the development of the Coastal Profiling Float it is appropriate to have a robust system that would account for changes during a long time span, since most oceanographic studies last several years. Additionally, a successful system will allow produced code to be understood not only by computer scientists and engineers, but scientists and researchers as well. This is best observed when a new feature needs to be implemented, such as in this case UART communication across Bluetooth and Iridium into the current costal profiling float design. Both software and hardware change constantly and through these developments there is a need to be able to integrate emerging technologies. With a proper methodology it is possible to pursue this in a seamless manner. Technology is sophisticated and it changes constantly. As development needs arise it is necessary to develop a robust and well tested method to integrate new technologies into current existing technologies.

Variation in Rockfish Reproductive Success in Relation to the El-Niño Southern Oscillation

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Rockfishes (*Sebastes spp.*) are a diverse group of viviparous fishes that exhibit distinct variation in habitat, life history traits, and reproductive phenology. Their populations are characterized by highly variable recruitment and reproductive success, leading to dynamic fluctuations. The reproductive success of a species is important for maintaining stable population sizes. Components of reproductive success include fecundity, egg size, and gonadosomatic Index (GSI), which may be influenced by feeding history and energy storage (measured as the hepatosomatic Index [HSI]). Reproductive success is influenced by many factors, including biological parameters and environmental conditions. Among those environmental conditions is the El-Niño Southern Oscillation (ENSO), which causes changes in surface water temperature and productivity across its cycle. The purpose of this study was to determine how rockfish reproductive success in central California may be affected by shifts from El Niño to ENSO-neutral phases of the cycle. We compared weight-specific fecundity, egg size, GSI, and HSI of three species: Gopher, Rosy, and Starry rockfish, between 2023, a year of El Niño conditions, and 2024, characterized by ENSO-neutral conditions. We hypothesize that all reproductive parameters measured will be lower in 2023 and higher in 2024. Preliminary results indicate significant variation in these reproductive parameters between the two years for the study species. This study could provide information for stock assessments and fishing regulations, as changing reproductive success across the ENSO cycle may have effects on rockfish population size and structure.

Analysis of the True Phylogenetic Relationship of the Aurora Rockfish (*Sebastes aurora*) Within the Genus *Sebastes*

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Understanding the familial relationships among marine species can be difficult, especially for deeper water species that may appear deceptively closely related due to convergently evolving advantageous traits. This difficulty is apparent in rockfishes, genus *Sebastes*. Because there's a disproportionate amount of studies favoring the economically valuable species of rockfish, some lesser-fished species, like the aurora rockfish (*Sebastes aurora*), are underrepresented in the literature. Various studies have placed this species in different subclades within the greater *Sebastes* phylogeny, and there is little to no information about their genetic structure across California. To resolve this, we will sample a large number of *S. aurora* as well as a diverse selection of representative rockfish species from several recognized sub-clades, looking at genetic and biogeographic data. We will use genetic data generated by RadSeq and Sanger sequencing (cytochrome b) to compare *S. aurora* with that of other rockfish species, and also examine genetic diversity within the species as well as potential genetic structure across a range of latitudes using Google Earth. Based on prior studies, we predict that the aurora rockfish will belong to the *Eosebastes* subgenus, and will be most closely related to the bronze spotted rockfish, hybridization with related species will be present, and there will be significant differentiation between those found in the north compared to those caught in the south. This study seeks to resolve the placement of this species in this hyperdiverse clade of fishes, and will potentially aid in understanding the drivers of diversification in the genus.

Emperor Penguin Dive Depths in Low Light Conditions

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Emperor Penguins (*Aptenodytes forsteri*) are the world's deepest diving penguins, yet little is known about their diving behaviors during the Antarctic winter in the Ross Sea, where the sun does not rise above the horizon for much of the winter. Emperor Penguins dive primarily during the day and twilight, sometimes to depths deeper than 400 meters, leading to the assumption they are visual hunters. Despite previous studies comprehending Emperor Penguin diving behaviors in periods of sunlight, data collected by Emperor Penguins foraging during the polar winter are scarce. We hypothesize that Emperor Penguins will have a higher dive rate and dive deeper during the limited daylight experienced in the polar winter. To examine the relationship between daylight and diving behavior, we obtained movement and diving behavior data during the post-egg-laying foraging trip from 3 penguins tagged with satellite-linked data loggers in 2023 after they completed their molt. Specifically, we examined 1) if there is a diel pattern present in the diving behavior of the Emperor Penguin during the low-light conditions of the Antarctic winter and 2) if there is a relationship present between solar altitude and dive behavior. Preliminary results show that the penguins perform the deepest dives at twilight and day, 400 meters deep. This study will provide information on post-egg-laying fast where body replenishment is vital, which can be further used to investigate the consequences of prey availability in a changing environment.

Citizen Science Contributions to Understanding ENSO Phases and Anthropogenic Drivers to Pinnipeds in the Monterey Bay Peninsula

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Citizen science can have large contributions to society, policies, and science in general. Alan Baldridge, a librarian and citizen scientist in the Monterey Bay Peninsula, conducted systematic observations of pinnipeds from Big Sur to Elkhorn Slough and many other areas in California from the 1960s-1990s. The abundance and species composition of pinniped communities can be influenced by prey dynamics, but it is unclear to what extent they adapt and are resilient to variabilities such as ENSO phases and competition with commercial fishing. This study will investigate how ENSO phases and patterns of forage fish landings correlate with the abundance and spatial distribution of pinnipeds around the Monterey Bay Peninsula. We hypothesize that the pinniped spatial distribution around the Peninsula will be influenced by the exposure to haul-out sites from ENSO phases, and both commercial fishing and ENSO phases influence forage fish, in turn affecting the abundance of pinnipeds and the species composition of pinniped communities. We will leverage unpublished historical data drawn from a series of 28 naturalist notebooks by former Hopkins Marine Station Librarian Alan Baldridge as the basis for the data on Harbor Seals and California Sea Lions throughout the study area. Correlating the two pinnipeds to prey landings will help assess the long-term demographic patterns. This study will cast light on the resilience and adaptive capacity of the pinniped population to ENSO phases and commercial fishing in the Peninsula. This study will highlight the importance of citizen scientists to local and broader impacts in the science community.

Feast-Fast Lifestyle: Physiological Effects of Flexibility in Daily Foraging Effort of Blue Whales (*Balaenoptera musculus*)

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Blue whales (*Balaenoptera musculus*), the largest animals on Earth, demonstrate variable daily feeding behaviors on foraging grounds, despite high caloric requirements of a large body size. The tradeoff between maximizing food intake and minimizing energetic costs associated with lunge feeding requires blue whales to optimize their feeding patterns on timescales relevant to prey availability. Understanding their behavioral plasticity—changes in blue whale foraging as a response to environmental changes—is crucial for evaluating the paradigm of Optimal Foraging Theory, which assumes efficient energetic use. This study investigated how extreme blue whale foraging flexibility (proxy for energy gain) affects respiration rate (proxy for measuring metabolic activity). From 2017 to 2023, 24 minimally invasive dart-attached tags were deployed on blue whales in the California Current ecosystem, yielding deployment durations from 1.541 to 18.330 days. We used depth and kinematic data from tags and custom MATLAB tools to identify all breaths and feeding lunges performed during each deployment. Using Rstudio, we assessed whether a relationship exists between feeding rate and breathing rate across relevant timescales (i.e. within feeding bouts, day/night) to understand how feeding rate modulation effects on energetic costs. These findings will enhance our understanding of blue whale metabolic flexibility, and inform conservation efforts,

related to their resilience to anthropogenic changes in the ocean. Medium-duration tags can be used to answer questions about feeding rate and breathing rate to understand how whales deal with conflicting energetic demands, indicating their resilience to increasingly unpredictable prey fields in a changing ocean.

ORAL PRESENTATIONS: SESSION 2

Long Term Monitoring on the Recovery of *Pisaster ochraceus* Post Sea Star Wasting Disease in Comparison to Less Susceptible Species

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In this study, we aim to understand the relationship between sea star abundance and habitat type within the Monterey Bay National Marine Sanctuary. It is expected that substrate determines the diversity in mobile species because sessile organisms- food sources for mobile species- require specific substrate types. Additionally, sea star wasting disease has heavily affected distribution patterns of *Pisaster ochraceus*, but minimally affects *Patiria miniata*. This study aims to understand factors driving sea star distribution and subsequently how different habitats may be more conducive to a population's recovery from sea star wasting disease. Capturing differences and similarities between the species distribution patterns will help us determine *P. orchraceus* and *P. miniata* relationships, and how this may affect recovery in *P. ochraceus*. Surveys have been conducted from winter to summer the last three years quantifying food availability, substrate type, and population density of sessile and mobile organisms. Analysis will include several statistical significance tests and threshold testing. This study will help scientists and ecologists understand the rate of recovery and the dynamics of *Pisaster ochraceus* and *Patiria miniata*.

Building a Large Scale Food Quality Index (FQI) of Monterey Bay

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Fish are a crucial food source across the globe, yet using a bottom up approach to estimate fish stocks from phytoplankton abundance is challenging. Phytoplankton are the primary food source for grazers which include many fish and zooplankton species. The food web is dependent on these primary producers. Phytoplankton are an important carbon sink and are crucial for understanding the carbon cycle. Utilizing remote sensing to gain insight about phytoplankton productivity is the first step in understanding large scale ecology and biogeochemical cycling. The objective of this study is to use remote sensing observations to quantify phytoplankton community composition and a trophic model, the Food Quality Index (FQI), to estimate the nutritional quality of the phytoplankton pool to grazers. Each taxon fixes carbon and stores energy differently and phytoplankton taxa must be accounted for in these ecosystem models. A food quality index is built based on literature and gains insight to the amount of energy the phytoplankton are providing in the bay. Understanding the amount of energy available for consumption allows predictions and models to be built for different food webs. Future studies may use this phytoplankton FQI to understand changes in fisheries and bottom up ecology.

Effects of Varying Temperatures on Regeneration of the Solitary Ascidian Species, *Ciona intestinalis*

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Tunicates are one of the more unique organisms within the Animalia kingdom. Mainly that despite being an invertebrate species, certain synapomorphies such as a present notochord in their larval stage classify them under the phylum Chordata, the same phylum that vertebrates fall under. Our observed tunicate species, *Ciona intestinalis*, is an ascidian that exhibits an efficient regenerative cycle, reforming anterior organs such as the oral/atrial siphon and neural complex after about 4-5 days. The purpose of this study is to observe what temperatures influence the regenerative cycle of *Ciona intestinalis* after an experimental amputation of the upper body of the animal. With recent changes in ocean temperature due to influxes of greenhouse gasses and carbon dioxide, as well as El Nino/ENSO events, many marine populations have experienced a mass decrease. In regeneration, there are multiple different ways temperature influences the rate or results of wound healing and regeneration. In some cases, warmer temperatures can increase the rate of cell proliferation, colder temperatures slow the rate down, and in both cases can lead to shock within the organism, or can even denature the cells involved in regeneration. Tissue regeneration will be documented in 3 treatments at varying temperatures, one 'bath' will be placed in $20℃$ as our control, and our two experimental groups will be baths placed at $14℃$ and $27℃$. After amputations we will then observe the animals under microscope and take images to monitor the rate of regeneration, as well as conduct an Edu protocol to observe what cells are proliferating at different temperatures. The findings from this experiment will hopefully warrant further research into temperature influences on other marine invertebrate species, as well as provide a better understanding of how regeneration is influenced by temperature.

Hungry Hungry Pycnos: Understanding Juvenile Diet Preferences and Diet-Specific Growth and Mortality in the Endangered Sunflower Sea Star

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The Sunflower Sea Star, *Pycnopodia helianthoides*, is a keystone mesopredator along the eastern Pacific coast. Populations have decreased by about 90% due to sea star wasting disease (SSWD), necessitating research on effective husbandry practices to culture *P. helianthoides* from fertilized eggs to mature adults. There is a surprising dearth of knowledge regarding their natural feeding history, despite the significant downstream ecological consequences of their disappearance. Understanding their biology and ecology is crucial for developing successful restoration strategies. This research focuses on the juvenile phase of *P. helianthoides*, investigating their feeding habits and preferences. With this research, we aim to understand 1) the diet preferences of juveniles by analyzing their behavior in the laboratory, and 2) how their growth and survival are affected by different diets. To study diet preferences, we analyzed the interaction of 10 juveniles with each food option in the laboratory with different food options using replicated time-lapse videos. The food options included husbandry observed options like coralline algae (rhodoliths), damaged sea urchins, damaged abalone, and *Ulva* (green algae). Preliminary observations suggest a preference for coralline algae. To study growth differences based on the same food options, we will rear 90 juveniles for 10 weeks on different diet items, and their growth and mortality will be compared. Insights gained from these experiments will contribute to recovery and restoration projects and provide a broader understanding of *P. helianthoides* biology and ecology.

Social Association Analysis of Icelandic Killer Whale Population During Feeding Events as an Indicator of Social Network

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This study investigates the frequency of social interactions between individual Icelandic killer whales (*Orcinus orca*) during feeding events for the field season of 2022 off the Southern coast of Iceland. Icelandic killer whales have notably smaller pod sizes and have shown flexibility in social structure and cooperative feeding behaviors between pods, in comparison to most other well-studied killer whale populations. Using a combination of land-based location tracking, photo identification, and on-water behavioral observation, we aim to track the social network of individual killer whales via recording each contact between individuals and determine which individuals and pods show repetitive association during feeding events. Photo identification allows for the comparison of images taken on the water to known killer whales in a compiled catalog. Having a holistic understanding of these social interactions is crucial for conservation efforts of killer whales and ecosystem management of the Vestmannaeyjar archipelago, as it can help indicate vulnerabilities of the population, in turn mitigating negative impacts throughout the trophic cascade.

Comparing Feeding Frequencies of California Condor Parents to Nesting Site Distance

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California condors (*Gymnogyps californianus*) narrowly escaped extinction in the 1980s through continued heavy monitoring practices, including feeding and nesting activity. We are interested in the feeding frequencies of *G. californianus* mating pairs in relation to nest distance. Though studies have been conducted on the health of *G. californianus* eggs in relation to chick survivability (Harvey et al., 2004), the average frequency at which the parents feed chicks has not yet been examined. Furthermore, the previous study was from 20 years ago and consisted of mainly captive condor eggs. We wish to pursue a narrowed, current study focused on the Central California *G. californianus* wild flock. We hypothesize that there is a correlational relationship between nest distance and frequency of parents at the feed site. This is tested by analyzing trail camera footage at a condor feeding site, collected over one month. The feed site attracts large numbers of *G. californianus*, with 2-6 proffered carcasses placed every two weeks. Two motion-sensor cameras are focused on the carrion- one by picture stills and one by video. The footage from these cameras is logged to count the appearances of individuals within mating pairs, organized by time of day. The data will be analyzed and visualized in RStudio to compare feeding frequency and nest distance. The results of this study will likely predict the success rate of future mating pairs, as well as the activity of mating pairs at the feed site. Further understanding of *G. californianus* parenting allows for more informed monitoring.

Modeling TSC Dependent LAM Using Drosophila Muscle Precursors

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Tuberous sclerosis complex (TSC) and lymphangioleiomyomatosis (LAM) are severe diseases caused by abnormal cell growth. While TSC affects multiple organs, LAM primarily targets the lungs and kidneys in young women. LAM and TSC both result in overgrowth of smooth muscle cells. Both diseases are linked to mutations in the TSC1 and TSC2 genes, first discovered in drosophila. Muscle precursor cells that form in the gut (CVM cells) have the same smooth muscle phenotype as TSC and LAM. Our preliminary research shows expression of dominant negative version of gigas specifically in CVM cells results in apparent cell migration defects. We speculate TSC1 and gigas help regulate the collective migration of drosophila muscle precursor cells. Our methods include a combination of immunohistochemistry, immunofluorescence staining, and both light and confocal microscopy to assess cell migration, as well as hybridization chain reaction (HCR) assays to determine the expression patterns of the TSC1 and TSC2 genes during Drosophila embryogenesis, for which little to no evidence exists. Ultimately, we hope to establish the CVM as a genetically tractable model for TSC, TSC-related LAM, and sporadic LAM. The broader impacts of this research can improve the understanding of the development of TSC and LAM disorders and the pattern of gene expression of TSC 1 and TSC2 genes could improve diagnosis.

