CREATIVE **COLLABORATIONS** UNDERGRADUATE RESEARCH CONFERENCE

Thursday, April 21, 2022 | 12–2 p.m.
University of San Diego | Hahn University Center
www.sandiego.edu/cc-urc
Office of Undergraduate Research

Student-faculty
Research
Scholarship
Creative Works

WELCOME to the Creative Collaborations Undergraduate Research Conference!

We are so excited to host Creative Collaborations in person for the first time in two years! In 2020 and 2021, students presented their research, scholarly activities, and creative works in a virtual format due to the ongoing COVID-19 pandemic. This year, 105 students across a broad range of disciplines submitted abstracts. We encourage you to visit students as they present their research in oral and poster formats.

The past two years have been historic, highlighted by the COVID-19 pandemic and its aftermath. Several of the research projects presented at Creative Collaborations address these issues and have the potential to make real contributions to knowledge and practice. Among the diverse presentations are studies about plagues and pandemics in the literature; detection of facial cues while mask wearing; and development of plans for affordable housing in response to San Diego's Housing Element document.

Creative Collaborations is an important part of Research Month at USD, which showcases activities across the university and honors students and faculty members who challenge themselves to extend learning beyond the classroom. We invite you to view and experience a variety of presentations during this celebration of faculty-student scholarly collaboration.

Congratulations to all the student presenters and faculty members participating in this year's Creative Collaborations Undergraduate Research Conference!

Elisa Maldonado Greene, PhD
Director

Disciplines & Schedule

ABTRACT BOOK

In keeping with USDs commitment to sustainability, the abstract book can be found online at www.sandiego.edu/cc-urc.

RESEARCH MONTH April 2022

Creative Collaborations Undergraduate Research Conference is part of USD's Research Month. For more information about offerings, please visit https://www.sandiego.edu/osp/research-month/2022.php

OFFICE OF UNDERGRADUATE RESEARCH

Established in September 2011 with a grant from the W.M. Keck Foundation and funding from individual donors, the mission of the Office of Undergraduate Research is to support undergraduate students in research, scholarship and creative activities. Underlying our mission is a commitment to equity and access, to ensure that all students are able to participate in and benefit from research activities both in and out of the classroom. The office provides services to both students and faculty members who mentor them in research activities, and encourages collaborations across departments, disciplines, and with the local and global community.

The University of San Diego is an enhanced institutional member of the Council on Undergraduate Research.

Life and Physical Sciences

Ichthyofaunal Utilization of a Man-Made Salt Marsh Creak in Mission Bay, California, 25 Years After Creation

MARIA ANGST and Drew Tally

Southern California's wetlands are drastically declining due to human activities. Increasingly, marsh restoration and creation are being used to mitigate such losses. This study used minnow traps to resample the ichthyofauna of a created marsh (Crown Point Mitigation Site; CPMS) and an adjacent natural marsh (Kendall Frost) in Mission Bay, California, 26 years following the marsh creation. These data were compared to data collected from 1995-1998, immediately after marsh creation. Fishes trapped included Fundulus parvipinnis, Gillichthys mirabilis, Ctenogobius sagittula, Atherinops affinis, and Mugil cephalus. Species richness and dominance measures were higher in the natural relative to the created marsh. The size-structure of F. parvipinnis in the natural marsh was skewed towards larger sizes relative to those in the created marsh. These size differences are the opposite of those noted in the years immediately following marsh creation and appear to arise from differences in creek morphology between the created and natural systems, with the created marsh having become shallower through time. The differences in size-structure and species richness between the created and natural systems suggest that marsh and creek geomorphology may affect the suitability of habitat for resident fishes, and so should be considered when designing marsh restoration projects.

Effects of Pregnancy and Lactation on the Gastrocnemius Muscle of Female Rats

JACOB BARRETTO and Nicole Danos

The proportion of Type I oxidative to Type II glycolytic muscle fibers within a muscle, contributes to the muscle's overall contractile properties. Although percent muscle fiber type within a muscle is mostly genetically determined, there are various instances in an individual's lifetime, such as during aging, where muscle fiber composition can change. In our project, we examined how pregnancy and lactation induce muscle remodeling in the gastrocnemius muscle of rats using immunohistochemistry on muscle samples from virgin non-pregnant, primiparous pregnant and postpartum lactating rats. The gastrocnemius is a part of the hindlimb muscles that power the animal's movement of the rat; therefore, muscle remodeling during these critical life stages can have potentially large effects on the animal's fitness. Here we show that over the course of pregnancy, there is a significant shift of muscle fiber composition in the gastrocnemius from Type I to Type II. Over the three stages that we measured, we found that during pregnancy the number of Type IIa and Type IIb fibers significantly increased compared to non-pregnant animals, but then decreased slightly during lactation. For Type IIb fibers, the average cross sectional fiber area increased significantly during pregnancy but decreased postpartum. Our results demonstrate that pregnancy and lactation lead to muscle induced remodeling in the gastrocnemius. We hope that our experiments will lead to future research into how reproduction induced changes contribute to locomotor performance and survival in mammals.

Potential Impact of Phosphorylation on Malate Dehydrogenase and Citrate Synthase Protein-Protein Interaction

ALEX BLATT and Joseph Provost

Fine tuning of metabolic protein pathways is an insightful way to learn about the progression of diseases linked to metabolism. Analyzing specific protein interactions in a structure-function relationship, opens the discussion for potential therapeutic interventions. Malate Dehydrogenase (MDH) and Citrate Synthase (CS) interact in human mitochondria forming a metabolon found within the Krebs Cycle. While the interaction between MDH and CS is not novel, the complete interface between MDH and CS is not yet determined. Furthermore, how these interactions may be modulated by post-translational modification has yet to be investigated. This study attempts to investigate if key residues driving isoform specific interactions are regulated by phosphorylation. Published docking models of MDH and CS highlight several potential sites of interaction, but the key residues of MDH in the interface are not experimentally determined. We performed additional docking predictions with published cross-linked lysine residues of MDH-CS. To examine the key sites of interaction between MDH and CS and its regulation, we selected several putative phosphorylation sites specific to mitochondrial MDH; S45, T85, S222, and T224, and generated phosphomimic S/T to D mutants. We conducted pull-down assays to illustrate the possible changes in interactions with CS in the wild-type and phosphomimic MDH-CS pairs. In determining the interface and post-translational modification with these key residues, we can clarify where and how the governing mechanism regulates MDH and CS interaction. This will enable us to gain insight into the modulation of the binding interface interaction and contribution towards altering various metabolic disease pathways.

Co-electrodeposition of Nickel and Platinum Nanowires for Methanol and Ethanol Oxidation

LAUREN DEL ROSARIO and Eleanor Gillette

The goal of this project is to deposit Nickel (Ni) and Platinum (Pt) nanowires in a single step electrodeposition process to act as catalysts for methanol oxidation in direct methanol fuel cells. The results from using cyclic voltammetry (CV) allows for the analysis of methanol oxidation for the various experiments performed during the course of the project. First, we determined the deposition parameters needed to produce NiPt alloys using a flat, glassy carbon working electrode. Such parameters include acid choice, nanostructuring, and NiPt ratio. With respect to acid choice, it was found that citric acid was preferred in the solution. This shows that citric acid allows the codeposition of Ni and Pt to occur. The optimum parameters were also used to demonstrate that nanowire electrodes could be fabricated using anodized aluminum oxide (AAO) templates. When different ratios of Ni:Pt were being tested on both types of electrodes, the results on the voltammogram showed that a 0.2 M Ni(II)SO4, 0.3 M Na2SO4 and 0.4 M Citric acid was the optimal ratio. In the future, the goals of the project will be focused on fabricating nanowire electrodes using anodized aluminum oxide template and analyzing their catalytic effects.