Mitochondrial Function Alteration Results in Age-Related Changes in Regenerative Capacity of Megakaryocyte Progenitor Cells

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Hematopoietic stem cells (HSCs) play a significant role in the continuous supply of blood cells throughout the lifespan. Originating from HSCs, various progenitor cells, including megakaryocyte progenitors (MkPs), ultimately produce platelets responsible for blood clotting in response to vascular damage. As we age, cellular functionalities between HSCs and MkPs differ from one another. Our lab has recently reported that old MkPs have higher regeneration potential than young MkPs upon bone marrow transplant. Surprisingly, for HSCs, the trend is the opposite. Aging is associated with mitochondrial dysfunction - energy production reduces, reactive oxygen species (ROS) increases, and many more. However, the effect of mitochondrial dynamics on MkPs and HSCs upon aging has yet to be confirmed. Thus, we hypothesize that the changes in mitochondrial functionality lead to changes in cellular functionality between HSCs and MkPs upon aging. Our preliminary data suggested that mitochondrial membrane potential (MMP) decreases and ROS levels increase in HCSs upon aging. For MkPs, it is the opposite, supporting our hypothesis that upon aging, mitochondrial functions are regulated differently in HSCs and MkPs. To ensure that mitochondrial dynamics might be the reason for increased cellular functionality of MkPs upon aging, alteration of mitochondrial dynamics in young mice might lead to increments of regenerative potential compared to older populations. Understanding age-related mitochondrial regulation during platelet generation might lead to the development of pharmacological interventions to prevent thrombotic hematopoietic disorder.

Curated Dataset for Benchmarking of RNA Base-Pairing Annotations Tools

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Non-coding RNAs are functional RNA molecules that don't translate into protein but play vital roles in cellular processes. Base pairs in non-coding RNA are key determinants in forming secondary and tertiary structures. Accurate base pairing annotations, referring to the correct identification of hydrogen bonds between bases, are essential for understanding RNA's roles in biomolecular interactions. Incorrect or missing annotations can lead to structural misinterpretations, functional discrepancies, and misleading experimental designs, thereby impacting drug design and genetic research. We examine computational tools such as MCAnnotate, RNAView, ClaRNA, FR3D, and DSSR, which identify base pairs but vary in reliability. IWe performed a data analysis to compare and analyze the base pairing annotations from various tools which revealed significant discrepancies in the tool annotation reported. Drawing conclusion from our analysis, we propose the development of a curated benchmark dataset using known conserved structural motifs. Conserved structural motifs show high accuracy in prediction of the base pairing, hence our dataset can provide a reliable reference for evaluating current annotation tools, crucial for improving their reliability and accuracy. This advancement is vital for molecular biology and bioinformatics, where precise RNA structure characterization enhances computational annotation tools and machine learning models, ultimately leading to more accurate RNA research and applications.

A Proposed Demonstration of the Creation and Utilization of Embedded Inconsistency Scales to Screen for Poor Online Self-Report Psychological Data

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The recent boom of online studies that use self-report psychological questionnaires has revealed the need for a robust mechanism that detects and excludes poor data from datasets through the use of embedded inconsistency scales. Much traditional psychological research that depends on self-reported data screens for inconsistent responding using well-validated inconsistency indicators (Ben-Porath, 2012). Such well-validated options are often lengthy, expensive, and proprietary, preventing researchers from using them to screen invalid data from their datasets (Burchett, Sellbom, & Bagby, 2023). Borrowing the approach used to create existing inconsistency measures, we aim to demonstrate the feasibility of creating an ad hoc inconsistency scale from self-report psychopathology data that has no such scale, and then demonstrate improved psychometric properties once individuals with elevated scores are excluded from the dataset. We anticipate that the new scale will align with the existing Minnesota Multiphasic Personality Inventory-2 Restructured Form (MMPI-2-RF) Variable Response Inconsistency (VRIN) scale's ability to detect inconsistent responders. Additionally, we anticipate that removing higher scorers on this scale will strengthen correlations between self-reported and informant-reported psychological data. This research proposal underscores the importance of teaching researchers how to create robust inconsistency scales ad hoc, using related item pairs from their planned measures, without the need to incorporate additional lengthy scales. We anticipate that the ability to use a standardized procedure to identify and eliminate inconsistent responses will have significant implications for scholars relying on self-report data.

ORAL PRESENTATIONS: SESSION 3

Exploring the Role Cut Scores Play in the Assessment of Invalid Responding

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Clinical psychological assessment in forensic contexts is conducted via a variety of methods, with the intent to make clinical interpretations regarding legal matters (e.g., risk assessment, competency to stand trial. Overreporting, the act of intentionally or unintentionally exaggerating symptoms, poses a threat to the accuracy of self-report assessment tools. For this reason, many stand-alone overreporting tools have been developed (e.g., Miller Forensic Assessment of Symptoms Test) and many omnibus psychological tests (e.g., Minnesota Multiphasic Personality Inventory–3) have validity scales embedded within to detect overreporting. Cutoff scores are commonly used to determine whether an individual has met a threshold that may indicate that they are overreporting. The ability of an overreporting measure to accurately identify overreporters can be influenced by the cutoff score used or domain of symptoms being overreported, ultimately hindering the generalizability of these measures (Burchett & Ben-Porath, 2019). An innovative approach to this concern is designing studies that consider standardized cutoff scores as well as alternative cutoff scores.The current study will use data from a larger ongoing study where participants are instructed to overreport on a series of overreporting measures in order to compare the percentage of accurately identified participants across measures and at varying cut scores. These findings will contribute to the limited research on the multimethod assessment of invalid responding (Burchett & Bagby, 2014).

What do CSUMB Psychology Alumni Have to Say to Current Undergrads? Take a Piece of Advice From a Former Otter

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After graduation, college alumni may reflect on how they could have approached the challenges they faced while attending college (Strapp, et al., 2023). Our study is an exploratory investigation into the themes of alumni's advice to current undergraduates. Further, we tested whether first-generation alumni gave different kinds of advice than continuing-generation alumni. Fifty-one alumni took part in semi-structured Zoom interviews with current students to talk about their experiences before, during, and after college. We focused on responses to the question, "What is one piece of advice you would give to students who are nearing graduation in psychology at CSUMB?". The 51 alumni gave a total of 70 pieces of advice. Using a bottom-up coding strategy, we identified two broad categories of advice: social-emotional (37%) and professional-academic (63%). For each broad category, we identified three subthemes. In the social-emotional category, the subthemes were: "don't be afraid" (58%), "personal development" (23%), and "self care" (19%). In the professional-academic category the subthemes were: "plan for the future" (57%), "utilize resources" (27%), and "well-rounded academics" (16%). After statistical analysis, it was found that the first-generation alumni did not significantly differ from the continuing-generation alumni in the frequency of different types of advice. Future studies should investigate first-generation and continuing generation students' overall well-being in university environments. In addition, studies should examine alumni advice

across disciplines and whether current undergraduate students find the advice that alumni give relevant to their own college experience.

Analyzing Facial Prominence and Gaze in Portrayal of University Neuroscience Researchers: Gendered Stereotypes

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Facial prominence defines how much of a person's face, relative to their body, is depicted in a photograph. Several studies have shown that men tend to be portrayed with more focus on their face, while women are represented with focus on both their face and their body. This phenomenon is called "Face-ism." Archer et al. (1983) were the first to conduct research regarding this topic. Higher facial prominence has been shown to be associated with higher judgments of power, confidence, and dominance. The cause for face-ism could be in alignment with gendered stereotypes: women being objectified for their bodies and men holding more power. A previous study showed women are more likely to show more of their bodies to be perceived as more likable (Sczensy & Kaufmann, 2018). Gender stereotypes are prominent in the workplace, especially in majority-male fields, like scientific careers. The aim of this study is to examine facial prominence patterns among neuroscience faculty at the campuses of the University of California system. Here, we will present results from examining both professional and personal images. This analysis aims to identify connections between gender and facial prominence. For each image, we assessed face length, body length, gaze style, and gender. We hypothesize that men will have higher facial prominence than women in both professional and personal images. We also discuss our plans to further this research using eye-movement tracking technology to understand the real-time dynamics of how viewers experience photos of people being presented with varying degrees of facial prominence.

Unveiling the Connection Between Parents' Education and Psychology Alumni Choice of Higher Education or Workforce

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Psychology being one of the popular majors in universities, it can qualify a person for many jobs but does not uniquely guarantee them any particular job (Landrum, 2018; U.S. Department of Education, 2016). This broad array of choices can lead to difficulty in career decision-making (Strapp et al., 2018). College students may turn to parents for help in this decision. First-generation and continuing-generation college students' parents' educational attainment could potentially be a factor in whether a new college graduate pursues graduate school or the workforce after graduation. In this study, we examined the relationship between parents' educational attainment and psychology alumni's decision to pursue higher education or the workforce after their graduation. Fifty-six psychology alumni from a small state university participated in a semi-structured interview via Zoom. The alumni were questioned about their time before, during, and after their time at the university as well as their parents' highest education level. A 2 (Parents' Education: less than a B.A., B.A. or higher) x 3 (Alumni's Path: grad school, workforce, workforce then grad school) Fisher's Exact test revealed no difference in alumni path by mother's education, $X2 = 0.722$, $p = 0.697$, nor by father's education level, $X2 = 1.728$, $p = 0.422$. These results suggest that parents' education may not influence alumni's paths after they earn their B.A. in psychology. Future work should examine other factors that may impact first-generation psychology alumni's path after graduation, such as sibling effects and the presence of mentors.

The Impact of Bilingualism on False Memory and Source Memory

Sara Jew[1], **Yeritzi Victoria**[1], **Dolores Marquez**[1], **Laura Flores**[1], Alex Cantrell[1], Reina Yorba-Rico[1], Edward Nelson[1], Harmony Perna[1], Dasai Hernandez Loyola[1], Samantha Ulloa[1], Renee M. Penalver, Ph.D.[1], Rogers Walker, Ed.D.[2], and Psychology 355/Bilingual Cognition (Fall 2023)[1]
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This study aims to investigate how language and memory are organized in the minds of bilinguals. False memory is memory for an event that did not actually occur (Deese, 1959). The Deese-Roediger and McDermott (DRM model) false memory paradigm is the leading model of false memory. Source memory is memory for the context in which a particular target item is learned (Parker, 1995). The source-monitoring framework is the leading model of source memory (Johnson, Hashtroudi, & Lindsay, 1993). Source memory and false memory are related systems; that is, confusion between sources of information (e.g., source misattribution) may lead to false memories. Source memory and false memory were examined in bilingual (e.g., Spanish-English bilinguals) and English monolingual language groups. The experiment investigates how language group status (e.g., bilingual or monolingual) affects false recognition and source recognition. The study presented bilingual and monolingual participants with a list of words from the DRM model during the encoding phase. Additionally, we asked bilingual participants to discriminate between two external sources (i.e., Spanish word presentation/English word presentation) in a source memory task. Bilinguals are worse at discriminating between real and fake events than monolinguals. Bilinguals are better at discriminating between L2 than L1 sources. The findings will be discussed using models of long-term memory and models of bilingual memory.

Representation in Literature: How Children's Book Choices Reflect in Their Social Attitudes

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Existing literature shows that diverse representation in children's books have helped children develop an understanding of social concepts such as discrimination, self-image, and cultural awareness (Colby & Lyon, 2004; Koss, 2015; Taylor, 2003). Prior work in our lab has shown that children who reported reading more diverse books were more likely to attribute social issues, like racial inequality, to structural factors in society (such as access to good education) (Kneeskern, Park, & Heck, 2024). However, it is possible that the books children reported were influenced by their parents rather than their own choices. It has not been fully researched whether children prioritize diverse protagonists in their own book choices and how children's book choices relate to their attitudes. It also remains unclear if children prefer protagonists that do or do not resemble them. In this study, we aim to use novel book stimuli to examine the racial diversity of protagonists children self-select to read about when given the option between four different racial groups, and test how these choices link to their racial attitudes. To assess this, we designed stimuli consisting of twelve novel books counterbalanced for four racial and two gender groups. We hypothesized that children who 1) choose more books with characters that do not look like them, and 2) choose books with more racial minority characters, will have more structural views of inequality and greater recognition of racial discrimination than children who choose characters who look like them or are White.

The Activists' Choice: Ballot Initiatives as a Step Towards Pro-Choice Efforts

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Following the overturn of Roe V. Wade, many U.S. state legislatures failed to implement abortion rights that satisfy the general population. When laws are not implemented that the public approves of, most states allow citizens and activists the right to pursue a ballot initiative. With enough voter signatures, these ballots can turn into new laws. However, with ballot initiatives being a multi-step, lengthy process, what ultimately pushes activists to pursue this path? Our research analyzes this novel intersection of political science and sociology fields to contribute to the current lack of literature on activists' decisions to pursue ballot measures for abortion rights. Our methodology consists of content analysis of local and national news sources to understand recent abortion ballot initiative processes in Colorado and Ohio. Thus far, our analysis shows ballot initiatives are used to educate voters, achieve quick change, promote public involvement, and close the gap between the public and politicians when politicians fail and negatively affect local communities. Activists consider various factors before pursuing ballot measures, such as time, current political economy in each community, and legal challenges and qualifications in each state. We hope our multidirectional research can influence important change by understanding the activist rationale and informing strategic and effective ballot measure processes.

Sisterhood Across Oceans

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This article discusses how Black women in Africa and the African diaspora have deployed music to struggle for liberation and women's rights. Music has played a fundamental role in the African and African diaspora experience, deployed in various spheres of society, particularly as shaped by the history of slavery, colonialism, and apartheid. In Africa, music has been deployed in daily life, including in religious, cultural, economic, and political activities. In the African diaspora, such as in Jamaica's Rastafarian culture, music has been used to express deliverance and social inequities. Also, in the United States, in the Black Church, music has been used for deliverance from slavery and as a form of cathartic release. In addition, music in Africa and the African diaspora has addressed social justice issues. Such is the example of Billie Holiday, Miriam Makeba, and Rita Marley who have used music as a vehicle of Black liberation and reclamation of women's rights. Holiday, in the struggle for civil rights, used music to speak out about lynching in the United States. Makeba used her music as a means to call out the horrors of apartheid in South Africa. Marley, alongside her husband the late Bob Marley, sung reggae to advance the ideals of Jamaica's independence as well as call out social inequities. While separated by geography and cultural differences, these Black women have come together through music to liberate Black humanity from the legacies and practices of colonialism, slavery, and apartheid, pushing humanity and humanism to be more inclusive.

Deliberately Unplanned! Exploring the Impact of Unplanned Events on Career Trajectories in Psychology Alumni

Milo Ramos, **Jhoana Morales-Lopez**, Maria Fernanda Corral Cervantes, Sofia Campos, & Jennifer Dyer-Seymour, Ph.D.
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One unexpected conversation, experience, or person can change an entire life trajectory. In this study, we compared the chance events commonly reported by first and continuing-generation psychology alumni to have influenced their career trajectories. Fifty-seven alumni participated in semi-structured Zoom interviews regarding their experiences before, during, and after attending college. Here,

we focused on responses to the question, "Tell me about any unplanned events that had a significant influence on your career decision-making." We used Bright et al.'s (2005) eight categories of unplanned events and added one, "Covid," for a total of nine categories. Results revealed that 8% of the sample reported encountering no unplanned events that influenced their career decision-making. Of the other 92%, most frequently reported was unintended exposure to activities that either turned out to be something the alum enjoyed (21.6%) or did not enjoy (19.6%). Four of Bright et al.'s categories had no relevance to our sample. A Chi-square analysis revealed no differences in college generation status. Results suggest that unexpected events influence the majority (92%) of students' career trajectories, regardless of generation or where they are in life. It is quite uncommon to have a career path with no interruptions, so how can institutions support students who are going through these unplanned events? Current students might want to expose themselves to a wide variety of experiences, but it is also important to have the right coping skills when navigating change. Higher institutions should look at more resources for current students.

How Does Auditor Tenure Affect Cybersecurity Risk?
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We propose to study the association between cybersecurity risk and auditor tenure. Cyber attacks in the recent two decades have cost businesses and governments millions of dollars, and the threats to personal wealth and information integrity continue to grow. Auditors, who are experts in accounting information systems, are asked to take additional responsibility for safeguarding cybersecurity. As a client hires auditors, conflict of interest inevitably exists, and auditor tenure becomes the center of the debate: whether the auditor's superior client-specific knowledge overcomes the lack of independence stemming from long auditor tenure and enhances the audit quality. The literature does not agree on the effect of auditor tenure on audit quality, and we fill the gap by examining the relationship between auditor tenure and one element critically related to audit quality: cybersecurity. Using data breach incidents between 2005 and 2018, our preliminary results indicate that longer auditor tenure is associated with more frequent data breaches. We plan to expand the sample period to more recent years and continue to explore the reasons behind the associations we find. Our empirical evidence of the association between cybersecurity risk and auditor tenure will contribute to the policy debate on mandating auditor rotation and auditor reports on clients' cybersecurity.

POSTER PRESENTATIONS

RONALD E. McNAIR POST-BACCALAUREATE ACHIEVEMENT SCHOLARS PROGRAM

1. **Effects of Country of Origin within an Ethnic Enclaves on Mental Health Service Use and Preferred Methods of Help-Seeking among Latinx Immigrants in the Midwest**

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Latinx immigrants exhibit lower rates of mental health service utilization with myriad barriers (Derr, 2016). Living in an ethnic enclave corresponding to their country of origin may increase access (Aguilera & López, 2008). However, when formal services are inaccessible or culturally incongruent, immigrants may turn to alternative or informal resources (Ransford et al., 2010). The current study will examine mental health service utilization and preferred methods of help-seeking across Latinx immigrants. Specifically, we will examine utilization and preferences among Latinx immigrants in a small midwestern town (pop. < 50k) with an approximately 30-year history of Mexican migration and a recent history of Cuban migration. Part of a larger study, participants completed questionnaires on immigration experience and mental health help-seeking. Mental health service utilization was assessed with yes/no items, and help-seeking preferences were assessed using open-ended questions. Participants were 167 adult immigrants, with 35% from Mexico (n = 58), 28% from Cuba (n = 47), and 13% from Guatemala (n = 22). Formal services were the most frequently preferred help-seeking resource across all participants (n = 104, 62.3%). Family members were the next most frequently cited resource (n = 7, 4.2%). Additional coding is being completed, and further analyses across country of origin will be conducted. These analyses are anticipated to suggest that Mexican immigrants report using mental health services at higher rates than Cuban immigrants. The anticipated findings aim to further inform of existing strategies for enhancing mental health resources among immigrant populations.

2. **La Niña Vs. El Niño: How Hypoxic Events Affect the Reproductive Output of Gopher Rockfish (*Sebastes carnatus*)**

Sofia Barajas[1], Samuel Perrello[2] B.S., Cheryl A. Logan, Ph.D[1,2], & Scott L. Hamilton, Ph.D[2]
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In the California Current Ecosystem (CCE), deep water upwelling creates zones of oxygen-depleted water, known as hypoxic zones. In addition, carbon dioxide (CO_2) saturation has increased substantially, leading to ocean acidification. The combined stressors of low oxygen and high CO_2 have been shown to alter fish maturation and reproductive output. During El Niño events, warmer water and a relaxation from upwelling occurs in the CCE. In this study, we examined the effect of ENSO cycles on Gopher rockfish (*Sebastes carnatus*) reproduction. Rockfish have large brood densities that increase exponentially with age. We predicted that older fish will have greater fecundity and resilience to low oxygen conditions. Larger female fish typically have more stored energy and have far greater reproductive outputs than smaller females, leading us to expect these larger females to be more resilient to changing ocean conditions. To analyze differences within an ENSO cycle, we sampled gopher rockfish from 2023 (La Niña) and 2024 (El Niño), and measured fecundity and developmental stage. We then analyzed fecundity? by year while controlling for size, age, and oceanographic conditions across specimens. Older, larger rockfish gave birth to substantially larger broods across years while individuals caught within the El Niño year produced smaller broods relative to their size and age. If hypoxic waters considerably increase, this could substantially decrease the sustainable yield of rockfish in the future. Yearly revisions are being made constantly to try to sustainably fish rockfish species, and quantifying these environmental conditions is vital for informing future policy making.

3. **Differences in Facial Prominence of Women and Men on the Covers of Popular Mexican Magazines**

Nancy Espitia & Justin L. Matthews, Ph.D.
Department of Psychology, California State University, Monterey Bay, Seaside, CA

Previous studies show that when portrayed in media, women are more likely to have less facial prominence than men, which suggests a bigger issue of gender discrimination, stereotypes, and assigned values. This study aims to connect the topic of face-ism to social issues like machismo and femicide, which are relevant to Mexican culture. We will test our hypothesis by assessing several popular Mexican print magazines. After selecting a timeframe of magazines, we will measure face and body length, which will allow us to calculate a face-to-body ratio for each person depicted and examine any reliable patterns in facial prominence between the men and women depicted. The goal is to better understand the biases and values we assign to others, using popular print media as a proxy. Previous research has shown a connection between facial prominence in photographs and characteristics we associate with the people being portrayed. High facial prominence has been associated with higher judgments of positive traits like dominance, while low facial prominence has been associated with negative traits like weakness. Previous work suggests that traits regarding mental capabilities are assigned to men, who are more likely to be portrayed with high facial prominence, while traits related to emotional capabilities and

physical qualities are assigned to women, who are more likely to have relatively low facial prominence. This study will address the differences between the portrayal of men and women on Mexican magazine covers to fill the gap regarding facial prominence and social values in other countries and cultures.

4. **Memory Recall and Recognition between First-Generation Students and Non-First-Generation Students**
Ramona A. Jalomo & Jill Yamashita, Ph.D.
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Previous research suggests that first-generation students exhibited different memory recall levels in certain academic areas. First-generation students have parent(s) who did not complete a university degree and non-first-generation students whose parent(s) did complete a university degree. This study investigates whether first-generation college students demonstrate different memory recall than non-first-generation students. In the first part, the participants will study a list of 25 unrelated words, each displayed for three seconds. After studying the word list, they will be given an immediate recall test to measure short-term memory. In the second part, a distraction task lasting up to 5 minutes will be given, so that participants cannot rehearse the words. The third part of the test will involve another memory recall task. The participants will then be presented the original 25-word list, with the addition of 25 new words, each will also be displayed for 3 seconds. Participants will identify which words were previously presented and which were not. The recognition test will measure long-term memory. After the data was collected, we will test to see if first-generation college students differ from non-first-generation college student's memory abilities. I predict that there will be a difference between the study populations, and first-generation students will have a higher percentage of memory abilities.

5. **The Effects of Ocean Acidification and Hypoxia on the Ventilation Rate of Female Gopher Rockfish (*Sebastes carnatus*)**
Jasmin Juarez-Gonzalez[1], Dylan Sarish[2], Cheryl Logan, Ph.D.[1], & Scott Hamilton, Ph.D.[2]
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Climate change has been reported to exacerbate ocean acidification and hypoxia (OAH) in many marine ecosystems. Highly productive upwelling regions are particularly susceptible to alterations in water chemistry due to their naturally acidic and hypoxic conditions, which periodically expose nearshore organisms to potentially stressful environments. Projections indicate that temperatures will rise, while dissolved oxygen and pH levels will continue to decline. This trend may pose significant challenges for marine species that lack the capacity for rapid adaptation to these stressors. We investigated the effects of ocean acidification and hypoxia on the ventilation rate of nearshore female gopher rockfish (*Sebastes carnatus*) by acclimating one group of female rockfish to ambient ocean conditions and another group to hypoxic and acidic conditions. Subsequently, we stimulated them to reach their maximum metabolic rate and videotaped their opercular compressions for five minutes. Video analyses will be conducted to quantify their average gill beats per minute (gbpm), enabling comparisons between individuals exposed to ambient conditions and those subjected to projected ocean conditions. We expect female rockfish exposed to hypoxic and low pH to exhibit an elevated average gbpm in response to decreased oxygen availability. Further statistical analysis will be made to explore the effects of OAH conditions on this nearshore species and their ability to adapt. This research aims to provide insights into future biodiversity patterns in nearshore environments, contingent on species' adaptive responses to evolving oceanic conditions.

6. **Degrees in Random Triangulations**
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We study the triangulations of a set of points in the plane. In particular, we derive bounds for the expected vertex degrees in such a random triangulation. Triangulations are mathematical objects that model a variety of phenomena, with applications in mathematics, computer science, and other disciplines. Briefly, a triangulation is a graph whose vertices are the points, the edges are non-intersecting line segments, and all bounded faces are triangles. Random Graph Theory is an active and highly successful research area, leading to breakthroughs in other subfields, efficient algorithms, and more. Unfortunately, the traditional tools of this research area do not work when studying a random geometric object, such as a triangulation. For that reason, not much is known about random triangulations. We derive new bounds for the expected degrees in a random triangulation. There are different reasons to study the expected vertex degrees of a random triangulation. From a theoretical perspective, we study the nature of a random geometric object (or of a random non-crossing object). At the same time, such results also have concrete applications. For example, the expected number of vertices of degree three implies a lower bound on the number of distinct triangulations every point set must have.

7. **Hidden Meanings: The Palestine Exception**

Moncerat Carpio Navarro, **Mikayla M. Castillo**, **Jhoana Morales-Lopez**, & Christine E. Rosales, Ph.D.
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Institutions of higher education are lauded as spaces where college students can acquire critical thinking skills and become advocates for a more socially just future. Yet, that is not the experience of many college students who feel silenced when it comes to the topic of Palestine. Few studies have touched on the role of the university in (mis) educating students on the experiences of Palestinians via their explicit and implicit educational rhetoric (Alexander et al., 2014). For example, official communications may rely on neutral language that position the experiences of Palestinians and Israelis as equivalent. With consistent violence and new garnered media attention spotlighting the Israeli occupation, activism and solidarity with Palestine has increased in institutions of higher education (Hill et al. 2018; Sirri, 2016), including here at CSUMB. In this study, we examine educational rhetoric at CSUMB via the response of administration to zionist concerns of antisemitism on campus following the ongoing Nakba that led to nationwide student uprisings in support of Palestine. We collected official emails and statements sent by administrators on the topic of Palestine. For the purposes of this poster, we share our first steps in developing a codebook and Listening Guide questions to analyze emails from administration. Future work looks to fully examine the Palestinian struggle at CSUMB by analyzing more material such as local news sources and interviews with student activists.

8. **Harmful Algal Blooms and Runoff in Coastal Harbors**

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Harmful algal blooms (HABs) are caused by excess nutrients in the water column, which are often caused by runoff from local coastal watersheds. In the Southern California Bight watershed basin, this runoff contains potential pollution from over 13 million people and industries associated with these neighborhoods. Nutrients can come from manufacturing, agriculture, and even residential gardening and sewage. As we've been having more precipitation events in California over the last few years, our runoff has been greater in volume but also greater in potential nutrient pollution. In this research, we will routinely sample a transect throughout Long Beach Harbor using available docks and piers to generate a baseline for the plankton community in a non-rainy season. This transect will go from the mouth of the LA river to the exit for the harbor so we can characterize the plankton community as a function of distance from the port. The understanding is that the LA and San Gabriel Rivers will deposit abundance of nutrients to the ocean, out through Long Beach Harbor. Then to measure the nutrient abundance there would be water chemistry protocols to measure ammonia. This will allow us to also measure the correlation of ammonia concentrations to the biodiversity of the phytoplankton.

9. **The Impact of Social Interaction on Communities of Color Experiencing Cognitive Decline**

Reina Yorba-Rico[1], Edward Nelson[1], Harmony Perna, B.A.[1],Grace Garcia, B.A.[1], Laura Flores[1], Yeritzi Victoria[1], **Sara Jew[1]**, Serena Ross, B.A.[1], Thuytien Nguyen, B.A.[1], Richard Esqueda, B.A.[2], & Renee Penalver, Ph.D.[1]
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Our society's demographics have changed drastically over the last 50 years; our aging population (e.g., 65+) continues to grow at rates that have never occurred before. Indeed, there is a projected increase in our aging population by 2050 (Census, 2020). That is an exponential increase totaling 98 million older adults, double the current estimate. As a result, as our aging population continues to grow, so do rates of Dementia-related diseases (e.g., diseases related to significantly negatively impacting our cognition). For the first time in modern history, we have more older adults than children. People of color are 1.5- 2 times more likely to develop a Dementia related illness (Alzheimer's Association, 2020). Unfortunately, those who do not have a close social circle of support are 1.5 times more likely to develop dementia than those with immediate social support (Fratiglioni et al., 2000). We investigate how varying socialization (e.g., no socialization, virtual socialization, and in-person socialization) impacts cognition in communities of color. We hypothesize that this research program will have cognitive benefits for those assigned to the treatment condition (e.g., the group that socializes in person). In the present study, we investigate the impact of social and physical interaction on people of color experiencing significant cognitive decline. We will measure the cognition scores of participants' pre and post-socialization. Lastly, we will discuss the significant challenges we have faced in recruiting participants for the current study and why we believe this to be the case.

KORET SCHOLARS

10. Post-Pandemic Factors Influencing STAT250 Student Success at CSUMB

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Since Fall 2020, CSUMB has seen the pass rate of several courses decrease from a high of 85 percent seen pre-pandemic, to 70 percent. This has been a common occurrence in schools across the country; students are not as academically successful in a post-pandemic world. As such, the Department of Mathematics and Statistics at CSUMB has been taking several initiatives to provide further support for students in those courses. This research investigates influential variables in academic and attitudinal outcomes of CSUMB students taking Applied Statistics for Science and Technology (STAT250). The course is predominantly taken by Biology, Marine Science, and Environmental Science majors and covers statistical concepts relating to said fields. Data collected through surveys taken by students each semester of the 2023-2024 academic year was analyzed with the goal of identifying characteristics that may be positively or negatively influencing course outcomes. In Spring 2024, CSUMB piloted a support course to act as an additional resource for STAT250 and data surrounding experiences in said course was collected and incorporated into analysis. In gaining a better understanding of student experiences in STAT250 and its support course, the research further supports changes being implemented to encourage student success. Trends or a lack thereof could indicate resources that seem to be the most valuable or don't seem impactful which informs the CSUMB Math and Stat. Department on how to move forward in curriculum development or if more individual approaches seem needed.

11. The Effectiveness of Reentry Programs: Monterey County

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Through this research, I evaluate the effectiveness of the programs for reentry into society from prisons and jails in Monterey County, both private and government-funded, within and without the institutions. I also explore the concept and societal advantages of alternative, community-based, abolitionist approaches. I performed data analysis of reentry programs in Monterey County from official government and institutional websites about the reentry services they provide and the requirements to receive the services. The purpose of this is to find the most effective and socially beneficial system (recidivism rates, job security, housing security, mental health, drug addiction, and the need for additional support) in place and use it as a comparative tool. I plan to interview local organizations providing reentry services including parole officers, counselors, formerly incarcerated individuals, and program directors involved in reintegrating formerly incarcerated people into society to document their personal experiences within our social institutions through qualitative analysis. This will include information on the challenges they face, what is working, what is not working, and their professional opinion on how the system could improve. Finally, I will compare my findings either with Norway or abolitionist-inspired programs in the US. This research will provide a global social view of the prison industrial complex and its associated reentry services and provide realistic solutions.

12. The Implications of Personality Traits on Prejudice Toward Political Outgroups

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Over the past two decades, political polarization has reached new extremes among party affiliates and the broader population in the United States and its European allies. A new and growing body of research has sought to investigate the growing affective polarization, examining factors such as personality traits and meta-perceptions and their role in political outgroup polarization. However, more research must examine the interaction between social media use and personality traits in affective polarization. The present study explores the role of six main factors in predicting individuals' prejudice toward their political outgroup: more social media engagement, less self-compassion, higher psychological reactance, less self-efficacy, more need for closure, and less empathy. Our study will consist of self-report surveys completed by California State University, Monterey Bay (CSUMB) students regarding information about outcome measures of political prejudice, the previously mentioned six predicting factors, and demographic data. Multiple regression analyses will be conducted to predict our target dependent variable (political prejudice) using independent variables such as the six factors mentioned. Lastly, this research's implications can inform future methods to help bridge the political polarization gap and foster understanding of political outgroups, which can benefit a functioning democracy.