NHE1 as a Target to Block Lung Fibrosis Progression

SARA DESALEGNE and Joseph Provost

Idiopathic pulmonary fibrosis (IPF) is a progressive fibrosing interstitial pneumonia of unknown origin. Fibrosis, a wound healing process, occurs when fibroblasts increase proliferation, convert to myofibroblasts, and secrete extracellular matrix (ECM) proteins. As a result, tissue becomes scarred, reducing lung compliance and ultimately leads to organ dysfunction and death. IFP is characterized by profibrotic agonists and alpha-smooth muscle actin (α-SMA) expression. TGF-β, IL-1β, LPA, 5-HT are agonists involved in cell migration regulation, proliferation, and cytokine production. Chronic agonists exposure causes α-SMA expression which stiffens fibrotic tissue alongside ECM proteins. Prior studies have shown that the sodium hydrogen exchanger isoform 1 (NHE1) is a key regulator in cell migration and pathophysiological development of cancer. The characteristics of IFP are similar to that of cancer (i.e., response to growth signals, myofibroblast origin and behavior, altered cellular communications, and intercellular signaling pathways). Due to these similarities, we hypothesize that NHE1 plays a key role in IPF progression. Results show fibroblast to myofibroblast differentiation is induced in the presence of NHE1 and can also be blocked by the NHE1 inhibitor (EIPA) in mammalian hamster cells. Cells treated with agonists showed some to high α-SMA expression. Cells treated with agonist and EIPA had no expression of α-SMA (TGF-β/EIPA: 35.67 ± 1.76; IL-1β/EIPA: 11.67 ± 2.03, LPA/EIPA: 33.33 ± 2.19, 5HT/EIPA: 30.00 ± 1.15), and is comparable to the untreated control (20.83 ± 3.12). This improves our understanding of NHE1's role in IPF, and how NHE1 can be a target to impede or hopefully reverse myofibroblast differentiation in IPF patients.

The Use of Computational and Wet-Lab Techniques to Elucidate the Role of HMGB1 in Cell Clearance

ALEXIS DESANY and Anthony Bell

High Mobility Group B1 (HMGB1) is a highly abundant multifunctional or "moonlighting" protein that regulates a critical intra- and extracellular activities. In the early 70s, HMGB1 was originally classified as an intracellular DNA-binding protein. In this role, HMGB1 controls DNA related functions such as: transcription, genetic recombination and DNA repair. More recently, research shows that HMGB1 also functions extracellularly. One of the most well-known is HMGB1 acting as a proinflammatory cytokine that protects host organisms. On the other hand, HMGB1 can inadvertently promote unintended responses that worsen autoimmune diseases such as lupus and rheumatoid arthritis. We focus on a relatively understudied or emerging function of HMGB1. Recent studies indicate that HMGB1 can inhibit phagocytosis. Phagocytosis is also referred to as cell clearance. Improper phagocytosis is linked to the origin of lupus and worsening of cystic fibrosis. We hypothesize HMGB1 binds to key molecules in the cell clearance pathway to inhibit phagocytosis. Computational techniques (docking) are used to evaluate HMGB1 binding interactions with known cell clearance molecules. The computational data is compared with existing wet lab data to evaluate their consistency before initiating surface plasmon resonance binding assays. The results will be used to establish a phagocytosis model based on HMGB1.

Neutrino Evolution in the Early Universe

BRANDON EICKERT, ASHKAUN BASHAR and Chad Kishimoto

In the hot and dense early universe, neutrino evolution is driven by both the coherent development of quantum phase and the decoherent destruction of this phase through scattering. In this environment, the quantum mechanical oscillation rate and kinetic scattering rate of neutrinos are affected by their interactions with a thermal background of the primordial soup of Standard Model particles; both these rates are large compared to the universal expansion rate. We solve the Quantum Kinetic Equations for neutrino states in the early universe for a variety of scenarios and discuss the characteristics of their solutions.

SIKE's Phosphorylation Sites Alter Quaternary Structure

DANIELLE ETIEL, ALYSSA PHAM, Sally Ryu, Cade Lyons, Marissa Dzotsi, Diya Patel, Theresa Nguyen, Ryan S. McCool, and Jessica K. Bell

Protein-protein interactions (PPIs) are a crucial part of intracellular communication and function. The "rules" for specificity are not completely understood, but protein modifications, such as phosphorylation, have been implicated in this process. Suppressor of IKKepsilon (SIKE) is associated with multiple, distinct proteins including cytoskeletal proteins tubulin and actinin. Although SIKE's function is not fully defined in these complexes, protein modification has been observed in SIKE (phosphorylated at six serine residues: 133,185,187,188,190,and 198) that may direct PPI formation: Co-immunoprecipitation revealed that the tubulin interaction was enhanced with the phosphomimetic SIKE (S133/185/187/188/190/198E). We hypothesize that the quaternary state of SIKE, regulated by phosphorylation, dictates SIKE PPI formation. Using the SIKE phosphomimetic mutant, size exclusion chromatography and chemical crosslinking studies showed a monomeric species, whereas native SIKE separated as a dimer. These studies support SIKE undergoing a phosphorylation-induced change in quaternary state. Prior computational assessment of dimer interface stability with single phosphomimetic substitutions identified S187E, S190E, and S198E as significantly different from WT on a per residue basis. Phosphomimetic mutants for these sites were created and sequence confirmed. In SEC, the point mutations shift the elution pattern from primarily dimer to primarily monomeric species. To assess SIKE interactions with tubulin, SIKE constructs were labeled using a maleimide-thiol conjugation to BODIPY TMR. BODIPY-labeled SIKE, phosphomimetic point mutations, and S6E SIKE interactions with tubulin were monitored using fluorescence polarization. These PPI assays assess the effect of phosphorylation in the selection of SIKE interaction partners. Together, this work advances our understanding of the role that phosphorylation-induced changes in quaternary state play in regulating protein interactions.

Viscoelastic Properties of Different Phytoplankton Species During Aggregate Formation

NOOR FAHMY and Jennifer Prairie

Phytoplankton-- which represent the base of the food web in the ocean-- form aggregates known as marine snow that sink though the ocean and sequester carbon to deeper depths. Previous studies have shown that viscosity of seawater can be dramatically enhanced when concentration of phytoplankton is high; however, the viscoelastic properties of marine snow during aggregate formation have never been investigated. We conducted experiments with aggregates formed from three different species of phytoplankton (Thalassiosira weissflogii, Skeletonema marinoi, and Chaetoceros affinis) at two different growth phases, measuring viscoelastic properties on a rheometer. At each growth phase, cultures of phytoplankton were rolled in cylindrical tanks for three days to form aggregates. Aggregates were then broken up to form a highly concentrated phytoplankton solution which was exposed to a constant shear rate in a rheometer to measure viscosity and other properties as aggregates formed. In addition, imaging with a microscope was used to visually track and quantify the structure of the aggregates as they formed. Results showed that aggregates are viscoelastic throughout all stages of their formation, and generally viscosity increased as aggregates formed. Furthermore, we will compare rheological properties of aggregates formed from different species and at different growth phases.

Sterile Neutrino Decays During Weak Decoupling

JOE GARBARINO, ALI MCNICHOL and Chad Kishimoto

Probing Beyond Standard Model (BSM) physics in the early universe provides an opportunity to address the relationship between modern cosmological observations and theoretical expectations. We explore the consequences of a population of sterile neutrinos that form very early in the history of the universe and decay around the time of weak decoupling. In this poster, we discuss the effects of these decays in generating a population of high energy active neutrinos and a prodigious amount of entropy. We also discuss the total relativistic energy density, Big Bang Nucleosynthesis, and the cosmologically-inferred measurement of neutrino masses.

Numerical Simulations of Dissipation in Accretion Disks

CATHERINE GIBSON and Ted Dezen

We perform general relativistic magneto-hydrodynamic simulations to study the dynamics of and radiation from accretion onto stellar mass black holes. Recent theoretical work suggested magnetic torques exerted at the innermost stable circular orbit can drive significant bulk vertical energy transport in regions close to the black hole, and hence dissipate a larger fraction of accretion power near the photosphere compared to standard models. This additional heating in turn may lead to the non-thermal high-energy (into several hundred keVs) radiation observed in some systems. We analyze time-dependent global simulations to further assess the feasibility of such models and illuminate the underlying physical mechanisms.