13. Qualitative Assessment Item with Low Inter-Rater Reliability in the CLAS Standards Rubric

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Health disparities continuously affect minorities in the United States. Research suggests that low health literacy increases health disparities and leads to increased visits to emergency room departments, increased risk of preventable diseases, and chronic conditions. The Office of Minority Health developed the National Culturally and Linguistically Appropriate Services (CLAS) Standards to increase health literacy and improve health outcomes for vulnerable populations. The Institute of Community Collaborative Studies at California State University, Monterey Bay, developed a rubric with 27 dimensions with the purpose of operationalizing the CLAS standards when applied to printed health information materials. Two test participants were recruited to apply the rubric to 11 educational materials created by the Monterey County Health Department. After conducting a pilot study, results revealed that six rubric items exhibited moderate-to-strong agreement (K>.41); eleven were classified as promising (observed agreement>.7 and K<.41); and ten items were classified as having low agreement (observed agreement<.7 and K<.41). To attain a clear understanding of the ten items that showed low agreement, two qualitative interviews will be conducted to analyze the different interpretations between both participants. The purpose of this assessment is for participants to explain their reasoning behind agreeing or disagreeing with the ten items on the CLAS Standards Rubric that exhibited low agreement. Our goal is to identify whether adjustments to the rubric, materials, or instructions need to be made. A qualitative assessment will reveal the areas for improvement and will be a determining factor in finalizing the CLAS Standards Rubric.

14. Overcoming Hurdles: Identifying Obstacles to Latinx Academic Achievement

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The goal of this project is to identify criminogenic risk factors prevalent in the neighborhoods of educated Latinxs during their upbringing. We aim to explore the participants' descriptions of these neighborhoods during their formative years. The study extends previous research conducted with educationally successful Latinos (Hurtado & Sinha, 2016; Sinha, 2023) and factors that marginalize youth of Color (Rios, 2011; Haney, 2020). Through this literature, we address the following research questions: How did participants describe the neighborhoods they grew up in? And what criminogenic factors were present in those neighborhoods? We analyzed data collected from in-depth qualitative interviews with 53 Latinx men and women, all senior-level college students. The interviews addressed familial, neighborhood, and schooling contexts, social identity, and consciousness. We conducted a content analysis on the neighborhood context section to identify criminogenic risk factors, using a coding scheme derived from Haney (2020). We discuss the implications of intervention program participation as potential protective elements against criminogenic factors (Brown, et al., 2021). This project aims to enhance the literature and understanding on factors impacting educational success by integrating insights from Haney, Rios, Hurtado, and Sinha's work. It takes into account the challenges and barriers Latinx students overcame in becoming academically successful (Hurtado & Sinha, 2016).

15. Technology: The Modern Babysitter? Exploring Children's Overuse in Today's World

Saba Shah
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Childhood and youth today differ significantly from those of past decades. Early childhood was a time of exploration, where children learned about the world, observed others to understand roles, and eagerly engaged in hands-on activities. Today, however, childhood has evolved. Instead of letting children explore and engage in activities, caregivers often rely on technology to keep them occupied. Children are constantly exposed to technology whether they are at home or school. In the modern age, parents face challenges to monitor and regulate their children's screen time. This study explores how parents assess the risks of their children's technology use and will be conducted through a multimethodology approach, using both qualitative interviews and quantitative surveys with parents. The quantitative and qualitative data will help us uncover how parents perceive technology risk, including exposure to screen time, inappropriate content, and its effects on physical and mental health. Furthermore, this study emphasizes the parental role, awareness, and education in assessing the risks of their children's use of technology. According to existing research, parents lack confidence in managing their children's technology use and hesitate to use restrictive methods due to potential resistance from their children. Furthermore, parents also expressed the need for further information and guidance to mediate their children's technology use. We need to be cautious in future research to make the study as unbiased and reliable as possible.

APPLE SCHOLARS

16. **Assessment of Nitrous Oxide Emissions from Different Nitrogen Fertilizer Treatments in Lettuce**

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Greenhouse gases (GHG) nitrous oxide (N_2O) significantly contribute to global warming and climate change. Nitrogen (N) management in agriculture is a major source of N_2O emissions due to excess N fertilizer application. In the Salinas Valley, lettuce is a leading crop, and growers rely on N fertilizer to meet crop demands, but low N uptake can result in higher N_2O emissions. This study examines the benefits of reducing N fertilizers on GHG emissions in two commercial iceberg lettuce fields. Fields 1 and 2 included four treatments: conservation N (CN), conservation N with compost (CNC), grower standard N (GSN), and grower standard N with compost (GSNC). Emissions were measured before and after multiple fertilizer events at both fields using a LI-COR LI-8720 Smart Chamber Gas Analyzer. Measurements were taken from replicate plots for each treatment. In Field 1, there was no significant difference in N_2O emissions between treatments; however, CN had the lowest cumulative emissions (218 ± 21.9 mg N_2O-N m²d^{-1}), while GSNC had the highest (268 ± 24.5 mg N_2O-N m²d^{-1}). Mean daily N_2O emissions peaked at 19.5 ± 6.13 mg N_2O-N m²d^{-1} during fertilizer event 3 and were lowest during fertilizer event 1 (0.0774 ± 0.0130 mg N_2O-N m²d^{-1}). Preliminary data analysis for Field 2 is ongoing, and results will be included in the poster. This research promotes a lower rate of fertilizer (CN) to mitigate excess N fertilizer and N_2O emissions in iceberg lettuce crops.

17. **Rewiring the Nervous System with the Assistance of Psychedelics in Post-Traumatic Stress Disorder**

Stephanie Brambila & Christine Rosales, Ph.D.
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Stress is a normal part of human functioning, however, when traumatic events occur they may leave a person with post-traumatic stress disorder (PTSD). Those diagnosed with PTSD have an altered nervous system and a variety of neurological changes can occur. PTSD can directly affect the amygdala, hippocampus, and prefrontal cortex. Symptoms of PTSD can last a lifetime with symptoms including hyperarousal, intrusive thoughts, sleep disturbances, and changes in cognition (Bremner, 2006). New medicinal therapies and interventions are needed in psychiatry because the current methods are not functioning for those with treatment resistance or medications that cause numerous side effects (Ferguson, 2001). The psychedelic movement is expanding back into Western research after years of laying dormant, due to The Controlled Substance Act (CSA) of 1970 and The Misuse of Drugs Act of 1971 of the UK, which restricted the use of psychedelics in research and clinical use (Nichols, 2014). This poster documents the recent literature exploring how the use of psychedelic substances is being researched again to uncover how the different varieties of psychedelics have the potential to help improve mental health. Notably, psychedelic substances can be impactful for those who have not found relief in traditional methods. (Perkins et al., 2018).

18. **Masculinity in Radical Spaces**

Jourdan D'Jalma Garnier & Christine Rosales, Ph.D.
Department of Psychology, California State University, Monterey Bay, Seaside, CA

Many, including men, have come to embrace Womanist and Feminist theories, yet radical spaces continue to be limited and harmed by toxic masculinity and patriarchal behavior (hooks, 2004; Lemons, 1997; Nopper, 2005; Zackariasson, 2009). Considering the abolition of patriarchy as the liberation of all people, we must work together to create radical spaces (anti imperialism, anti white-supremacy, anti-capitalism, etc..) that encourage men to embrace feminism while understanding and respecting the current physical, emotional, and social safety needs of women (hooks, 2004; Lemons, 2009). Healing does not come before recognition and accountability. We must first practice prioritizing the safety of women and non-binary folks and holding men accountable for patriarchal behavior in radical spaces. We found there to be no cohesive resource on how to approach this issue: holding activist men accountable for patriarchal behavior. This project aims to set the background to conduct a meta-analysis of systems practicing holding men accountable and/or protecting women and non-binary folks. We will then synthesize these systems to create a framework informed by transformative justice to hold men accountable for toxic masculinity and patriarchal behavior while prioritizing recovery from abuse and the safety of women and non-binary folks embodying various marginalized and privileged identities. Only after creating and maintaining the framework to hold men accountable will we be able to create resources and spaces for men to constructively and holistically process and heal from Patriarchy to build true radical Womanist and Feminist spaces in which men and women can safely work together.

COLLEGE OF ARTS, HUMANITIES, AND SOCIAL SCIENCES

DEPARTMENT OF SOCIAL SCIENCES AND GLOBAL STUDIES

19. **Ideology Meets Experience: How Political Views and Extreme Weather Experiences Shape Climate and Environmental Attitudes**

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Attitudes about climate change and environmental issues are deeply polarized in the United States along partisan lines. Due to the distant and intangible nature of climate change, individuals often lack direct evidence of its dangers in their daily lives and thus form their attitudes primarily in response to ideological cues from elites like scientists and politicians. A large body of research has established political views as the dominant predictor of climate change and environmental attitudes in America; however, little research has examined the impact of direct experience with the consequences of climate change, such as extreme weather events, on these attitudes. Some research has found that direct experience can increase concern about climate change; however, we know little about how political views might moderate the relationship between experience with extreme weather events and concern about climate change and environmental issues. Therefore, this research analyzes data from the General Social Survey to examine the relationship between experience with extreme weather events and levels of concern about climate change and environmental issues among individuals with different political views, aiming to determine whether there is an interaction between direct experience and political views. The anticipated results may reveal significant variations in concern across and within political groups depending on experience with extreme weather events. This has potential implications for climate advocacy strategies and policy development, as these dynamics highlight how personal experience and political context together shape public opinion, potentially informing more targeted and effective approaches to climate advocacy and policy-making.

DEPARTMENT OF PSYCHOLOGY

20. **Background Music Used as Auditory Environmental Context to See Its Effects on Memory Recognition**

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Studies regarding the encoding specificity principle have shown a positive relationship between matching auditory environment context (EC) conditions during encoding and retrieval. I hypothesize that playing the same background music during encoding and retrieval will improve recognition memory scores. There will be two experimental sessions. In the first session, the subject will be presented with 25 non-related words, words will be four to five letters, one-syllable nouns, each will be presented for 3 seconds. Subject will then be given a free-recall test. This is followed by a 10-minute distraction task. In session two, the subject will be given a 50 word recognition test, where half are from the study list and half are new words. During the experiment, music will be played continuously, varying per music condition group. The music file consists of either Lofi music (L) or a segment of Vivaldi's Four Seasons (V). Lofi is rhythmic electronic music, commonly listened to while studying. Vivaldi is live-played orchestra music. Both are instrumental while being two distinct music styles. The music type will either change or stay the same once session two begins. The encoding and retrieval music will be manipulated in a between-subjects design, producing four conditions, (LL, LV, VV, VL). The predicted conclusion of this study will be that recognition scores will be higher for subjects in same-context conditions (LL, VV) compared to different-context conditions (LV,VL). This would mean that the encoding specificity principle is supported by using music as an environmental context cue.

21. **Identify Overreporting on the Personality Inventory for the Diagnostic and Statistical Manual for Mental Disorders (PID-5) Brief Form**

Mariah Moreno, Destiny Renero, & Danielle Burchett, Ph.D.
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The Personality Inventory for the Diagnostic and Statistical Manual for Mental Disorders, 5th edition (PID-5; Kruger et al., 2012) has repeatedly found reliable and valid for the measurements of personality dysfunction.Within clinical assessments, it is critical to be as accurate when assessing for personality dysfunction. Some measures of personality dysfunction include overreporting scales, which are helpful to identify invalid responses within the questionnaires. Identifying these invalid responses is crucial for forensic evaluation settings where individuals may distort self-reported information creating compromised results. Previous research, regarding the 220 item Personality Inventory for the Diagnostic and Statistical Manual for Mental Disorders, 5th Edition (PID-5; Krueger et al., 2012) has involved creating and validating an overreporting scale (Sellbom, Dhillon, & Bagby, 2018; see also Dhillon et., 2017), but research is needed to examine whether it is possible to create similar indicators for the 25-item PID-5 Brief Form. The focal point of this study is to identify and create a valid overreporting scale for the 25-item PID-5 Brief Form and then compare its functioning

against a well validated overreporting scales on the Minnesota Multiphasic Personality Inventory-3 (Ben-Porath & Tellegen, 2020). Detecting credible responses keeps clinical assessment reliable and valid for examiners and examinees. If it is feasible to identify over reporting on the PID-5 Brief Form, it will be useful tool for future forensic evaluations and research projects. For future works, the collection of well- validated items from the PID-5 Brief Form can be compared to the overreporting measurements used in the MMPI 3 Scale Performance.

22. **Identifying Inconsistent Responding on the Personality Inventory for the Diagnostic and Statistical Manual for Mental Disorders (PID-5) Brief Form**

Destiny Renero, Mariah Moreno, & Danielle Burchett, Ph.D.
Department of Psychology, California State University, Monterey Bay, Seaside, CA

The Personality Inventory for the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (PID-5; Krueger et al., 2012) is used to assess self-reported personality dysfunction. The 220-item PID-5 has been found to be reliable and valid for measuring personality disorder-related symptoms and traits. However, test results may be invalidated if an examinee engages in inconsistent (e.g., random or fixed) responding, leading to inaccurate test conclusions. Previous studies have examined and validated measures of inconsistency on the PID-5. However, it is unclear whether an inconsistency scale can be created for the much shorter 25-item PID-5 Brief Form. For the current study, we will examine whether it's possible to identify item pairs on the PID-5 to create an inconsistency scale. Item pairs will be selected if they're highly statistically and conceptually associated with each other, and individuals will score a point on the scale if they answer a pair in conceptually inconsistent ways (Ben-Porath, 2012). Similar inconsistency scales have been created for the Minnesota Multiphasic Personality Inventory (MMPI) measures (e.g., Variable Response Inconsistency; VRIN). With respect to previous research, it's crucial to remember that while an inconsistency scale could not completely eradicate inconsistent response patterns, it would give researchers and clinicians a better tool to identify these challenging, real-world scenarios. Moreover, further research and updates could offer more insight and refinements to the PID-5 Brief Form and reduce the chances of inconsistent responding leading to inaccurate interpretations in clinical assessments and in research studies using the PID-5 Brief Form.

COLLEGE OF HEALTH SCIENCES AND HUMAN SERVICES

KINESIOLOGY DEPARTMENT

23. **"MB FLOW": A Theory-Based Intervention Program to Promote Physical Activity Motivation**

Angelique Loera, **Raquel Rodriguez**, & Sara Powell, Ph.D.
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Physical activity (PA) is a controllable health variable that enhances cardiorespiratory, metabolic, energy balance, musculoskeletal, and mental health issues, and lower all-cause mortality rates. The American College of Sports Medicine recommends individuals engage in at least 150 minutes moderate-intensity or 75 minutes vigorous-intensity aerobic PA weekly. Unfortunately, less than half of U.S. adults reach recommended aerobic activity levels. Exercise programs explicitly designed to increase PA participation in inactive people have primarily focused on physiological benefits, psychological well-being, and social connectedness they can provide. As a result, PA can enhance physical, mental, emotional health, and quality of life. Despite known PA benefits, CSUMB offers limited exercise programs for faculty and staff, and those offered are underutilized. Thus, this project aims to investigate the effectiveness of a theory-based intervention to enhance PA levels and motivation among CSUMB students, faculty, and staff preparing for Monte's 5K event in October 2024. This intervention evaluates the impact on participants' engagement in PA, self-efficacy for exercise, and motivation for maintaining an active lifestyle. The first step of this project involved the creation of various educational materials such as worksheets, handouts, marketing collateral, and instructional videos focusing on psychological skills education. The researchers designed materials aimed at increasing program participants' ability to set goals, ignite and sustain motivation, build self-confidence, foster positive body image perceptions, manage stress, and continue to engage in PA upon program completion. Program outcomes will be assessed this fall in a future UROC project.

COLLEGE OF SCIENCE

DEPARTMENT OF APPLIED ENVIRONMENTAL SCIENCE

24. **Morphological Monitoring of the Carmel River Channel in Monterey County, California**
Nikki Gigliotti, **Joab Pimentel**, Destiny-Ciara Yano, & James Guilinger, Ph.D.
Department of Applied Environmental Science, California State University, Monterey Bay, Seaside, CA

Nearly a decade ago, the San Clemente Dam was removed and the Carmel River has since undergone major changes as a response to its removal. This project aims to explore data that has been collected over the past decade, which will be used to identify any major changes to the Carmel River from its flow, channel size, and its grain size today. This is to identify if there are any detrimental changes that could be impacting the river's health. By using equipment such as an auto leveler on preset benchmarks we can measure the channel depth at specific locations. This gives us a two dimensional image of elevation change within the channel. Gravelometers are used to quantify the sizes of each section's sediments in order to determine a channel's energy flow. Using this data in comparison to data from previous years, we can build a model graph for each site to show the variation in channel depth. This will help determine if the sediment stockpile is affecting the river's overall elevation and whether it is making deeper pools or wider rifles.