Quantifying “Roll-Flashing” Behavior in Leopard Sharks

MAYA S. HODDER and Andrew Nosal

Every summer, pregnant female leopard sharks (Triakis semifasciata) aggregate in the warm shallow waters off La Jolla Shores Beach, California, to incubate their developing embryos. Upon conducting aerial drone surveys of this aggregation in 2019, it was discovered that the leopard sharks would occasionally roll left or right and momentarily flash their white ventral surface (i.e., their underside) skyward. Daily drone surveys were conducted to quantify the frequency of the roll-flashing behavior, where preliminary results displayed each individual shark, on average, flashed once every 14 minutes. Additionally, 41.4% of sharks performed multiple flashes per one minute intervals, with an average of 5.93 seconds (+/- 4.66) in between flashes. After further conducting a literature review, l hypothesize that roll-flashing functions as chafing to remove ectoparasites. To explore the function of this behavior, 7 female leopard sharks were caught and surveyed for ectoparasites. All caught leopard sharks displayed the presence of ectoparasites on the dorsal, lateral, and/or ventral surface, with the majority of ectoparasites firmly embedded onto the various surfaces. While these results display a correlation between ectoparasitic presence and leopard shark flashing, it remains unknown if ectoparasite presence is causational to roll-flashing. Future studies may experimentally elicit roll-flashing in captivity to further explore the function. These findings can also be utilized for future studies in investigating the symbiotic relationship between ectoparasites and leopard sharks.

Mixed Sterile Neutrino Dark Matter and Small Scale Structure Formation

EMMA HORNER, FRANCISCO MUNGUIA-WULFTANGE, and Chad Kishimoto

Dark matter is abundant within our universe, yet its origins and exact nature remains unknown. CMB and large scale structure observations constrain the total quantity and distribution of dark matter, and a possibly anomalous 3.55 keV X-Ray line could have dark matter origins. These constraints allow us to probe the properties of dark matter and the means of their production. In this poster, we explore production mechanisms for sterile neutrino dark matter that may be consistent with dark matter interpretations of the X-Ray line and large scale structure constraints.

Examining the Adsorption of Fluoride from Contaminated Water Using Biomass

RACHEL LAING and James Bolender

Fluoride is a water contaminant that impacts 200 million people globally and can cause dental and skeletal fluorosis (Mondal and Roy 1). The goal of this study was to determine whether locally available sources of biomass in regions of western Uganda can be used to remove fluoride from contaminated water. Banana peel biomass was treated with 0.1M HCl or 0.1M HNO3 via vacuum filtration, or with a combination of each acid with a charged metal. The treated banana peels were tested with various initial fluoride concentrations ranging from 0.5 mg/L -- 5.0 mg/L in an artificial groundwater solution for 24-hour period contact times. Results were plotted as Average Fluoride Concentration (mg/L) vs Time (hrs). Results showed that treatment of banana peels with HCl and HNO3 were not effective in removing fluoride from water, as there was no significant decrease in concentration over a 24-hour contact period. Langmuir plots of 1/qe vs 1/Ce were created to analyze the binding capabilities of the biomass. It can be concluded that HCl and HNO3 treated banana peels are not effective in removing fluoride from contaminated water, however further analysis is needed to determine whether the addition of a charged metal results in adsorption of fluoride.

Creating a Selective Glucose Sensor for Use in Diabetics

REBECCA MARGETTS and Eleanor Gillette

Glucose sensing is important because there are over 400 million people with diabetes worldwide. Thus, there is huge demand for an implantable, low-cost, reliable method of measuring glucose in the body. The sensor of the 3 electrode setup has to be prepared by potentiostat mediated electrodeposition, using a process developed in our group. Once the nickel nanotubes have been grown on the sensor, the three electrodes are removed and placed in the solution to be tested. The potentiostat is again used to pass a current through the electrodes to assess the oxidation of the target solution. A graph of current vs voltage is output by the potentiostat and a peak in the current signifies that a molecule is losing electrons, and thus is getting oxidized. From research last summer, against expectations we determined the ideal nickel deposition time to be 1 minute, rather than the 20 minutes used by previous researchers. We determined that glucose gives a response at several different concentrations. Additionally, sucrose (an interferant in the blood) did not give any response, which shows promise for making a selective sensor.

Synthesis and Characterization of Terpene-Derived Polymers From Renewable Chemical Feedstocks

JOSHUA D. MARQUEZ, Gopi N. Vemuri and Peter M. Iovine

The majority of plastics used today are derived from petroleum-- a non-sustainable resource. In addition to the lack of sustainable source materials, traditional plastics suffer from low biodegradability and therefore persist in the environment. Herein we describe the synthesis and characterization of a new class of polymer derived primarily from a renewable source. Myrcene and farnesene belong to a class of naturally-occurring organic compounds termed terpenes. We describe the synthesis of terpene-based polymerizable monomers. The monomers were synthesized in a relatively short sequence using a Diels-Alder reaction followed by an organocatalytic amidation reaction. The resulting diol was used as a monomer for two different classes of polymers: polycarbonates and polyurethanes. In addition to the synthetic details, we describe preliminary characterization data for the polymers themselves.

Using Atmospheric Circulation and El Nino Southern Oscillation to Understand Dust Activity in the Asian “Dust Belt” Region

ANNE MAYTUBBY and Zhi-Yong Yin

Dust aerosols are known to travel long distances, impacting global climate cycles and human health. Global oscillation events, such as El Nino Southern Oscillation (ENSO), can impact dust emission and transport in arid regions on a seasonal and annual basis. Increased precipitation, a teleconnection related to ENSO, enhances soil moisture and reduces dust emissions. This study analyzes the seasonal impact of ENSO on one of the largest dust sources in the world, the "dust belt," ranging from North Africa to East China. Specifically, dust aerosol concentrations within the Eastern Arabian Peninsula (EAP) and Central Asia East (CAE) are compared in relation to the ENSO cycles. Correlation analysis between the NINO3.4 index, dust column mass density, and weather conditions revealed that in CAE, increased SST in the northern Indian Ocean causes enhanced precipitation in the summers following the EN winters, and thus explains reduced dust aerosol concentrations in the following summers in this region. However, in EAP, a more indirect relationship between ENSO and precipitation is observed, where relative humidity increases enhance precipitation in the region during the EN winters while maximum wind speed is reduced in May-June. The variation in how ENSO impacts precipitation between these two subregions explains the variance in low dust emission months between the two areas. The results of this study suggest a complex relationship between ENSO, precipitation, and dust emission within the Asian "dust belt," furthering our understanding of seasonal and annual variability in dust activity throughout the region.

Quantifying Vertical Depth Distribution of Southern California Soupfin Sharks (Galeorhinus galeus)

SIENA MERK and Andrew Nosal

Depth in the ocean allows both vertical and horizontal movement, which influences patterns of predation and nutrient transport in the water column. Soupfin sharks (Galeorhinus galeus) exhibit strong latitudinal sexual segregation, in which pregnant females undergo gestation in the warm, shallow waters off La Jolla, while sexually immature sharks occupy California's Central Coast. This study aimed to quantify the vertical distribution of soupfin sharks tagged with pop-up satellite tags at two sites off southern California: La Jolla and Northern Channel Islands. Preliminary analyses suggest that pregnant female sharks in La Jolla exhibit significantly shallower diving behavior in order to incubate their developing embryos. Sharks at both sites appear to be more deeply distributed in the water column in the fall, compared to summer, likely in response to the shifting thermocline and chlorophyll. Deeper diving in the fall may also allow sharks to maintain a constant temperature preference via behavioral thermoregulation. The soupfin shark is a Critically Endangered species targeted by drift gillnet and pelagic longline fisheries. Understanding the temporal depth distribution of soupfin sharks would enable fishery managers to implement targeted conservation actions.

NHE1 is Involved in the Cytoskeletal Remodeling and ECM Deposition of Lung Fibrosis

TRINA NGUYENTU and Joseph Provost

Idiopathic Pulmonary Fibrosis (IPF) is a progressive lung disease characterized by the deregulation of the wound healing process leaving an accumulation of fibroblasts and scarring tissue. Under normal conditions, fibroblasts support growth and health of connective tissues and maintain the extracellular matrix (ECM). However, as the disease progresses, increases in profibrotic agonists lead to fibroblast-myofibroblast transdifferentiation causing stiffening of the cells, increasing in secretion of ECM proteins. This leads to lung inflexibility, respiratory failure, and death. Sodium Hydrogen Exchanger Isoform 1 (NHE1) is an ion transporter protein on the membrane that mediates cellular pH, cell migration, and cytoskeletal anchoring. NHE1 has been found to impact the pathophysiological development of cancer and other diseases. The purpose of this study was to investigate if NHE1 is involved in IPF progression. We measured two indicators of fibrosis: the remodeling of skeletal proteins through actin stress fiber formation and the production and secretion of ECM proteins. To stimulate these activities, cells were treated with profibrotic agonists: TGF-β, 5HT, and LPA +/-EIPA, a NHE1 inhibitor. The addition of EIPA blocked stress fibers indicated that these agonists required NHE1 activity for cytoskeletal remodeling. The role of NHE1 in TGF-β induced fibroblast-myofibroblast transdifferentiation is also determined and is identified with α-SMA +/-EIPA. Finally, the role of NHE1 in production and secretion of ECM proteins were investigated to detect changes in these proteins +/- agonists and EIPA. This work highlights that NHE1 has a role in supporting profibrotic behavior and may be a novel target to fight IPF.