25. **Land Use, Water Quality, and Amphibian Presence in the Moro Cojo Slough**
Sara Gonzalez[1], **Debbie Lee Vandever**[1], Hannah Kim, B.S.[2], & John Olson, Ph.D[1]
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Estuaries are known to be biologically diverse ecosystems that play an important role in sequestering carbon from our atmosphere, filtering pollutants from our water, and creating buffer zones that protect the coast from erosion. Extensive agricultural land use has threatened estuaries and their ability to serve as important habitat for many creatures including amphibians, which are declining globally due to anthropogenic climate change. Currently restoration efforts along the Central Coast of California are being conducted in the Moro Cojo Slough State Marine Reserve (MCSSMR) to preserve endangered and threatened amphibians. This study aims to investigate the correlation between water quality, land use types, and known amphibian presence of the California Red Legged Frog, California Tiger Salamander, and Santa Cruz Long Toed Salamander within the slough. We hypothesize amphibian presence will be higher in restored or natural areas due to increased filtration from the slough. This will be done by measuring the water quality (i.e., salinity, temperature, pH, conductivity) with a YSI monitoring meter at 10 sites in the MCSSMR. ArcGIS will then be used to create a map depicting the surrounding land use (i.e., agricultural, urban, natural, restored) and its relation to the measured water quality and amphibian presence. Results of this study will provide a better understanding of the potential impacts of varying land uses on water quality and amphibian perseverance, which can further guide land management practices being conducted here today.

26. **Conditions for Conidial Release: Airborne Dispersal of *Fusarium oxysporum* via Wind from Strawberry Plants**
Samantha Suiyen Kozlo[1], Gabriel Sacher, Ph.D.[2], & Peter Henry, Ph.D.[2]
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[2]*United States Department of Agriculture, Agriculture Research Service, Salinas, CA*
Understanding the wind dispersal of *Fusarium oxysporum* spores remains a relatively understudied area despite its potential significant impact across many cropping systems. Our study investigates how environmental conditions, such as distance, wind velocity, and time, influence spore density within a controlled wind tunnel setup. Using a DIY 61cm wind tunnel we positioned multiple petri plates at varying distances to simulate different dispersal scenarios to see how different velocities affect the spread of *Fusarium*. A spore trap was utilized to quantify spore deposition, with observations taken after 4 days to 1 week. Initially, we tested two different methods of spore collection: one using petri plants infested with FOF and another method blowing spores from infected plates. Given higher rates of detection of FOF from the infected plants than the petri plates of Fusarium growth on the infected plates, we opted to use infected plants instead. We ran 3 trials and each trial involved a 15-minute blowing period and revealed a noticeable trend: plates positioned around 15-20 cm from the source at velocities at 2.5m/s and 4.0m/s showed higher spore colony counts compared to the other distances of 30, 40, 50, 70, 80cm. This research is crucial as *Fusarium oxysporum* epidemiology remains not completely understood, emphasizing the need to identify strategies to mitigate its spread among crops. In relation to the study more knowledge about the effects from wind dispersal can educate and encourage stakeholders to continue studying this unexplored fungi.

27. **The Effects of an Increase in Fine Sediment from Wildfire on Filter-feeding Stream Benthic Macroinvertebrates**
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Department of Applied Environmental Science, California State University, Monterey Bay, Seaside, CA

Benthic filter feeders are essential in stream ecosystems as they control nutrient cycling and help scientists understand how stressors affect the ecosystem. A recent study at Fort Hunter Liggett showed a potential decrease in benthic macroinvertebrate filter feeders

between different sites studied. To determine if an increase in fine sediment (<2mm) in streams from recent wildfires has affected the number of filter feeders, we conducted a bioassessment at five sites on Fort Hunter Ligget streams following the California SWAMP protocol. We subsampled these samples, to a total of 600 or more organisms from each site. We identified each taxon's functional feeding groups (FFGs) using the EPA's Appendix B, and the Aquatic Insects of North America book. The FFG data will be compared with sediment data from those sites and past years, using the CCAMP data navigator. The preliminary results show that as fine sediment decreases, benthic filter feeders increase. The site with the lowest filter feeder percentage of 23%, had the highest fine sediment percentage of 69%, and three sites showed an increase in fine sediment after the Dolan/Coleman wildfire in 2020 compared to previous years. These results will be expanded upon but these preliminary findings indicate that benthic filter-feeder populations are being affected due to fine sediment after wildfires, which could ultimately lead to a trophic cascade within stream ecosystems. These possibilities should be considered in future studies regarding wildfire impacts on stream ecosystems in California, a fire-prone state.

28. **Measuring and Monitoring Spawning Gravel for Steelhead Trout Along the Carmel River Channel in Monterey County, California**
Nikki Gigliotti, Joab Pimentel, **Destiny-Ciara Yano,** & James Guilinger, Ph.D.
Department of Applied Environmental Science, California State University, Monterey Bay, Seaside, CA

This research has been going on for almost a decade yielding data of river sediment composition. Since the dams removal we have seen a steady flow of sediments from the stockpile flow slowly down river. Through measuring and monitoring the spawning gravel for steelhead trout, we can see how this endangered species is affected. Steelhead trout migrate upstream after the winter months to lay eggs in spawning grounds. Conditions of the river have been ideal for the trout because they prefer coarse gravel with fast flowing water for their eggs to spawn. We are measuring the size of the gravel/pebbles in millimeters, with a gravelometer, through cross sections in the river. This research builds on previous work sites that were conducted using the same cross sections so that we can see change over years. With this data we can establish how the dams removal and sediment flow are affecting spawning grounds downstream. Areas with smaller sediment size or "sandy channels" are very unlikely to be used by steelhead, limiting their spawning grounds. With this data we can build a comprehensive study to present to potential conservation agencies to see if they need to intervene and work on restoring habitat that has been buried under fine sediments.

DEPARTMENT OF BIOLOGY AND CHEMISTRY

29. **Predicting Polarbilizty of Asphaltenes Using Machine Learning**
Selsela Arsala & Arun Sharma, Ph.D.
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Asphaltenes, a distinct class of molecules tend to congregate in crude oil. Understanding asphaltenes is crucial in the petroleum industry due to their detrimental effects on oil processing, resulting in significant economic losses and production disruptions. There is no singular type of asphaltene structure, two main architectures exist: archipelago and continental. Archipelago structures polyaromatic hydrocarbon entities connected by aliphatic chains while continental structures and aromatic fused rings. Using Mathematica, neural networks were used to predict the polarizability of monomer and dimer asphaltene structures using WHIM and GATEWAY parameters. WHIM utilizes a holistic approach that considers the molecule as whole and invariant with a weight assigned to it. GATEWAY captures the 3D configuration of the molecule and calculates how each atom contributes to the overall structure. Using these two parameters, tests were done to determine which is more successful in predicting the polarizability of the asphaltenes. This study allows for more accurate predictive models and helps in understanding the fundamental properties of asphaltenes.

30. **Modeling TSC Dependent LAM Using Drosophila Muscle Precursors**
Hailey Christian, **Jackie Schmidt**, **Hamza Al-Hakim**, Paola Cabezas, & Frank Macabenta Ph.D.
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Tuberous sclerosis complex (TSC) and lymphangioleiomyomatosis (LAM) are severe diseases caused by abnormal cell growth. While TSC affects multiple organs, LAM primarily targets the lungs and kidneys in young women. LAM and TSC both result in overgrowth of smooth muscle cells. Both diseases are linked to mutations in the TSC1 and TSC2 genes, first discovered in drosophila. Muscle precursor cells that form in the gut (CVM cells) have the same smooth muscle phenotype as TSC and LAM. Our preliminary research shows expression of dominant negative version of gigas specifically in CVM cells results in apparent cell migration defects. We speculate TSC1 and gigas help regulate the collective migration of drosophila muscle precursor cells. Our methods include a combination of immunohistochemistry, immunofluorescence staining, and both light and confocal microscopy to assess cell migration, as well as hybridization chain reaction (HCR) assays to determine the expression patterns of the TSC1 and TSC2 genes during Drosophila embryogenesis, for which little to no evidence exists. Ultimately, we hope to establish the CVM as a genetically tractable model for TSC, TSC-related LAM, and sporadic LAM. The broader impacts of this research can improve the understanding of the development of TSC and LAM disorders and the pattern of gene expression of TSC 1 and TSC2 genes could improve diagnosis.

31. What Makes a Pollinator Garden Successful?

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Pollinator gardens are a specialized type of garden that primarily consists of plants that attract bees, hummingbirds, butterflies, and other pollinator species. These types of gardens play a crucial role in promoting the health and biodiversity of an ecosystem. They can be established essentially anywhere where there is an interest in promoting pollinator populations and biodiversity. As a result, pollinator gardens provide a valuable educational opportunity for those looking to understand the complex relationships between plants and their pollinators, as well as demonstrating the delicate balance that allows for these ecosystems to flourish. For this project, I aim to identify some of the core principles that make a pollinator garden "successful," such as the choice of plant species, management practices, and plant density.

32. Vibrational Frequency Analysis of Ionic Pairs with Various Surfactants

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Reverse micelles (RMs) are nanostructures that consist of an aqueous core with surfactants used to stabilize its structure within hydrophobic solvents. The structure is comprised of a polar interior and a hydrophobic exterior, with three distinct layers: the core, the intermediate layer, and the interfacial layer. The innermost region, known as the core, consists of water, contributing to the polarity of the interior of the RM. The core is surrounded by the intermediate layer which is encapsulated by the interfacial layer. The interfacial region is composed of the hydrophilic head of the surfactant that facilitates the dispersion of ions within the RM. As surfactants are subunits of RMs, these molecules can be simulated to understand the intermolecular interactions and predict the behavior of ions in RMs. Specific surfactant and ion pairs were simulated to understand their vibrational frequencies and interactions under aqueous conditions with the use of Gaussian. The surfactant used was Dioctyl Sodium Sulfosuccinate (AOT), and the accompanying cation was methyl ammonium. The molecules were optimized in GaussView using MP2, 6-311G, ++, (d,p), after the geometry of the methyl ammonium was flipped 180°. Flipping the geometry of the cation caused the methyl group to have closer interactions with the polar head of AOT, leading us to obtain the vibrational frequencies of the modes of interest. These were graphed into a visual representation using Wolfram Mathematica. Previous studies determined the interactions between surfactants and their accompanying cations in normal geometry; this work extends those understandings to interactions within RMs and flipped cations.

33. Predictive Habitat Modeling for the Endangered *Ambystoma macrodactylum croceum*

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The Santa Cruz long-toed salamander (*Ambystoma macrodactylum croceum*) is a critically endangered and geographically isolated subspecies of the long-toed salamander, endemic to Santa Cruz and Monterey counties. Their limited range is further threatened by the effects of human-caused habitat loss and fragmentation. Identifying *A. m. croceum*'s potential habitat and reducing encroachment of these areas is critical to their conservation. Ecological Niche Modelling (ENM), allows for the prediction of the distribution of a population by correlating environmental variables and occurrence data. However, previous studies where the models for the long-toed salamander species complex were generated have not accounted for *A.m. croceum* as an ecologically unique and separate population. Furthermore, modeling small populations can be difficult due to a limited number of sites, observations, and low detectability. We are generating an ENM for the Santa Cruz long-toed salamander through Maxent software, a tool with high predictive power for presence-only data with limited samples. Variables that we are evaluating include human habitation, agriculture, elevation, and temperature. These results will shed light on factors differentiating the viable range of the subspecies when compared to its sister taxa, and can also serve to aid in monitoring known populations, finding new populations, and wetland management.

34. Evaluating Cover Crop Susceptibility to Impatiens Necrotic Spot Virus (INSV)

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California's lettuce production is being affected by a plant pathogenic virus known as Impatiens necrotic spot virus (INSV), precisely in Salinas. INSV is primarily vectored by western flower thrips (*Frankliniella occidentalis*), a complex pest to manage due to its fast reproduction and resistance to insecticides. Although the virus was reported as early as 2006, severe outbreaks didn't surge until 2018-21 in Monterey County. Farmers faced total yield losses with millions of dollars lost causing the market price of lettuce to increase. Given that cover cropping is a common practice for nutrient management, soil health, and other benefits, there's an interest in researching their susceptibility to INSV. This can potentially mitigate the impact of INSV by reducing the habitat suitability of

thrips. The research project's purpose is to create a list of commonly used cover crops and rank them from least to most susceptible to Infectious Necrotic Spot Virus. The rationale for this project is to provide insight to growers or farmers of susceptible cover crops to construct a crop rotation plan that can help mitigate the attraction of western flower thrips, the vector for INSV. The list of cover crops included: Pacheco triticale, Cayuse oat, Sudan grass, Merced rye, Barley, *Sinapis alba*, *Brassica juncen*, Lana vetch, Buckwheat, and Faba bean. The procedure involved mechanically inoculating the selected cover crops to INSV. The plants were grown for an additional 2 weeks before assessing them for INSV symptoms using a Numeric Severity Scale (0 to 5), where a score of 0 indicated the plant had no INSV symptoms, while a score of 5 indicated the plant had completely died. Each cover crop was then processed and tested for INSV using ELISA. Three plants of each species were included per replicate, and lettuce was included as a susceptible check. The experiment was replicated two times. Based on these studies, Faba Bean was the most susceptible to INSV and interestingly, also developed symptoms of necrotic spots on the leaves and at the base of the stem. The implications of this research project can help us understand disease management, thrips control, and crop rotation planning. By identifying a cover crop susceptible to INSV, we can deem such cover crop as a reservoir of the virus. Additional information on the attraction of western flower thrips to cover crops will help provide a greater understanding of associated benefits and risks when planting cover crops. Having all this information can help plan crop rotations and reduce the risk of disease carryover which can result in a positive economic impact.

35. **Investigating the Influence of Landscape Variables on the Dispersal of Western Flower Thrips in Salinas Valley Lettuce Production**

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The western flower thrips (Pergande) (Thysonaptera: Thripidae) is a significant pest that harms crops and spreads plant diseases such as the Necrotic Spot Virus (INSV). These tiny insects' feeding mechanism causes visible damage to crops, and their role in spreading viruses makes them more problematic. We monitor western flower Thrips (WFT) across the Salinas Valley using sticky traps that are replaced weekly. Crops and landscape features near each trap are recorded. The main objective is to understand how different landscape variables influence thrips behavior. Using existing data, the information was restructured and cleaned to determine trends across the three regions: north, central, and south. By analyzing the patterns in each region, specific strategies can be developed to control thrips and protect lettuce crops in the Salinas Valley.

SCHOOL OF COMPUTING AND DESIGN

36. **Debugging Javascript: Techniques and Tools for Effective Error Correction**

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Javascript (JS) is a popular programming language in web development, yet many learning resources focus on correct code implementation and compilation rather than debugging tools and techniques. Our team frequently encounters errors while developing the JS application central to our research. We highlight practical debugging strategies, identify common errors, and develop a systematic approach to error correction. We have submitted a proposal for a debugging tutorial at the upcoming CCSC Northwestern Conference, where we will demonstrate our findings and gather feedback from attendees. This poster will showcase our research process, the debugging techniques we found most effective, and real-world examples from our development experience.

37. **A Novel Tool for Comparative Analysis and Annotation of RNA Structural Motifs**

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Non-coding RNAs (ncRNAs) play crucial roles in various cellular processes and disease mechanisms. The three-dimensional structure of ncRNAs is a key determinant of their biological function, with many evolutionarily conserved structural motifs identified for their specific roles. However, annotating these RNA structural motifs and understanding their intricate relationships through comparative analysis can be a challenging task. Automated computational tools can annotate highly similar motif instances, but effective analysis of RNA 3D motif variations requires manual intervention, as noted in existing literature. One of the major obstacles in the manual analysis of RNA motifs is the lack of any existing tools dedicated to effective comparative analysis. To address this challenge, we have developed a novel RNA structural motif annotation tool. Unlike existing tools such as JMol or MOL*, which facilitate the analysis of PDB-based 3D objects, our tool offers unique features: 1) it enables objects to be rendered and manipulated independently on a single canvas, and 2) it facilitates motif feature extraction, organization, and classification. Researchers can upload their own motif structures or import ones from our database to conduct in-depth analyses of motif families, such as kink-turn and sarcin-ricin motifs, and build relationships among instances of these families, potentially leading to the recognition of motif subfamilies and modules. Additionally, our tool supports collaboration among researchers, facilitating the sharing and reviewing of annotations to

build RNA motif annotations collectively. The data generated from this tool can accelerate the discovery of novel RNA motifs and aid in understanding their biological functions.