Body Surface Temperature Comparisons between Aggregating and Solitary Forms of the Intertidal Anemone Anthopleura elegantissima

ISABELLE REMICK and Steven Searcy

The intertidal sea anemone Anthopleura elegantissima is found along the west coast in a clonal aggregation or solitary form. Although both forms are found commonly on boulders, clonal aggregations are the result of binary fission while solitary individuals result from sexual reproduction. Both forms are strongly impacted by the intertidal's pronounced fluctuations in physical conditions which expose them to large temperature gradients, ultraviolet radiation and desiccation during low tide. It is of scientific interest to further investigate the ecological costs and benefits of each anemone form as it relates to thermal stress for the soft-bodied invertebrate. As climate change adds additional challenges to the intertidal environment, it is essential to understand how anemones will adapt to rising air and ocean temperatures. In this study, rock location, cardinal direction, season, time of day and exposure to sun were recorded to determine their significance to temperature differences between the clonal and solitary forms. Altogether, clonal anemones had significantly lower temperatures and less temperature variation than their solitary counterparts. As global warming is expected to significantly affect intertidal communities, the ability to avoid additional risks to desiccation and thermal stress could allow the clonal form to gain a competitive advantage within the intertidal.

The Effects of Increasing Sea Surface Temperature on Intensity, Frequency and Entropy of Tropical Cyclones in the Gulf of Mexico

ISABELLE REMICK and Zhi-Yong Yin

Sea surface temperature (SST) in the Gulf of Mexico (GoM) has consistently increased since the 20th Century as a result of greenhouse gas emissions and global warming. Alongside earthquakes, tropical cyclones are one of the top geophysical causes of life and property losses from a global perspective. It is therefore of scientific interest to determine how increasing global temperatures will affect tropical cyclone frequency and intensity in the U.S. Gulf Coast region. Correlations and comparisons of SST with variables of frequency and intensity show that stronger hurricanes with greater rates of occurrence are expected in future years. As GoM SST increased by 0.96˚C and the number of cyclones per decade increased by 25 from 1981 to 2011, the number of major cyclones, cyclone-related fatalities and property damages, maximum wind speed, minimum atmospheric pressure, and specific entropy all increased significantly. Statistically significant positive correlations were found between the GoM SST, Atlantic Multidecadal Oscillation (AMO), and specific entropy, suggesting that during positive phase of the AMO, there will be warmer GoM SST, and stronger tropical cyclones. As coastal development increases along the U.S. Gulf Coast, greater storm intensity, frequency and entropy will magnify fatalities and property damage.

Flood Impacts and Risk Assessment of Pleasant Creek in Capitol Reef National Park

MIRANDA SKINNER and Suzanne Walther

Capitol Reef National Park (CRNP) is located within Southern Utah. Flash floods are one of the main hazards CRNP experiences and because of the remote location of the park, numerous parameters, and sudden nature of flash floods it is extremely difficult to collect data, predict their occurrence, and create hazard maps. Pleasant Creek (PC) is a perennial stream that runs through CRNP and, due to the highly resistant sandstone of the Waterpocket Fold, experiences flash floods. We used 3D imagery and structure from motion to quantify the geomorphic changes of PC over a flood season using data collected in 2014, 2015, and 2021. We created high resolution digital elevation models (DEMs) from the 3D imagery and differenced for elevation change using Geomorphic Change Detection (GCD) software to quantify the erosion and deposition in the channel over 6 years. This data will be used to create a flood hazard map and model future flood events. This research will aid in understanding the pattern and extent of short-term and long-term geomorphic changes caused by flash floods in rural semi-arid landscapes and can be applied to urban areas to help mitigate infrastructure damage and prevent deaths.

Synthesis of Aldehydes from Heterocyclic Gem-Diboronates

HANNAH STUEBE and Timothy Clark

Organoboron chemistry has become a valuable tool in synthesis because the carbon-boron bond can be used to form carbon-carbon, carbon-nitrogen, and carbon-oxygen bonds, allowing access to biologically relevant molecules. Heterocyclic molecules, (cyclic molecules with non-carbon atoms in the ring,) allow for modification of solubility, lipophilicity (fat solubility), polarity, and accessibility to hydrogen bonding capacity of biologically active agents useful for the development of pharmaceuticals. This presentation will highlight our efforts to develop new reactions that utilize organoboron chemistry to synthesize heterocyclic gem-dibornates from simple starting materials and, the homologation of the gem-diboronates to form aldehydes.

Potential Involvement of NHE1 in COVID-19 Related Pulmonary Damage

LAM TA, DANIELLE VIGILANTE, MEERA IYER, and Joseph J. Provost

In some moderate and severe COVID-19 infections lung scarring similar to fibrosis have been observed in survivors, many of which have persistent functional and radiographic abnormalities at the initial follow-up suggesting a possible shared pathobiology between fibrotic lung disease and COVID-19- lung disease. Fibrosis is an inflammatory response to pulmonary infections that activates fibroblasts and produces excessive extracellular matrix proteins that stiffen cells, leading to reduction in lung capacity and breathing deficiency. Several factors involved in the "cytokine storm" also are pre-fibrotic leading to the advanced disease. This includes interleukin 6 and others. The focus of this study is on sodium hydrogen exchanger isoform 1 (NHE1) that plays a key role in intracellular pH regulation and cell movement and its effect on fibrosis development. Both cytokines IL-1 and IL-6 are used to show one measure of cell restructuring and stiffness by measuring stress fiber formation. To examine the role of NHE1 in fibroblast response, both IL-1 and IL-6 cells were treated with proinflammatory cytokines in the presence and absence of NHE1 inhibitor (EIPA). This study will provide an initial insight to the relationship between NHE1 and proinflammatory response for future experiments.

Synthesis and Characterization of Boron-Rich Nanoparticles for Therapeutic Applications

LOUIS TRIPOLI, PARKER O'CONNELL, ISABELLA SERNA and Peter Iovine

Boron neutron capture therapy (BNCT) is a non-invasive radiation-based therapy that relies on the selective accumulation of 10B in cancer cells. In order to advance this treatment modality, new boron-enriched delivery agents are needed. The goal of this research project is to develop new synthetic approaches towards boron-enriched nanoparticles. A unique aspect of this work is the use of Lewis acid-base interactions as a driving force for nanoparticle assembly. We have investigated several synthetic routes to boron-rich building blocks including terpene-based small molecules and polymeric boron carriers. We also report the synthesis of a complementary Lewis basic polymer that can complex the Lewis acidic boron sites.

Effects on Reproduction of Agraulis vanillae Infected with Nuclear Polyhedrosis Virus

ALYA TRUONG and Wilnelia Recart Gonzalez and Arietta Fleming-Davies

Pollinators are essential to the reproduction of plants and many agricultural crops. Pathogens can affect pollinator populations and with their increasing prevalence, they could have major impacts on population densities of pollinators. Pathogens can have sublethal effects where surviving individuals can experience decreases in fecundity, oviposition, and other factors that may influence their ability to reproduce. Through analyzing total fecundity and oviposition preference, we can determine a pathogen's role in the reproduction of a species. Exposure of pathogens affects the density and morphology of the pollinator. Climate change variables such as droughts may also influence pathogens, pollinators, and plants. This study takes a look at Gulf fritillary butterfly, Agraulis vanillae, as a pollinator/herbivore and its species that it uses as a oviposition location as well as food source, Passiflora caerulea. This study will examine how Gulf fritillary butterflies, Agraulis vanillae, reproduction is affected when exposed to the nuclear polyhedrosis virus NPV and when fed food sources, Passiflora caerulea, exposed to different water treatments. Extracted occlusion bodies (OBs) from the virus will be used to expose the pathogen to the host. Total fecundity and oviposition preference will be counted after the A.vanillae has successfully oviposited from mating. I predict that A.vanillae fed with P.caerulea exposed to low water treatments will reproduce less because most of its energy will be exhausted into combating the virus. Currently, I am analyzing data from the oviposition trials.

Transformation of Nicotiana benthamiana to Investigate the Function of a Novel LTP

Summer Umemoto

Tobacco (Nicotiana benthamiana) is a commonly used mode plant in research involving tissue culture, plant regeneration, expression and localization studies. First identified in during a RNAseq study in Drosera capensis, our lab is interested in the biological function and localization of a protein tentatively called Lipid Transfer Protein 3 (LTP3). LTPs are small lipid-binding proteins involved in lipid exchange between membranes in vitro. LTP3 is hypothesized to be involved in exudate production in Drosera capensis as well as Nicotiana benthamiana. D. capensis is a relatively slow-growing plant and it is extremely difficult to produce a transformed plant from it, so we turned to N.benthamiana as a model organism to study LTP3. PCP19.39, a plasmid for expression of Lipid Transfer Protein 3 with a GFP promoter, was inserted into Agrobacterium tumifaciens GV3101 and used for tissue infiltration studies and transformation of N. benthamiana cell cultures. Confocal microscopy was then used to localize GFP fluorescence emitted from transformed regeneratedadult leaf tissue. The results showed that LTP3 was present in the cytosol of the epidermal cells of transformed leaf tissue. We were then able to confirm the presence of the protein using PCR. In future studies, we hope to determine the biological function of LTP3 in these cells.

Community resilience yes, junkyards no!

ASHLEY VALENTIN GONZALEZ and Alberto Pulido

Analytical studies on environmental racism have focused on the interconnections between policymakers and environmental hazards in low-income communities to determine the degree of racial inequality. Yet, the majority of these studies ignore the arrival and permanence of toxic spaces such as junkyards and polluting industries impacting poor bayfront neighborhoods such as Logan Heights. We purport to examine this topic on two fronts. First, I plan to investigate the historical connection between the battle over greenspace between the Chicano Park takeover and the junkyard. Junkyards in Barrio Logan play a crucial role in how environmental racism came to be in this community. My second goal is to demonstrate how the resilience and need of a community through political mobilization will result in re-building the neighborhoods that were destroyed and disregarded by policymakers. We will adopt a Participatory Action Research approach (PAR), in order to discover how and why issues of environmental justice have been at the center of community mobilization in Logan Heights for over 50 years.

Missing Absorption Feautures in the Soft State Spectra of Black Hole X-ray Binaries

ROY VELASCO and Theodore Dezen

In this work, we investigate a long-standing discrepancy betweeen theory and observations of accretion disks in black hole x-ray binaries, where numerical models predict relativistically broadened atomic absorption features in the photon spectra that are absent from data. We self-consistently solved the disk vertical structure and radiative transfer equations using a range of dissipation profiles based on results from recent three-dimensional simulations. We found that the strength of these features decreases as the fraction of gravitational potential energy lost that goes into heating the region near the photosphere increases and that the absoprtion is optically thin.

The History of Forced Sterilization of Latina Women

SEREN VENTULLO and Alberto Pulido

Sterilization began with the eugenics movement, where people wanted to regulate the production of specific children. Eventually, eugenics led to horrific experimental efforts to oppress and control Latina's and Latinx and their ability to have children along with other women of color. Los Angeles and Puerto Rico, with large Latinx populations and were among the most prominent locations where women underwent harmful procedures. Women would be coerced, tricked, or sterilized against their will, often after childbirth. These traumatic practices created mistrust between the Latina community and the healthcare system. This project explores deep questions relating to racism and body autonomy, as well as acts and expression of resistance and empowerment from Latinx women and their community. Despite the forced sterilization of Latina women, which concentrated on suppressing the continuation of an entire population, women in the community continued to resist racism and fought for autonomy that is documented in this research. The research analyzes primary literature, interviews, books, and documentaries related to this topic.

Syntheses of Azulene Derivatives as Fluorescent Ligands at Monoamine Neurotransmitter Receptors

WYATT WESTFALL and Matthew Parker

Dopamine plays crucial roles in the regulation of a wide range of brain and bodily functions, transmitting signals in the brain, regulating vital organs and controlling the activation of genes.1,2 Dopaminergic drugs have already been key in the treatment of Parkinson's disease and ADHD.3,4,5 The large number of uses our bodies have for dopamine points to a vast field of undiscovered medicines that operate on dopamine transmitters. Our ongoing research is aimed at synthesizing azulene derivatives as dopamine bioisosteres which could act as fluorescent ligands for monoamine neurotransmitter receptors. Azulene is an aromatic system consisting of a nucleophilic five-membered ring and an electrophilic seven-membered ring. The electron-rich five-membered ring of azulene mimics the two hydroxyl groups of dopamine. Because azulene exhibits a bright blue fluorescence, if target molecules show affinity for dopamine receptors, they can be used to develop fluorescence-based receptor binding assays, which would be cheaper and safer than current radioligand binding assays. These target molecules could also be used directly as potential therapeutics. Testing of these potential bioisosteres for biological activity will require future collaboration with biochemical research groups. Future work could be directed at the synthesis of azulene-based serotonin bioisosteres.

Linkages between the ENSO cycle, drought, wildfire, and air quality in southern California

JACKSON WILLIAMS and Zhi-Yong Yin

El Nino/Southern Oscillations(ENSO) has a significant impact on the atmospheric conditions, especially on the Western Coast of California. California is constantly in a precipitation deficit though precipitation is quite variable from year to year. During the past decade in a constant state of drought, many wildfires have occurred. The purpose of this research was to investigate the possible connections between the ENSO cycles with precipitation variation to the prevalence of wildfires and higher concentrations of aerosols to potentially impact human health. Past studies have analyzed the effects of the ENSO cycles on the precipitation of Southern California on average, but those studies didn't test the correlation between El Nino and specific regions based on the different climate classes within the region. The NINO 34 Index based on central eastern equatorial Pacific surface surface temperature (SST) was used to determine the characterization of the year as normal, El Nino, or La Nina. We discovered that in CSb and BWh regions, winter precipitation is statistically correlated with the NINO3.4 index, although the correlations are all relatively weak (r = .249 - .335). The wildfire data was also compared to the ENSO cycles, as well as the black carbon aerosol concentrations obtained from the MERRA-2 dataset for southern California. Connecting impacts of climate oscillations to human health creates new understanding of the occurrence of diseases or ailments that may be caused by aerosols associated with major wildfires.

Social Sciences

Creativity and Social Media

MAREN ALTVATER, NARDINE FRANCIS, and Veronica Galvan

Social media has rapidly expanded to be a large influence on society throughout the past ten years. Some researchers argue social media use has negative effects on individual behavior and creativity. One factor of social media use is that some users actively create content and engage with others' posts, while others primarily consume social media without creating posts themselves. Acar et al (2019) found that active social media use is correlated with creativity. However, their study explored older platforms such as MySpace. In this study, we will investigate a potential link between social media and creativity in more modern apps such as Instagram and Tik Tok. Through the examination of active or passive social media via survey, we will explore the relationship between social media use and creativity levels. We hypothesize that there is a significant difference in creativity levels between active users and passive users of social media. We predict that active users will exhibit higher levels of creativity compared to passive users. We will administer a social media survey to USD students. Participants will also complete the Abbreviated Torrance Tests for Adults (ATTA) to examine their creativity. An examination of scores on both the survey and the ATTA test will be conducted to determine if active and passive users differ in their creativity. Additionally, analysis will reveal if overall frequency of social media use has an effect on creativity. We expect to find a significant positive correlation between creativity and active social media use.