DEPARTMENT OF MARINE SCIENCE

38. **Validation of Fish Hematocrit Measurements Using an ABL90 Flex Blood Gas Analyzer**
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Marine organisms are subjected to a wide array of environmental variation which influences their physiological condition. Studying blood parameters can provide scientists a rapid assessment of the physiological status of fishes subjected to environmental variation. A useful blood parameter that responds to environmental oxygen availability is hematocrit (HCT), which is the percentage of red blood cells in the organism's blood and an indicator of oxygen carrying capacity. Fish can elevate HCT to increase oxygen carrying capacity during hypoxia. In this study, we tested whether a rapid point-of-care blood gas analyzer (ABL90 Flex blood gas analyzer) could provide HCT values comparable to the widely used centrifuge method using blood samples from rockfish (*Sebastes spp.*) exposed to variable upwelling conditions. Rockfishes are regularly exposed to hypoxia during strong upwelling events in the California Current Ecosystem. We investigated ~50 blood samples across a range of upwelling conditions to determine whether there is a correlation between HCT values from the two different methods. Preliminary results show that the ABL90 flex may be a suitable method for studying HCT in rockfish in a field setting across a range of environmental conditions, but that it provides consistently lower values than the centrifuge method. Our study provides a robust validation dataset for testing whether the ABL90 can be used as a standalone reliable method for assessing HCT in fish, and aids in efforts to understand how rockfish physiology is shifting due to environmental variation.

39. **Effects of Birds on *Cercariae batillaria* Infection Rates in Japanese False Ceriths**
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Cercariae batillaria is an introduced parasite with a complex life cycle that infects *Batillaria attramentaria* as part of its lifecycle. In Elkhorn Slough, CA, *C. batillaria* manipulates its first intermediate host by increasing the snail's size to aid in infecting native fish species as second intermediate hosts before infecting birds as their definitive host. Snails become infected when eggs are released in bird droppings, so the localized distribution of birds and snails are likely important in determining overall infection rates. We are investigating how shorebird and piscivorous bird abundances and activity affects infection rates of *C. battelaria* in *Batillaria attramentaria*. To test this, we selected six 2-hectare study sites along the Elkhorn Slough, and measured snail density and infection rate. Afterward, we revisited the collection sites multiple times and recorded bird abundances and behavior. Preliminary results show that greater snail densities correlate with high *C. battelaria* infection rates and greater avian diversity. We also tested the relationship between bird density and snail infection rate. From this we can better understand the relationship between the introduced snails and birds in Elkhorn Slough. This is particularly important as snails are an important food source for different avian and fish species, so understanding these effects allows us to better understand the relative effect of the introduced species in the larger wetland environment.

40. **Impact of El Niño on Algae Composition in the Rocky Intertidal**
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In this study, we aim to understand the potential impact El Niño Oscillation Events (ENSO) have on algae abundance throughout the Monterey Peninsula. The intertidal is an important coastal area of the ocean inhabited by a very diverse group of organisms, distinguished by the extreme conditions organisms are well adapted to, allowing them to survive chronic disturbances such as harsh waves and drastic changes in water levels. This results in organisms that are well-suited for long periods without water and can withstand destructive waves. El Niño is a weather event in which the Pacific Jet Stream moves towards the west coast of the United States. This typically reduces upwelling, which results in less nutrient rich waters being brought up along the coast, causes warmer water temperatures, and can result in stormier weather and larger waves which cause ecological disturbances. All of these could negatively impact the organisms living in the intertidal zone. Algae communities are fast-growing, diverse, and are impacted heavily by ecological disturbances, making them a potential indicator of how ENSO events can impact intertidal zones. R studio will be used to assess the data's statistical significance from the year 2021 to 2024 to compare El Niño years to non El Niño years. It is expected that the most recent ENSO event through 2023 and 2024 will negatively impact the abundance of algae in Monterey. Algae abundance will be determined through the use of transects and quadrats at different sites and counting percent cover of different functional groups.

41. **Urchin Recruitment Within the Monterey Bay Area**
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The field of conservation aims to protect species that play important ecological roles in their environment. In the Monterey Bay, kelp forests are foundation species in the biologically-rich landscape. Sea urchins are herbivores who's populations have astronomically gone up, which has led to the decimation of kelp forests and the reduction of biodiversity. We aim to better understand the seasonal patterns of urchin recruitment and how these trends compare to historical data. We monitor urchin recruitment across the year at two sites to understand seasonal recruitment patterns, the sites are Stillwater Cove and Monterey Harbor. We suspended brushes in the water column at the sites, the brushes act as urchin recruit collectors. We use a sonicator device to remove organisms from the scrub brushes and then filter the seawater. This allowed us to separate the urchin larvae, which we put into vials. These vials are examined with a dissection microscope to record numbers of juvenile urchins. Due to external factors during data collection such as human error and Covid-19 limitations, there are gaps in the sampling. Despite the gaps, we are going to look across all of the years to see which months have the highest numbers. Recruitment is generally low but we expect to see the pattern of an increase in the spring months due to increased nutrients and energy production in the area. By understanding the importance of how the concentration of urchins affect the ecological diversity of kelp forests, steps can be taken to protect their existence.

42. **Maternal Effects, Water Chemistry, and Enso Impacts on Multi-Brooding in Rosy Rockfish (*Sebastes Rosaceus*) and Starry Rockfish (*Sebastes constellatus*)**
Neil Elias[1], Samuel Perrello[1,2], Cheryl Logan, Ph.D.[1], & Scott Hamilton, Ph.D.[2]
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Multi-brooding frequency in viviparous fishes can have significant impacts on population growth, and climate change may influence this reproductive trait. Rosy (*Sebastes rosaceus*) and starry (*Sebastes constellatus*) rockfish are ecologically important temperate reef fishes that often have multiple broods in the waters of southern California, but rarely in central California. Latitudinal differences in nutrient availability and other environmental drivers are thought to influence this multi-brooding behavior. Upwelling is stronger in central California where fish are exposed to relatively cooler, hypoxic and acidic conditions. Climate change is also influencing the intensity and frequency of upwelling events, which may cause variation in the frequency of multiple broods in these regions. We compared multiple brooding frequency in specimens collected during La Niña (2023) and El Niño (2024) in central California to determine if upwelling intensity influenced multiple brooding behavior. We analyzed ovarian samples for evidence of secondary broods and examined upwelling intensity during the reproductive season using the NOAA CUTI index. We predicted that multiple brooding frequency would increase in the El Niño year when water temperatures are generally warmer and upwelling is weaker. We also expected that large, mature females would experience multi-brooding more often. We found that larger Rosy Rockfish exhibited multiple broods more frequently than smaller fish during La Niña conditions, consistent with literature. These shifts in reproductive trends are essential to understanding future population growth of these two recreationally and commercially important species under climate change.

43. **Applications of Low-cost Sensors in Shallow Underwater Sensor Networks for Monitoring Submerged Canopies**
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As seagrasses —marine angiosperms responsible for carbon sequestration, erosion mitigation, and runoff filtration— succumb to increasing coastal eutrophication, there is a rising effort to develop methods to monitor their health. *Zostera marina* (eelgrass) is a species of seagrass common among coasts in the Northern Hemisphere. Key factors of growth, such as lateral branching, rhizome development, and carbohydrate storage, are dependent on light availability and shading. However, it is unclear how far light is able to penetrate these eelgrass canopies. To get a better understanding of light attenuation through local eelgrass canopies, we will be designing an underwater sensor network (USN) for shallow areas with high sediment load. Most USNs engineered for extended deployments are economically inaccessible for smaller institutions with more limited funding. Despite this, many sensors rated for terrestrial use or short-term underwater deployments (30 minutes or less) are sold commercially for a fraction of the cost. To test the potential of using these low-cost sensors for longer deployments, we will be assessing potential waterproofing methods for three types of sensors (turbidity, temperature, and ambient light). In addition, we will be evaluating potential data transmission methods to be used in the USN by potential performance and cost. In the coming year, we will be using the methods and sensors that proved most successful to assemble our USN. The data collected using the USN will then be inputted into a submerged canopy model, GrassLight, allowing us to estimate the productivity of eelgrass in the slough.

44. Assessing Uncertainty of the Chen et al. (2011) Satellite Algorithm for pCO$_2$ in the California Current System Upwelling Regions

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As the ocean breathes, a vital exchange unfolds; surface ocean water mixes with CO_2 in the surrounding air, regulating Earth's climate and supporting the balance of marine ecosystems. Understanding and accurately predicting this exchange is crucial, particularly in regions of significant upwelling such as the California Current System (CCS). The applicability of the pCO$_2$ algorithm developed by Chen et al. (2011) for estimating upwelling in the Antarctic Peninsula to the upwelling regions of the California Current System (CCS). In this study we assessed the accuracy of this algorithm in predicting the partial pressure of carbon dioxide (pCO$_2$) by comparing calculated pCO$_2$ values, from the Chen algorithm, to measured pCO$_2$ values from the in-situ mooring California Current Ecosystem 2 (CCE2). Additionally, we determined the reliability of satellite-derived sea surface temperature (SST) measurements in this upwelling zone by validating satellite SST data with in-situ mooring SST data. To determine the uncertainty associated with calculating pCO$_2$ using satellite data, we compared satellite-derived pCO$_2$ values with those measured directly in situ. The results provide insights into the validity of the Chen et al. (2011) algorithm in a different oceanographic context as well as the potential of satellite observations for monitoring upwelling-induced changes in pCO$_2$ and SST within the CCS.

45. Investigating the Current Population Status of the Pismo Clam (*Tivela Stultorum*) around the Monterey Bay

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The Pismo clam (*Tivela stultorum*) was an iconic species for commercial and recreational fisheries, and of the sandy intertidal and subtidal ecosystems ranging from Central California to Baja California, Mexico. Unsustainable harvesting practices and overexploitation led to an uncontrollable decline in their population in the 1990s. There is currently a gap in knowledge regarding the current status of populations at several different beaches across the Monterey Bay. Burial rate trials were conducted on clams collected during tides lower than -1.0ft from both the surf zone with a clam rake and within 30-meter transects split into 3-meter sub-sections we dug using shovels. All clams were sized using calipers then placed into a pool in the sand with little disturbance. The time of initial movement and burial completion were recorded. This study yielded population counts across several beaches, building upon previous historical studies. No legal-sized individuals have been found in Monterey Bay, but the strong presence of juveniles has indicated that this population is growing. Continuing to track the age classes of individuals found, identifying drivers of crucial physiological survival responses, and comparing this with their habitat conditions, Pismo clam populations can once again thrive in Monterey Bay.

46. Impact of Coastal Upwelling on *Sebastes carnatus* Growth via Expression of Insulin-like Growth Factor-1 (IGF-1)

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Climate change is driving ocean acidification and hypoxia (OAH), intensifying seasonal upwelling along the California coast, and potentially negatively impacting nearshore species. OAH exposure may divert energy from growth and reproduction to environmental stress responses. For example, lower dissolved oxygen and pH levels associated with OAH affect juvenile nearshore rockfishes' (genus *Sebastes*) metabolism and swimming abilities. We studied the impact of upwelling intensity on the growth of adult gopher rockfish (*Sebastes carnatus*) by comparing the expression of an endocrine biomarker for growth, insulin-like growth factor-1 (IGF-1), in fish caught during high and low-intensity upwelling periods. We analyzed IGF-1 levels in 14 fish collected via hook-and-line from January to May 2023 off the coast of central California. Dorsal muscle tissue was dissected within 10 minutes of collection and immediately flash-frozen. Tissue samples were analyzed using an enzyme-linked immunoassay to measure the concentration of IGF-1. A 10-day Coastal Upwelling Transport Index (CUTI) average was calculated for each trip to determine recent upwelling exposure. Trips with a 10-day CUTI average >1 m²/s were classified as 'high' intensity; values <1 m²/s were classified as 'low' intensity. We found that IGF-1 levels were higher in the low-intensity upwelling group (Welch's t-test; t= -6.2682, df= 5, p=0.0015), indicating that exposure to upwelling and OAH stressors may negatively impact fish growth. As climate change continues to intensify upwelling, the reduced growth of gopher rockfish may lower reproductive output and lead to the potential decline of an important fishery species.

47. Sandy Beach Habitat Variability of Pismo Clam (*Tivela stultorum*) Populations in Monterey Bay

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The Pismo clam (*Tivela stultorum*) are valuable bioturbators and prey for many marine organisms, inhabiting the sandy intertidal and subtidal from Central California to Baja California, Mexico. Unsustainable harvesting practices of commercial and recreational

fisheries led to the overexploitation and decline of their population in the 1990s. Despite ongoing sampling efforts in Southern California, where most Pismo clam populations reside, Monterey Bay lacks information on the current population status of their local populations. During low tide (-1.0ft or lower), we dug along 30-meter transects divided into 3-meter sections where all clams were identified; corresponding sediment samples were collected and sized using a sieve stack. The beach slope was calculated using a DGPS (Differential Global Positioning System). We produced a map showcasing the location of clam populations and analyzed the relationship between sediment grain size, degree of sorting, and beach slope with a PCA (Principal Component Analysis) to determine the ideal beach morphology for Pismo clams. By exploring the potential habitats in their northernmost range, we can potentially restore the decimated Pismo clam populations. Clams were present in beaches with well-sorted, fine-grain sediment, and a gentle beach slope.

DEPARTMENT OF MATHEMATICS AND STATISTICS

48. **Experimental Design for Studying Factors Related to Game Outcome in Kinesiology**

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A statistician's goal is to design an experiment to increase or maximize statistical power, the probability of detecting a meaningful relationship, depending on the context of your experiment. Finding an efficient design is critical for researchers because data collection is expensive and laborious, and the sample size is often limited in a kinesiology experiment. This project focuses on designing a pickleball tournament to test for the relationship between a fitness measure and a game's outcome, and we compared three methods via simulations. Assuming "X" number of players participated in the study, we simulated the fitness measure and tournament to compare the three methods using linear regression, where the outcome variable of interest is the score difference of each match. Method 1 matched players randomly, Method 2 designed matches by separating fitness measures between opponents, and Method 3 is known as an optimal c-design, which minimizes the standard error of the regression parameter of interest, in order to determine each match. Our simulations showed that Method 2 is not as useful as Method 1, and Method 3 consistently resulted in the highest power. In order to maximize the statistical power of an experiment, collecting data in a way that minimizes the standard error was the best way found to increase the chance of obtaining a statistically significant result.

49. **Identifying Factors Related to Performance in Kinesiology**

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Fitness level and skills are crucial components for most sports, and determining key factors associated with performance (game outcome) can aid with in-depth understanding of the sports and improvement of players. Collecting and interpreting performance data enables coaches to improve their training programmes, athletes to make better tactical decisions, sports organizations to manage teams more effectively, and researchers to develop a better understanding of sports performance (O'Donoghue, 2014). This study focuses on pickleball in which the winner is determined by set scores, and each set is a series of binary outcomes. There are several statistical methods to model the relationship between key factor(s) and game outcome, and the choice may depend on the type of outcome variable (e.g., total match score difference, individual set score differences, number of plays won out of total plays, simply win or loss). We simulated the speeds of 24 players and pickleball tournaments under certain assumptions. We split players into two groups, fast and slow. We did not allow repeated matches in each run of the simulations, we evaluated and compared statistical power among nine generalized linear models. In conclusion, three of the nine models respected type I error rate, and their statistical powers were comparable for detecting the relationship between speed and game outcome. In the future, we plan on using this information to collaborate with the kinesiology department in developing a pickleball tournament in a real life scenario, with the expectation that our simulation results can be used to analyze the real life results.