Effect of Instruction Language on English-Spanish Bilinguals Speech Perception

ALEXA ANDRADE and Laura Getz

Compared to monolinguals, bilinguals have an advantage in faster reaction times during task switching (Hern ndez et al., 2013). However, it is not known how switching task language affects basic perception of speech sounds. The goal of this project was to determine whether Spanish-English bilingual participants respond to auditory stimuli differently based on the language in which they receive task instructions. Participants were randomly given experiment instructions in English or Spanish, and then were presented with minimal pairs of words varying in voice onset time (VOT) along a continuum (e.g., belly/peli). Both endpoints of the stimuli were words in Spanish, but only one was a word in English. After each word, participants classified the starting sound (e.g., either /b/ or /p/). Thus, we predicted that if participants were given instructions in English, they would be thinking in English, and thus their responses would follow the pattern of the Ganong effect (Ganong, 1980), shifting the boundary between /b/ and /p/ towards the endpoint that is a word in English (e.g., giving more /b/ responses to the belly/peli continuum). However, if participants were given Spanish instructions and thinking in Spanish, their responses would shift more towards the voiceless endpoint overall (e.g., giving more /p/ responses) given the differences in VOT between Spanish and English speakers (Lisker Abramson, 1964). Results will show how English-Spanish bilinguals' auditory perception is affected by instruction language, which can have implications for bilinguals who grow up as informal translators as well as for auditory comprehension in everyday conversations.

Change of Venue Survey: An Analysis of Appellate Court Transcripts of Trials from 2000-2020 when a Policeman is Murdered

ANNA ANCONA, MAYA BADRANI and Nadav Goldschmied

The present study aims to expand on our previous research concerning the legal practice of change-of-venue. The pre-trial motion of change of venue is usually made by the defense in case of excessive public scrutiny, and if granted it entails that the court will move the location of the trial to another county in order to avoid bias in the jury. We focused on whether police involvement influenced the granting of the change-of-venue motion, researchers studied court transcripts of appealed murder convictions from all 50 US states during the 2000-2020 timespan through Nexis Uni. It was found that when a member of the police was the victim (n = 49), the success rate of change-of-venue (36.7%) was higher compared to when the victim was a civilian (22.8%). This suggests that police involvement is considered a polarizing topic, and therefore courts are more likely to fear bias and grant a change-of-venue motion. Future research should aim to include cases not resulting in a conviction to determine the overall effects of this motion. In addition, there should also be a focus on the success rate of the motion when a member of the police is the defendant.

Marginalized Communities' Struggle for Eudaimonia: People with Disabilities in Higher

FANISEE BIAS, and Thomas Reifer

For my project, I am specifically interested in tracing an alternative history of the recognition of the issue of PwD, sometimes also called people with different abilities, while rooting this in larger issues of identity and structural inequalities in the United States and the global system. I aim to specifically analyze how these issues have historically been conceptualized, analyzed and represented, and gaps here, that need to be highlighted. I aim to do this so as to examine the progress that has been made to try and overcome barriers for people with disabilities, the successes and limits of these attempts, and the ways this may be rooted in an inadequate conceptualization of these issues, and their intersections with larger structural inequalities, such as race, class, and gender. This will provide the basis for my analysis of the barriers and ways forward for people with disabilities in pursuing higher education. In all this, I will take an intersectional approach to my inclusive research asking if PwD are represented in conversations about intersectionality and related questions of justice and equity as a whole, and in higher education in particular.

Shame, Sovereignty, and Embodied Citizenship

CLAIRE BREDAR and Karen Shelby

My paper will examine an understudied and normalized part of American culture and life, diet culture, through a political theory lens. For American women especially, being conscious of and critical towards one?s physical body is acceptable, encouraged, and even in vogue, an indicator of one?s self-discipline or resolve. I question what messages this paradigm actually offers women regarding their place and value in society. Female bodies have historically belonged to others in a literal sense; perhaps now that ownership has become theoretical, an impossible standard of physicality relentlessly enforced by the fashion industry, pop culture, and even the medical establishment. I seek to trace the origins of our collective body shame, understand the psycho-political implications of believing one?s own physical embodiment to be insufficient, and finally to examine alternative frameworks of understanding embodiment and their relative ability to engender corporeal sovereignty.

NBA Comebacks: A Descriptive Research into an Uncommon Feat

ANNA BUTTS and T.J. ELKINTON and Nadav Goldschmied

Gill (2000) showed that late-game reversals in the National Basketball Association (NBA) were uncommon with the leader at the beginning of the final quarter winning the game about 80% of the time. This archival study examined the frequency in which (1) teams were able to gain substantially over an opponent (20 points or more) and (2) the frequency of comebacks within this subset of games. Data was retrieved from the NBA across 23 seasons of play dating from 1997/1998 to 2019/2020. Both 20+ points games as well as comebacks were most likely in recent seasons. The results also showed that the average probability of a comeback for this time span was 3.24%. These results show that comebacks are a very difficult feat for NBA teams to mount. The results provide additional evidence that three-point shots are changing the game of basketball increasing the volatility of scoring. Future research should evaluate the factors associated with NBA comebacks as the study of group resilience gains more attention in research.

Gender Differences in Distress Before and During the COVID-19 Pandemic

JACQUELINE BUZANIS and Jennifer Zwolinski

Several studies have shown that during the COVID-19 pandemic, levels of anxiety and depressive symptoms increased greatly (Seens et al., 2021) with females being more susceptible to stressors during the pandemic (Fitzpatrick et al., 2020). Given these findings and the fact that females do tend to show more externalizing disorders in general, the current study will investigate gender differences in anxiety and depression both pre and during the COVID-19 pandemic. I propose that higher levels of anxiety and depression resulted in females than males. Participants included 193 liberal arts college students enrolled in Psychology 101 who completed online self-report measures from September 2020-February 2021. The outcome variables of interest included higher levels of anxiety and depression from 12 months ago (pre-pandemic) to the time of the self-report. Results using one-way ANOVAs showed that females reported higher symptoms of anxiety than males, but that there were no gender differences for depression. Findings from this study will provide insight into whether and how mental health differences between genders are impacted by COVID-19.

The Effects of Adolescent Cannabinoid Exposure on Cocaine Reward and Reward-Related Brain Systems in Adulthood

CASSIDY DE ANDA GAMBOA, LESLIE ESTRADA, JULIA REMLINGER, MARISSA FRANCO, and Jen Wenzel

Cannabinoids (CBs) are the most widely abused illicit drug by adolescents. Adolescents who use cannabis are more likely to develop psychiatric disease, including substance use disorder (SUD), in adulthood. Therefore, it is important to determine how cannabinoid CB exposure during adolescence may shape brain development and render individuals more susceptible to SUD. In our laboratory, we are particularly interested in the neural mechanisms of cocaine reward and aversion which motivate cocaine use through positive and negative reinforcement. In these experiments, we sought to determine how adolescent cannabinoid exposure shapes cocaine reward and aversion in adulthood in a rat model. To this end, we treated male and female adolescent rats with one of several doses of the synthetic CB drug WIN 55,212-2 or an inert vehicle, and in adulthood conducted behavioral tests to determine cocaine reward, cocaine aversion, cocaine-induced locomotion, cocaine-induced anxiety, and hedonia. Following behavioral testing, animals were treated with cocaine or vehicle one final time and then sacrificed. Brains were then removed and processed for immunohistochemical analysis of the protein product of the immediate-early gene c-fos, which serves as a proxy of cell activation by cocaine. Briefly, our data show that adolescent CB exposure alters cocaine conditioned reward and locomotion and decreases cocaine-induced activation of the prefrontal cortex in adult male, but not female rats. Thus, exposure to CBs in adolescence results in lasting changes in the brain and behavioral response to cocaine that may work to predispose individuals to cocaine abuse disorder.

"I Want to Help People": An Analysis of Undergraduate Pre-Health Interests and Role Congruency

MADOLYN DOLCE and Dr. Anne Koenig

When attempting to understand the source of the gender gap in the nursing profession, the question arises: is nursing inherently more appealing to women or are men interested in the job duties but avoid the career because of stereotypes and stigma? To examine this question, I will survey the University of San Diego undergraduate pre-health population on their career interests. I provide the students an unlabeled description of nursing as a career, written in either stereotypically agentic or communal language. I expect male students receiving the agentic description of nursing and the female students receiving the communal description of nursing to be the most attracted to the description without the label of nursing. Under the assumption that men avoid nursing due to social stigma, I expect the men's attraction to decrease once told that the description is of nursing, whereas the women's attraction would not change. Expected social roles have influence over an individual's career goals and thus, through goal congruence theory, men and women tend to chase careers that align with agentic or communal goals, respectively. Although it is desirable that people seek out careers that align with their personal goals, this process could be biased due to gendered socialization and individual interpretations of the career. In the effort to affirm the value of nurses and to decrease the gender gap in the profession, my study will help us to better understand the mindset of the future healthcare workers at USD considering role and goal congruence.