GAIN REU

50. **Generation of Mito-FUCCI3 to Understand the Mitochondrial Adaptations to Endocycle**

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An endocycle is defined as a cell cycle variant where the cells duplicate their genomic DNA effectively without cell division; as a result, the cells increase their size and ploidy. One common example of cells going through an endocycle occurs during the formation of giant placental cells. Most of the cells go into the endocycle to become highly metabolic; however, how mitochondrial biogenesis is coordinated with the endocycle is unknown. Determination of how mitochondrial morphology and activity change in an endocycle will help to explain how mitochondria are producing the energy levels needed to maintain these giant cells. The purpose of this project

is to engineer a plasmid that acts as a biosensor, depicting mitochondrial adaptation to endocycles. Building upon the system FUCCI4, we engineered a FUCCI3 plasmid to contain the known biosensors of the cell cycle: Clover-Geminin, mKO2-Cdt(30-120) and H1-mMaroon. To understand mitochondrial dynamics, we added the blue protein Electra1 fused to partial COX8A (Cytochrome c oxidase subunit 8) to our FUCCI3 system to form mito-FUCCI3. We engineered mito-FUCCI3 to contain IRES, T2A and E2A, and to be expressed under the CMV promoter. Finally, we integrated our mito-FUCCI3 into a PiggyBac plasmid. The piggybac transposase system will next be used to engineer various cells in the Shariati lab. Specifically, mito-FUCCI3 will be used to understand how the mitochondrial life cycle is coordinated with the endocycle during placenta formation.

51. Investigating DNA topoisomerase II's Role in Cytoplasmic Incompatibility in *Drosophila melanogaster*

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Wolbachia is a maternally transmitted bacterial endosymbiont that infects a wide array of species including insects, filarial nematodes, crustaceans, and arachnids. In the case of *Drosophila*, *Wolbachia* manipulates host reproduction in a way that favors infected females over uninfected females, allowing it to survive, and rapidly spread throughout *Drosophila* populations. One way in which it does so is through a phenomenon known as cytoplasmic incompatibility (CI). *Wolbachia* has a deleterious effect in *Drosophila* sperm which leads to several post-fertilization embryonic defects in the host's eggs. Previous studies have discovered that CI in *Drosophila simulans* reduces host egg hatch rates to ≤ 10%. However, CI is much weaker in *Drosophila melanogaster*, and it is not fully understood why. A maternal enhancement screen identified that a DNA topoisomerase II (top2) mutant enhances CI in *D. melanogaster*. In order to verify this hit, a series of one by one wild type and top2 mutant CI crosses were conducted, and their egg hatch rates were counted over a period of three days. Cytology methods were also utilized in order to characterize the defects of CI. While the effects of *Wolbachia* on *Drosophila* host reproduction in CI are well understood, the exact mechanisms in which it works remains unknown. Findings from this project will contribute to furthering our understanding on how vector-borne diseases such as Dengue can be mitigated.

GREAT SCHOLARS

52. Mapping the Human Gut

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The Human Cell Atlas (HCA) project aims to create a comprehensive reference map of all human cells, providing insights into human health and disease.There are many independent studies of human gut cells, but the information is scattered and not well integrated. As an undergraduate researcher and Data Wrangler at UC Santa Cruz, I focus on the cellular landscape of the human gut, an organ essential for digestion, immunity, and overall health. Utilizing open-source data submitted by researchers worldwide, we integrate and analyze single-cell RNA sequencing and spatial transcriptomics data. We meticulously curate meta-data and review associated publications to accurately populate our database fields. This process ensures the quality and reliability of the data within the HCA. Our efforts have led to the detailed characterization of various cell types and their functional states within the gut. The cellular atlas we are developing identifies distinct populations and their spatial organization, providing valuable insights into gut physiology and pathology. This resource is designed to be easily accessible, facilitating its use by a wide range of researchers. By standardizing and curating large-scale datasets, our work within the HCA project contributes to a deeper understanding of the cellular composition of the human gut. This comprehensive atlas not only aids in the study of gastrointestinal diseases but also supports the development of targeted therapies and precision medicine. Ultimately, our goal is to create a valuable and accessible resource for the global research community, fostering advancements in biomedical science.

53. Comparing Brain Organoid Profiles from Different Embryonic Stem Cell Lines

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Human embryonic stem cells (hESCs) have been increasingly utilized in neurodevelopmental research for their ability to differentiate into various cell types from the ectoderm layer involved in tissue and organ development. However, while various studies have characterized and compared different hESC lines, limited research has specifically explored how differences in stem cell lines may exhibit differences downstream when utilized in models like hESC-derived brain organoids. Here, we investigate how different stem cell lines may influence brain organoid cellular composition, gene expression, and neuronal activity. Specifically, we compare these aspects between two embryonic stem cell lines (H1 and H9) across different developmental stages. Based on existing

literature–emphasizing little to no differences in hESCs generated following standardized protocols–and preliminary experiments, we hypothesize that similar brain organoid profiles will emerge from these two stem cell lines. To test this hypothesis, we generated dorsal cerebral cortex organoids from H1 and H9 stem cell lines. We conducted tissue sectioning and staining via immunohistochemistry at developmental time points of 5 and 10 weeks to characterize cell types. Additionally, we performed quantitative polymerase chain reaction (qPCR) for gene expression analysis and conducted electrophysiological recordings to evaluate the neuronal activity of the brain organoids. Ultimately, this study aims to provide insight into the reliability of hESC lines in generating relevant brain organoid models to study neurodevelopment and disease.

54. AI Meets Immunology: Predicting TCR-pMHC Interactions

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T-cell mediated immune responses play a crucial role in the body's immune defense. Advancement of our knowledge of the relationship between T-cell Receptors (TCR) and peptides from the Major Histocompatibility Complex (pMHC) has potential to improve cell therapies, vaccine development, and TCR-based diagnostics. Our body's immune defenses are triggered when immunogenic peptides presented by the MHC are presented to TCRs. At this time, the research community is striving to further our understanding of binding patterns between the two. As more TCR-antigen paired data continues to be produced, machine learning models can be trained to predict MHC alleles and TCR interactivity against rare and novel targets, especially ones that were not previously included in the training data. The goal of this project is to: standardize and encode a TCR-pMHC model and test datasets based on public, experimentally validated TCR-pMHC paired data, write and train a convolutional neural network (CNN) model using TensorFlow based on specifications described by Fast et al (2023), benchmark model performance against similar publicly available training models, and publish our source code for further improvements. Emulating the source code from NetTCR 2.2, we will collect a subset of data from VDJdb, filter that dataset using PANDAS, and train a CNN to establish patterns and interactions using various training tasks. We expect that the improved training model will have the capability to make accurate predictions on peptides not included in the training data and publish our source code for public and academic use.

55. *Skih*-daddle: Microsatellites, Genomic Instability, and Possible Correlations to *skih-2* Deletion

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Various studies have established that an increase in microsatellite instability (MSI) – accumulated unstable repeat regions within DNA – play a role in cancer development. Normal DNA mismatch repair corrects errors associated with MSI, however, when incapacitated mutations accumulate. The aim of our current research is to understand the potential role of *skih-2* in the regulation of microsatellites. The exonuclease involved in mRNA decay and part of the exonuclease complex, *skih-2,* has been found downregulated in MSI-related cancers. Although the function of *skih-2* is not fully understood, we hypothesize that it is involved in maintaining genomic stability through curtailing excessive MSI expansion. To test this hypothesis, we investigated whether *skih-2* deletion led to intensified MSI. This was carried out via collection of wildtype and *skih-2(Δ) C. elegans* in the initial generation and after 30 generations, allowing plenty of time for possible MSI to occur. High molecular weight DNA was subsequently extracted and prepped libraries were sequenced using nanopore. The resulting sequences were then aligned, with our initial generation 0 acting as the reference genome to track developments in microsatellite expansion. Interactions between *skih-2* and MSI could lead to further understanding in how genomic stability is maintained.This in turn will illuminate the mechanisms by which genetic diseases occur, in conjunction with greater insights on the impact of epigenomic alterations within cells. Future investigations aim to fully characterize the role of *skih-2* in relation to mismatch repair and microsatellite regulation, defining its roles in preserving important biological pathways and cellular health.

56. Bending the River

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In habitat restoration, analyzing DNA from ancient sediment or tissue samples to gain insight into the precolonial biodiversity of the habitat can provide insights to guide restoration strategies. However, ancient DNA is easily contaminated by the modern environment, making analysis and interpretation more complex. As part of an ongoing project conducted by Metabolic Studios to help alleviate water scarcity and quality issues faced by the city of Los Angeles and to restore the native wetland habitat around the LA River, I am identifying plant and mammal species DNA extracted from ancient LA River samples. First, I am examining the plant genetic structure from grasses that emerged from ancient LA River sediment excavated from the project site and will use NEB library

preparation, shotgun library sequencing, and whole genome analysis to identify the plants. Next, I will also extract ancient DNA from the excavated 7000-10000 year old sediment core samples themselves, and use target capture baits enrichment on shotgun libraries to identify both mammal and plant species DNA within the samples. My results will aid the creative restoration and storytelling efforts of Metabolic Studios and their collaborators, the Tongva Tribe, by providing insight into the composition of the wetland habitat prior to colonial interference, and detail of how modern and ancient DNA or species may mix in the samples themselves. The latter may help describe what happened to sediments as the LA River was concretized, and illuminate what to expect when sediments are uncovered and the seeds within allowed to grow.

57. **Genetic Species Identification of *Sebastes* Rockfishes in California**

Anastasia Swann[1], Libby Gilbert-Horvath[2], Andres Aguilar[3], S. Elizabeth Alter, Ph.D.[1], & John Carlos Garza, Ph.D.[2]
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Accurate species identification is one of the most important parts of sample collection for ecology and fisheries management. However, making an accurate species identification based solely on morphology can be challenging. This can be due to cryptic species that are morphologically indistinguishable due to similar coloration or overlapping meristics but are genetically distinct. A good example is the rockfishes of the genus *Sebastes*, which are in the process of rapidly speciating, as evidenced by the 65 known species of *Sebastes* living off the Pacific Coast of California (Love et al. 2002), with more that continue to be discovered (e.g., Frable et al. 2015). Due to these factors, it is common for field misidentifications to be discovered during later data analysis. Here we analyzed rockfish samples that appeared as morphological outliers in multi-species collections, thus requiring a reassessment of their species identification through genetic means. We also analyzed samples from rockfish species that are known to have biological differences in different habitats, to evaluate whether they are genetically distinct. To analyze these samples, we used the genotyping-in-thousands sequencing (GT-seq) method (Campbell et al. 2014) to genotype a set of 96 genetic markers chosen for the high heterozygosity necessary to differentiate closely related rockfish species (Baetscher et al. 2023). Our objectives are twofold: genetically determine the species identity of potentially misidentified individuals, and evaluate selected *Sebastes* samples[2] for evidence of new cryptic species. The results from both lines of investigation will further our understanding of the phylogenetic relationships amongst *Sebastes* species.

iCARE

58. **The Effect of Vegetation Maturity on Amphibians**

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This study focuses on the relationship between restored habitats and amphibians in the Moro Cojo Slough State Marine Reserve. Human activity such as climate change has significantly impacted important ecosystems like estuaries, which have many valuable flora and habitats for organisms. There are currently many restoration efforts along the Central Coast of California restoring native flora which provide shelter for many sensitive organisms like amphibians. This study aims to investigate vegetation diversity and amphibian abundance within the Moro Cojo Slough State Marine Reserve. With a decline in natural habitats, we expect there would be a significant decrease in the amphibian population. Natural habitats with a larger and more diverse vegetation will be expected to have a higher amount of amphibians, compared to those with a lower abundance and diversity. Many studies have shown that habitats that have a higher abundance of vegetation, have a larger amount of not just amphibians but animals overall. To test the hypothesis we will be IDing all surrounding vegetation at various wetland sites by photographing and identifying, measuring the height of each plant, and writing down the presence of amphibians on each plant to determine the density and relation between restored habitat to amphibian abundance. This research can be important for understanding the effect of plants on amphibians that rely on them for shelter and a source of food. It can also be important to know what plants to protect and increase the growth of those plants.

59. **Bmp-Dependent Control of Substrate Morphogenesis by Migrating Cells**

Oscar Galindo[1], **Precious Eady**[1], **Itzel Gonzalez**[2] & Frank Macabenta, Ph.D.[3]
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[2]Applied Environmental Science Department, California State University, Monterey Bay, Seaside, CA
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Comprehending cell migration coupled with the variety of functions it serves, allows for understanding organogenesis and interactions with multiple tissues. We used *Drosophila* cells as a tractable model for how the migration of CVM influences the trajectory of the

TVM cells. The methodology used is a series of embryo fixations followed by immunohistochemistry with the use of rabbit, mouse and goat antibodies; the antibodies target specific proteins in the CVM that allows us to visualize the cell membrane. We also used immunofluorescence staining to analyze our data through confocal microscopy. FGF signaling is required for proper migration of CVM cells and the TVM, the removal of FGF may result in the abnormal CVM migration in TVM bridges. FGF and BMP signaling in *Drosophila* is required for normal TVM development; if the BMP effector Tolkin (Tok) is removed, then the TVM in heartless mutants will cross. We believe that the TVM crossing over is due to BMP signaling being activated by the CVM-secreted Tok. Tok may therefore serve as a positive regulator of BMP signaling in the TVM to promote normal development in crossing of bridges. Brinker negatively regulates BMP signaling to restrict BMP-dependent cell growth; therefore, loss of Brinker leads to a vast amount of bridge development. By staining the Tok heartless mutants the project goal is to analyze how many bridges are created by the heartless mutants and the brinker mutants, in order to understand how migrating cells can regulate their own substrate, which is relevant for understanding how cancer cells influence their microenvironment.

60. **Community Dynamics in Bioremediating Bacteria**
Jasmine Maciel[1], William Nader[1], Mary Snook[2], & Nathaniel K. Jue, Ph.D.[2]
[1]*Biology Department, Monterey Peninsula College, Monterey, CA*
[2]*Department of Biology and Chemistry, California State University, Monterey Bay, Seaside, CA*

The Salinas Valley is an agricultural area with significant pesticide use to ensure a high agricultural productivity. These enter the watershed and cause problems for wildlife downstream. Bioreactors address this problem by targeting the degradation of pesticides. A bioreactor provides a structure for bioremediating bacteria, allowing them to clean agricultural water waste that flows through. How do bacterial communities respond when a pulse of pesticide enters the bioreactor? To test this question we conducted a pesticide spike-in experiment, in which bioremediators and imidacloprid were added to the bioreactor's inflow. Water and Sediment samples were collected at the beginning and at the end of the bioreactor for DNA isolation and analysis of pesticide concentration. We used 16S sequencing to assess changes in microbial communities. We used the Qiime2 pipeline to compare the bacterial community composition at different time points to examine changes in the bacterial communities. Results from this study will be used to improve the efficacy of bioreactors in the field and improve pesticide removals. Our hypothesis is that by the end of the study, the microbial communities in the bioreactor system will show an increased concentration of bioremediators due to the presence of pesticides in the water. Bioreactors are environmentally friendly solutions to challenges faced by agricultural communities worldwide. By optimizing our pesticide-degrading bacterial communities, we can help reduce the health and environmental risks that are associated with pesticide use. This approach promotes sustainable agriculture practices and protects our ecosystem, contributing to a more sustainable future.

61. **The Dynamics of Pesticide Metabolism and Uptake in a Woodchip Bioreactor**
William Nader[1], Jasmine Maciel[1], Mary Snook[2], & Nathaniel K. Jue, Ph.D.[2]
[1]*Biology Department, Monterey Peninsula College, Monterey, CA*
[2]*Department of Biology and Chemistry, California State University, Monterey Bay, Seaside, CA*

Pesticides are a large and essential part of crop production in California. These pesticides have the potential to flow into our oceans and groundwater, affecting marine life and compromising our potable water. The Jue lab at CSUMB investigates bacteria that are capable of metabolizing and breaking down pesticides. We tested this idea by taking some water flow from farmlands in Salinas and allowing it to flow through a bioreactor that contains bacteria that was pesticide selected in our lab. However, the pesticide in the water from the farm may not be uniform as it flows. This means we will not know how much we started with, causing our readings at the beginning and end of the port to not accurately represent the concentration of pesticide and bacteria. To better demonstrate efficacy, our lab conducted a series of spike-in trials what consists of using Rhodamine Dye and measuring the flow rate over several different days and timing how long it takes to flow through the bioreactor, this was done to set up the model against which we will compare with pesticide concentrations. We then "spiked in" a defined pulse of the pesticide Imidacloprid and took a series of samples at the end of the reactor to truly test how much the pesticide concentration had decreased. We then tested observed concentrations of pesticides for difference to a model of expected concentrations generated from the rhodamine dye control to examine the efficacy of pesticide bioremediation of the bioreactor system.