Competition Between Audiovisual Correspondences Aids Understanding of Interactions Between Auditory and Visual Perception

SAM EASON, VICTORIA NGUYEN, MAKENA SPENCER, and Laura Getz

Audiovisual correspondences (AVC) refer to an observer's consistent matching of sensory features across the two modalities; for example, between auditory pitch height and visual elevation or visual size. Previous work shows faster responses when participants classify the height of a pitch in the presence of congruent visual elevations (e.g., high pitches are congruent with higher visual elevations), but no response time differences in the presence of visual objects of different sizes (Getz & Kubovy, 2018). To further investigate the strength of the pitch-elevation and pitch-size AVCs, we created trials where they competed with each other. Specifically, when classifying pitch height, participants completed trials where the two visual dimensions were both congruent or both incongruent with pitch. Additionally, there were trials where elevation was congruent but size was incongruent (i.e., high pitch with large object at high elevation) and trials where size was congruent but elevation was incongruent (i.e., high pitch with small object at low elevation). We found that reaction times to pitch were just as fast when only elevation was congruent as when both elevation and size were congruent. Conversely, reaction times when only size was congruent were just as slow as when both dimensions were incongruent with pitch.These results reinforce the superiority of the pitch-elevation AVC and can be interpreted based on the metaphor we use for pitch in English. Current work is investigating the competition between elevation and brightness, sharpness, and spatial frequency in order to determine which AVCs are stronger and more automatic.

Exploring how stress, COVID, and streaming may be reshaping music-personality connections

LUCY EDWARDS, Kunal Patel, and Laura Getz

While there has been an abundance of literature exploring the correlations between personality traits and music-listening preferences, there has been little research looking at how the emergence of streaming services has influenced music-personality correlates, or how the ongoing COVID-19 pandemic may uniquely influence the relationship between music and personality. This study analyzed data from over 200 participants, and assessed participants' reasons for music listening, genre preferences, music listening tendencies, experiences of stress related to the pandemic, and the "big five" personality traits. We hypothesized that there would be fewer/weaker correlations between music and personality than found in prior research due to the prevalence of streaming services which have resulted in a blending of genres and greater access to a variety of music styles. Out of 20 potential correlations between musical genres and personality traits, we only found 4 to be significant, which matches some--but not all-- of those found in previous literature. We are currently completing an expanded survey that will attempt to explain this divergence by assessing the ways that stress, pandemic experiences, intended purposes of music-listening, and the use of streaming services may influence the relationship between music and personality. This research establishes the complex ways in which music technology and environmental forces inform the connections between music and personality.

Examining the Role of the Endocannabinoid System in Elapsed Time Memory

AKEMI ITO, VIVIANA CASTRO, ERIN FOLEY, ISABELLA LANCA, TESSA OLIVER, ISABEL TAGGART, and Jen M. Wenzel and Jena B. Hales

Our sense of time is a fundamental ability we use to judge duration of events, temporally organize our experiences, and decide when to initiate actions. Previous research suggests certain brain regions, such as the hippocampus, are critical for estimating elapsed time duration. The hippocampus expresses cannabinoid type-1 (CB1) receptors, and CB1 receptor activation via binding of endogenous or exogenous cannabinoids regulates neural signaling in these structures. In addition, cannabis administration is demonstrated to "speed up" an organism's internal clock, meaning that humans and animals perceive time intervals as longer than they actually are after cannabis administration. However, it remains unclear how cannabinoids affect time discrimination processes in the hippocampus. To investigate this question, we trained rats on the Time Duration Discrimination (TDD) task, where they learned to discriminate between two durations to perform a correct learned response: turning left out of a delay box following a 10-second delay or right following a 20-second delay. After learning the discrimination, rats underwent surgery to implant guide cannulae bilaterally into dorsal hippocampus. Following recovery, rats continued daily testing on the task and, on select days, received intracranial infusions of CB1 receptor agonist (WIN) or CB1 receptor inverse agonist (rimonabant). A within-subject design was used to compare performance between sessions in which rats were infused with rimonabant, WIN, or vehicle throughout dorsal hippocampus. Behavioral data will examine the effect of dorsal hippocampal infusions of CB1 receptor agonists and inverse agonists on TDD performance, and results will be discussed along with methodology and previous data.

Backlash Toward Dominant Women: The Impact of Target Age and People's Beliefs in Fixed Personality

ABBY KING, MIA SHAEFFER and Anne Koenig

Prescriptive stereotypes are beliefs about how a person should act based on their identities, such as gender. It is clear that in adults, women who violate gender stereotypes by acting dominantly experience backlash (i.e. social penalties). However, less research has examined the amount of backlash received by other ages, including preschool children, adolescents, and the elderly. We are recruiting 500 student and online participants, who are exposed to vignettes describing a male or female who is 4, 8, 15, 35, or over 70 years old, and displays dominant behavior on a cruise ship (e.g. cutting in line, interrupting others). Participants rate the individual's characteristics on a 7-point Likert scale, including likeability, competence, acceptability, and morality of the behavior. We hypothesize that in accordance with backlash theory, females who act dominantly will be less liked than men across all age groups. We also hypothesize that personality beliefs will moderate the impact of gender on likeability, such that dominant female children will receive significantly less backlash when compared to adult women due to people's belief that children's personalities are less fixed. Additionally, we predict that dominant elderly women will receive less backlash in comparison to adult women, due to the assumption that elderly people are held to less strict gender roles. The results of the study have implications for the age at which backlash against counterstereotypical behavior toward women begins.

Fighting to the Death? Does Hockey Fighting in the NHL Affect Players' Longevity?

JAEDYN LAMBRECHT and Nadav Goldschmied

Hockey is a sport known for its violent nature. Specifically, hockey fights have consistently been an integral part of the National Hockey League (NHL) since the league's establishment in 1917. Fighting appears, at least partially, to be calculated and intentional, as the practice is rampant early in the game and in the pre-season when players try to settle old fighting scores or distinguish themselves, respectively (Goldschmied & Espondola, 2013). Otherwise, NHL players are likely to be involved in fighting as a mechanism to gain fan support, generate game momentum (Goldschmied & Apostol, 2021), or enhance team camaraderie. However, fighting should have adverse health ramifications. In the current study, we sought to investigate whether a players' involvement in hockey fights throughout their career was associated with shorter life spans. Previous longevity studies have not distinguished hockey fighting from other aggressive aspects of this sport (e.g. accidental physical contact with other players). By utilizing NHL-provided and fan-reported data from hockeyfights.com, we conducted an archival study examining the frequency of hockey fighting during the 1957-1971 NHL seasons. A Kaplan-Meier survival analysis log-rank method showed no relationship between an elevated number of fights and a reduced lifespan. We found that NHL players at the time who fought more often were also taller, heavier, as well as better offensive players (i.e., delivered more assists and scored more goals). These distinguishing factors can provide offsetting effects, buffering NHL fighters from long-term deleterious health consequences.

The Impact of State-Level U.S. Legalization Initiatives on Illegal Drug Flows

VIVIAN MATEOS ZUNIGA and David Shirk

Many have theorized that liberalizing U.S. drug laws can help curb drug flows from Mexico and weaken criminal organizations south of the border. However, there is little research examining the effect of changes in U.S. marijuana legislation in recent years. This paper asks: How has marijuana legalization in the United States affected flows of marijuana from Mexico? Specifically, to examine the theory that drug legalization reduces the incentives and rewards for international drug trafficking, I will test the hypothesis that liberalization of marijuana laws in U.S. states (measured by the percentage of the population in states with access to legalized medical or recreational marijuana per year) has resulted in a corresponding decrease in marijuana seizures at the border (measured by bulk tonnage of marijuana seizures per year). I will draw on a mixed methodological approach that will include descriptive and inferential statistical analysis of data from the U.S. State Department, archival research using primary and open-source documents from U.S. and Mexican government and media sources, and interviews with U.S. officials and security experts to analyze trends in seizures and legalization.