62. **Analyzing the Impact of Data Structures on Data Computation in Model Applications**
Angel Vazquez[1] & Joshua Gross, Ph.D.[2]
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[2]*School of Computing and Design, California State University, Monterey Bay, Seaside CA*

Data structures such as arrays, lists, indexes and queues provide the foundation for efficient data manipulation in the study of Computer Science. With each data structure offering unique benefits and drawbacks depending on the situation, based on computation power, time, and ease of implementation. However, implementation of these data structures are impossible without a solid understanding beyond the logic and use case for each operation. To overcome this hurdle, this study aims to provide insights of

commonly used data structures through data analysis for a model application involving the parsing, sorting, organization of various data files. Data collection devices, particularly, medical devices such as fitness trackers generate large amounts of valuable data needed by researchers. Often when collecting data from different sources, it will need to be parsed. In this model application, a program must use a variety of data structures to efficiently reach the desired goal of the researcher. As such, the usage of data structures in scenarios such as the model application highlights the importance of understanding the underlying execution of data structures to streamline data computation.

MPC MICRO-INTERNSHIP PROGRAM

63. Applications of ROV Technology in Environmental Sampling: Trash, Microplastics and Other Observations
Christopher C. Barraza, **Zaira Hernandez**, **Brandon H. Pillar**, & Kevin A. Raskoff, Ph.D.
Biology Department, Monterey Peninsula College, Monterey, CA
Our research set out to determine the impact of human waste on marine environments and to investigate the viability of remotely operated vehicles (ROVs) in the collection of marine debris. Deploying the ROV beneath the waves at the Monterey Municipal Wharf revealed significant human impact in the form of waste products littering the sea floor; we were also able to record footage of the waste present. A robotic arm attachment was utilized to retrieve several types of marine debris to mitigate its impact on the marine ecosystem. Sediment and water samples were also collected at various locations along the wharf to sample for microplastics. In the lab, we used a solution of 5% sodium hexametaphosphate to separate microplastics from the sediment by density and then filtered the sediment samples and water samples through a 0.45 μm filter, we then used a microscope to count the number of microfibers present in the samples. Our ROV sampling found 18 pieces of trash, the most common item being cigarette butts along the shore followed by fishing line along the wharf. We were able to extract 190 microfibers from our samples and found a significant prevalence in the sediment close to and along the shoreline. Our research provided us with a unique look into the state of environmental waste in our marine ecosystem as well as footage that can be used to monitor the environment over a time with multiple deployments.

64. How Does Water Clarity Affect the Number of Species in the Ocean?
Ryan Beck, Chris Klaus, Ranal Pillay, & Kevin A. Raskoff, Ph.D.
Biology Department, Monterey Peninsula College, Monterey, CA

Our group hypothesized that there is a relationship between water clarity and the populations of species. We wanted to test if we would see a higher number of individuals if the water turbidity was higher (less clear). Two locations on the Monterey Commercial Wharf were chosen that were in close proximity but differed in depth and turbidity. The equipment that was used in the research was the Qysea FiFish V-EVO ROV, secchi disk, Niskin bottle, and YSI Pro 30 conductivity meter. The ROV collected visual data while the secchi disk, Niskin bottle, and YSI Pro 30 conductivity meter collected the physical data. The data collected from the two different sites agreed with the hypothesis that there were more individuals of several species found in locations with higher turbidity. The ROV video recorded showed a higher concentration of rockfish, crabs and nudibranchs congregating at the deeper, more turbid location. There were 34.6x more rockfish, 1.4x more crabs, 3x more nudibranchs at the deep, turbid site compared to the shallow site. Future research could investigate the importance of depth vs. turbidity, as well as the importance of tidal cycles and time of day on species location and behavior.

65. Distribution of Marine Organisms Based on Depth and Location at the Monterey Municipal Wharf
Kat S. Drumright, Jules A. Dye, Colton R. Michael, & Kevin A. Raskoff, Ph.D.
Biology Department, Monterey Peninsula College, Monterey, CA

The Municipal Wharf at Monterey Bay provides a habitat for a variety of intertidal marine species in the form of pier pilings and other underwater structures. Using video footage from QYSEA "V-EVO" ROV (remotely operated vehicle), we were able to document the prevalence and distribution of marine invertebrates seen inhabiting the pilings. In this experiment, the ROV was used to capture video of pilings on the East and West sides of the wharf, from surface (0 m) to seafloor (5-8 m). Video footage was analyzed by taking a 0.3 by 0.3 meter quadrat and calculating the coverage of particular species including the Red Bryozoan, Strawberry Anemone, Colonial Sea Squirt, Acorn Barnacle, and California Mussel. Results determined that these organisms are not distributed randomly, and exhibit a preference for East or West location and depth. In particular, the Red Bryozoan, Colonial Sea Squirt, Strawberry Anemone, and the California Mussel showed a directional preference of over 60% difference in population distribution between East and West sides. In terms of depth, the majority of species were observed having a preference for near-surface depths with over 72% of the coverage by Strawberry Anemone, California Mussel, and Acorn Barnacle above 4 m. However, the Red Bryozoan demonstrated an affinity for near-bottom depths. While water quality testing showed no significant difference in temperature or turbidity between locations, other predictions can be made as to why these organisms showed locational preference including species-specific preferences, competition, and intertidal zonation.

66. **Biodiversity and Abundance in CA Coastal eDNA Samples**

Brian Garcia[1], Oscar Garcia[1], Freddy Irwin[1], Macy Roberts[1], Rachel Meyer, Ph.D.[2], & Princess Gilbert, Ph.D.[1]
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Environmental DNA (eDNA) is a useful tool in studying biodiversity, and it is important to obtain a biodiversity baseline to be able to compare to in the future. One thing that can easily be observed in an eDNA sample is the abundance of DNA. We were curious if there is a relationship between abundance and biodiversity, specifically alpha diversity, and if invasive species presence correlated with high alpha biodiversity levels. After learning and practicing wet lab and field work techniques including soil and water sample collection, accurate and precise micropipetting, DNA extraction, PCR, and gel electrophoresis, our team of four MPC interns took field samples and initiated sample processing lab work which will be added to the UCSC CaleDNA database. We also used the software analysis program Ranacapa and eDNA Explorer database to analyze the eDNA California coastal metadata. Preliminary results indicate that sample sites with the highest levels of abundance, (e.g. Bodega Bay, Moonstone County Park, and Carpinteria Beach), correlate with the highest levels of alpha diversity. There were no invasive species observed at these sites, however since eDNA often does not provide data to the species specific level, the lack of invasive species DNA in the samples is not conclusive. As eDNA research methods advance, hopefully researchers will develop ways to identify DNA at the species level. eDNA would then become a useful tool in studying both how pervasive an invasive species is, and if it has a relationship with biodiversity and abundance levels.

67. **Redesigning a Charging Adapter for Reduced Manufacturing Cost**
Julian Clark & Kevin Gong
Monterey Peninsula College, Monterey, CA

Third party manufacturing of a charging adapter for a consumer electronics device comes with extra costs associated with setup and high volume production. To assist in a cost savings exercise, three engineers from Monterey Peninsula College developed and assessed a number of alternative designs that can be fabricated in-house with an injection molding machine. Their project was part of the spring Design and Prototyping workshop at Monterey Peninsula College, and is funded in part by LSAMP, HSI-STEM EMC^2, and the Chevron corporation.

68. **Fitbit Data Aggregator for Large-Scale Kinesiology Intervention Studies**
Brandon Le[1], **Sean Cornell[2], & Angel Vazquez[2]**
[1]University of California, Los Angeles, Los Angeles, CA
[2]Monterey Peninsula College, Monterey, CA

Working with the Iowa State University Kinesiology department, a team of three software engineering students at MPC and UCLA developed a prototype open-source multi-unit Fitbit data extractor and aggregator for use in large scale health intervention research. While their system is currently undergoing beta testing with Iowa State, the team plans to build on their work towards enabling greater access to device data. Their project was part of the spring Design and Prototyping workshop at Monterey Peninsula College, and is funded in part by LSAMP, HSI-STEM EMC^2, and the Chevron corporation.

69. **RC Duck with Dual Air/Water Propulsion for a Competitive Event**
Rosie Mireles & Adriana Resendiz
Monterey Peninsula College, Monterey, CA

Racing an inflatable duck down river incurs numerous engineering challenges in propulsion, control, structural supports and power electronics. One team's approach to outpacing their rivals by combining ducted fan motors with submerged marine thrusters is discussed in this presentation. Their project was part of the Design and Prototyping workshop at Monterey Peninsula College, and is funded in part by LSAMP, HSI-STEM EMC^2, and the Chevron corporation.

70. **Motorized Disk Alignment for Gas Flow Meter Manufacturing**
Jordan Simpson, Kale Davis, & Andrew Gibbs
Monterey Peninsula College, Monterey, CA

The pressure reducer within a modern gas flow meter consists of a stack of thin wafers that are placed laboriously by hand onto three posts to maintain proper airflow through the vanes. In this presentation, three Engineering students from MPC showcase their design of a rotary tool to rapidly align the wafers, thus reducing assembly time substantially. Their project was part of the Design and Prototyping workshop at Monterey Peninsula College, and is funded in part by LSAMP, HSI-STEM EMC^2, and the Chevron corporation.

AGPS NEXTGEN/L2L PROGRAM

71. **Breeding for INSV Resistance in Lettuce**
Josue Ceja[1] & Kelley Richardson, Ph.D.[2]
[1]*Department of Biology and Chemistry, California State University, Monterey Bay, Seaside, CA*
[2]*United States Department of Agriculture, Agriculture Research Service, Salinas, CA*

72. **Sweet Alyssum/Insect Population Survey**
Rigoberto Cruz-Lopez[1] & Kimberly Horton[2]
[1]*Department of Biology and Chemistry, California State University, Monterey Bay, Seaside, CA*
[2]*Taylor Farms, San Juan Bautista, CA*

73. **The Power of Seeds: Nutrient Profiles in Broccoli**
Angela Diaz[1], Myungjin Lee, Ph.D.[2], & Xianming Duan, Ph.D.[2]
[1]*Department of Biology and Chemistry, California State University, Monterey Bay, Seaside, CA*
[2]*Sakata Seed America, Salinas, CA*

74. **Promoting Agricultural Sustainability Through NRCS Outreach**
Sara Drumonde[1] & Pa Yang[2]
[1]*Department of Biology and Chemistry, California State University, Monterey Bay, Seaside, CA*
[2]*USDA Natural Resource Conservation Service, Merced, CA*

75. **Role of Genetic Purity in Quality Assurance**
Victoria Favila[1] & Bidisha Chanda, Ph.D.[2]
[1]*Department of Biology and Chemistry, California State University, Monterey Bay, Seaside, CA*
[2]*Sakata Seed America, Salinas, CA*

76. **Enhancing Growers Irrigation System w/ NRCS**
Josue Flores[1] & Drew Mather, M.S.[2]
[1]*Department of Biology and Chemistry, California State University, Monterey Bay, Seaside, CA*
[2]*USDA-Natural Resource Conservation Service, Capitola, CA*

77. **Advancing Red Raspberry Breeding through Phenotypic Evaluation**
Jonathan Garcia[1] & Luis Rodriguez[2]
[1]*Department of Biology and Chemistry, California State University, Monterey Bay, Seaside, CA*
[2]*Plant Sciences Inc., Watsonville, CA*

78. **Mechanical vs. Vector Transmitted INSV in Lettuce**
Isidora Garcia Hernandez[1] & Kelley L. Richardson, Ph.D.[2]
[1]*Department of Biology and Chemistry, California State University, Monterey Bay, Seaside, CA*
[2]*United States Department of Agriculture, Agriculture Research Service, Salinas, CA*

79. **Phenotypic Evaluation of Advanced Black Raspberry Breeding Lines**
Ryo Harris[1] & Cecilia Viscarra, M.S.[2]
[1]*Department of Biology and Chemistry, California State University, Monterey Bay, Seaside, CA*
[2]*Plant Sciences Inc., Watsonville, CA*

80. **Knowledge Needed to Implement a Spray Drone in Agriculture**
Mariela Hernandez Medina[1] & Mark Mason[2]
[1]*Department of Biology and Chemistry, California State University, Monterey Bay, Seaside, CA*
[2]*Nature's Reward, Salinas, CA*

81. **Genotypic Diversity of Baby Greens Extended Shelf Life**
Bryan Holt[1] & Kyle Brasier, Ph.D.[2]
[1]*Department of Biology and Chemistry, California State University, Monterey Bay, Seaside, CA*
[2]*Vilmorin - Mikado, Gilroy, CA*

82. Defining Plant-Soil Microbe Interactions to Support Plant Health and Carbon Sinks

Damaris Ispache[1], Veronica Escalante, Ph.D.[2], Adrien Fremont, Ph.D.[2], & Kateryna Zhalnina, Ph.D.[2]
[1]*Department of Biology and Chemistry, California State University, Monterey Bay, Seaside, CA*
[2]*Environmental Genomics & Systems Biology, Lawrence Berkeley National Laboratory, Berkeley, CA*

As greenhouse gas concentrations, particularly carbon dioxide, continue to impact climate change, enhancing carbon sequestration through natural processes becomes more essential for limiting the adverse effects of climate change. methods. We investigated these interactions by evaluating eight cover crop varieties using field soil from the University of California, Davis. A greenhouse experiment was designed and implemented to understand the relationship between these plants, their exudates, rhizosphere microbes, and biogeochemical cycles. Metabolites from the rhizosphere were extracted and will be analyzed using liquid chromatography-mass spectrometry to identify the chemical compounds exuded by plants. Microbial communities in the rhizosphere were characterized through bacterial isolation using Reasoner's 2A (1/100) and soil extract media. This analysis aims to isolate and identify microorganisms that through interactions with plants influence carbon sequestration. Plant diversity and the associated microbial dynamics in the rhizosphere play a crucial role in carbon storage, enhancing ecosystem services, and promoting plant health. These studies provide a foundation for developing strategies to utilize microbial communities for improved carbon sequestration and sustainable practices in plant systems.

83. Sources Across the Salinas Valley, CA

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84. Field Mapping and Regenerative Organic Certification at Earthbound Farm Stand

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85. Identifying Heat Tolerance in Wild lines of *Agaricus bisporus*

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86. The Development of Seed Coatings to Improve Germination and Vigor

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87. Identifying and Addressing Agricultural Resource Concerns in Tulare County, CA

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88. Slakes & VAST: Comparing Aggregate Stability Testing Methods

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89. Testing Different Tomato Varieties on Viscosity, Brix, and Bostwick

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90. Fusarium Wilt Race 2 of Strawberries: Detection through RPA and q-PCR

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91. **Almond Physiology & Hydraulics**
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Department of Biology and Chemistry, California State University, Monterey Bay, Seaside, CA

92. **Comparison of Two Organic Insecticides for Cabbage Past Management**
Ramon Perez Zamudio[1] & Katie Chiapuzio[2]
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[2]Braga Fresh Family Farms, Soledad, CA

93. **Implementing Climate Smart Management Practices in Agriculture**
Gladys Puga[1], Stefanie Kortman, M.S[1], Elise Vasquez[2], Angelica Alcazar[1], Justin Ide[1], & Arlene Haffa, Ph.D.[1]
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[2]Department of Applied Environmental Science, California State University, Monterey Bay, Seaside, CA

94. **Cultivating Connections: Integrating Research and Outreach to Engage Diverse Audiences**
Crystal Salazar-Nieto[1] & Geralynn Cortez, M.A.[2]
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95. **Controlling Mealybug Populations: Ant Identification and Experimental Vine Treatment**
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96. **Characterization of Phosphorous Acid Sensitivity of *Pythium uncinulatum* and *P. ultimum* from Salinas Valley**
Katelynn Sanchez, Keeliah Keelen, & JP Dundore-Arias, Ph.D.
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97. **Evaluating Lettuce Cultivars for Soilborne Disease Resistance in Monterey County**
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[2]D'Arrigo Bros, Salinas, CA

98. **Phenology Vine Stage Decline**
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[2]Constellation Brands, Soledad, CA

99. **Nitrate Leaching Curves Analysis**
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