Ranked-Choice Voting and Its Effects On American Democracy

ISAAC MORALES and Jane Friedman

Ranked-choice voting (RCV) is an alternative form of voting that has gained traction in multiple jurisdictions, such as the state of Maine, San Francisco, New York City. This system has voters rank which candidate they would prefer to be in office. Unlike plurality elections, if there is no candidate that has attained the majority of votes, then it would go into an instant runoff until there is a winner. This study sought to uncover the effects a new system of voting would have on our nation's election. The claims this project addresses are: ranked-choice voting increases voter turnout in elections, RCV could confuse voters, and RCV encourages more constituents to cast a vote. To do this, we investigated Bay Area elections in the municipalities of Oakland, San Leandro, and Berkeley. In order to prove these hypotheses, we compared it to cities who have yet to adopt RCV, such as Miami, Minneapolis, and San Jose. Most of our data found these claims inconclusive. However, our findings of voter turnout in comparison to other jurisdictions suggest that ranked-choice voting has led to more consistent turnout than other regions that have yet to implement RCV. Additionally, this project expands on the implications the aforementioned voting method may have on future elections. In order to fully understand RCV's potential to improve American democracy, this study must continue as constituents adapt to the new ballot format.

The Role of Speech Convergence in Group Communication.

MICHELLE NGUYEN and Laura Getz

The key to impactful counseling is alliance between the therapist and the patient. Previous research found that alliance (e.g., affiliation and cooperation) can be predicted by measures of speech convergence, or the rhythmic coordination with a conversational partner(s) in which one interacts in vocal synchrony (Ireland & Pennebaker, 2010; Manson et al., 2013). While previous studies investigated convergence in pairs of participants (Pardo et al., 2018), we studied convergence between triads of participants. To explore the role of speech convergence in casual conversations in Expt 1, we varied group composition (friends vs. strangers) and prompted groups to have a ten-minute conversation about life as a college student. Participants then answered questions regarding their perception of their conversational partners. Features of speech convergence that we measured were the number of names spoken, number of turns between speakers, speech duration, speech pitch (fundamental frequency), syllable duration, and pauses. Overall, we found that participants' voice pitch in the first two minutes of conversation compared to participants' pitch in the last two minutes of conversation showed statistically significant convergence, meaning the pitch more closely matched their partner at the end of the conversation. In Expt 2, we plan to compare speech convergence during casual conversations to speech convergence during difficult conversations, including topics such as discrimination and sexual assault. Given the small sample size, higher power is needed to clarify the impacts of speech convergence on group communication, nonetheless, our results have implications for understanding factors that contribute to talk between three speakers.

Pandemic Emotion Perception

RHIANNON NOVELLI and Laura Getz

Existing research articulates difficulties masks cause in the interpretation of emotions (e.g., Carbon, 2020). The COVID-19 pandemic is an unprecedented time in which the impact of the pandemic on individuals' emotional processing is yet to be determined. Previous work in our lab has looked at interactions between audiovisual perception, emotion recognition, and memory without the use of masks; this work and existing research provide a baseline for my current project investigating the detection of facial emotions based on auditory cues during mask wearing. The Ryerson Audio-Visual Database of Emotional Speech and Song (RAVDESS) is a verified tool to help analyze emotional reactions in individuals that was used in conjunction with the Facial Masks and Respirators Database (FMR-DB) which displays images of individuals with different types of masks. Participants heard sentences neutral in content (e.g., "dogs are sitting by the door") spoken in either a happy, sad, or neutral tone accompanied by masked or unmasked ambiguous faces. The purpose of the present study was to see how vocal expression of emotion can change the emotions detected on faces. We expect participants to interpret the ambiguous non-masked faces in a strong emotional manner when listening to the emotionally-charged audios. We also expect participants to have greater difficulty interpreting masked faces and rating them more neutral despite the emotion of the accompanied audio. The findings for this study are influential during COVID-19 as they may help mitigate communication complications as a result of the pandemic.

The Natural Sublime: From Burke to Balke

BRYSON PATTERSON

As a part of my Keck Fellowship this year, I looked at the natural sublime in art and my own photography using the framework established by Edmund Burke in his 1757 book titled: A Philosophical Enquiry into the Origin of Our Ideas of the Sublime and Beautiful. The themes from Burke?s book were connected with contemporary scholarship on the natural sublime with an emphasis on ice and glaciers. The artwork of the Norwegian landscape painter, Peder Balke, was then analyzed for both the sublime scenes it depicts and the ability to instill a sublime feeling. Finally, I hope to connect Balke?s work with my own photography from my travels in pursuit of the sublime.

Performance under Pressure: Icing the Kicker in the National Football League (NFL)

EMMA ROHRER, TYLER RATKOVICH, ELLIOT GORSUCH, NICOLE SEVCIKOVA, NICOLE HUNTER and Nadav Goldschmied

The current archival research explored kicking performance under pressure in the National Football League (NFL) during the 2002-3 to 2019-20 seasons. Specifically, we investigated the effects of a timeout by the opposing team, a practice known as 'icing the kicker' before a crucial field goal was attempted. This strategy is primarily psychological in nature and is meant to cause mental disruption for the opposing kicker by potentially increasing rumination and worry. This tactic was studied in the current study exclusively in the last 2 minutes of a game when the kicking team was behind by 3 points or less (including a tied score), or in overtime, as converting the kick then is likely to bring about victory. An analysis of 959 high pressure kicks showed that 737 (76.9%) were successful and in 336 instances (35%) icing was attempted. A Generalized Estimating Equation (GEE) regression, which accounted for the data being nested (kicks by specialized kickers), showed that icing reduced the success rate of kickers significantly from 79.1% to 72.6%. The analysis is preliminary in nature as many factors influencing kicking performance under pressure went unaccounted for. In future research we aim to incorporate a more comprehensive model to explore the effect.

The Role of the Medial Prefrontal Cortex in Spatial Memory and Navigation in Male and Female Rats Performing the Traveling Salesperson Problem

ANAHI SALAZAR, SALMA GODOY, EMMANUEL ANJEH, and Rachel Blaser, and Jena Hales

The Traveling Salesperson Problem (TSP) is an optimization task that requires subjects to identify the shortest route to travel from a starting to ending point, while visiting a certain number of targets. This task has been used to examine spatial memory and decision making in animal models, such as rats, while they perform naturalistic foraging behaviors. Previous studies from our lab have found that rats with hippocampal lesions and medial entorhinal cortex lesions are impaired across many different measures and spatial configurations in the TSP task, specifically on measures of spatial memory. Given the various cognitive demands of this task, our lab was interested in examining the role of the medial prefrontal cortex (mPFC) in the TSP task. After rats were trained on the task, they received bilateral excitotoxic lesions of the medial prefrontal cortex or sham lesions, to serve as the control group, and were retested on the TSP task using eight spatial configurations. Following testing, rats were perfused and their brain tissue was analyzed for lesion quantification. Additional male and female control rats were included in this study in order to examine whether there are any differences in TSP performance based on sex. Results will be discussed in terms of medial prefrontal cortex involvement and sex-based differences in rat performance on the TSP task.

The 2000 American Presidential Election: A Flash Point in the Public's Lack of Faith in Presidential Elections

Kenneth Scroggin

Since the early stages of the United States' existence, presidential elections have been a source of contention. The particularly controversial presidential elections prior to 2000 were settled in their own unique ways, which impacted the times that followed in their own regards. In a similar sense, the 2000 American Presidential Election symbolizes a flash point in the lack of public faith in presidential elections for the 21st century. This is especially understood through the impacts of the events during the period between Election Day of November 7, 2000 and the certification of the electoral votes. The narrowness of the margins, the uneasy procedural process of verifying the results of this election, and the general sense of uncertainty, all connect to the murky impression the American public had at this moment in time. This lack of faith regarding the 2000 election stems from a mixture of specific functional, textual, and societal factors. From the point of the 2000 election onwards, these factors continued to develop in the subsequent years, under similar frameworks presented with the 2000 election. The ramifications of these changes contribute to a growing lack of public faith in following presidential elections, represented by escalating contention in the 2004, 2016, and 2020 elections. Overall, the moment in time of the 2000 American Presidential Election speaks to the current lack of public faith in the overall nature of American presidential elections.

How Gender Affects Perceptions of Safety Following Information About Sexual Assault

KIARA SUMMERS, NATALE RAHMON and Anne Koenig

The topic of sexual assault is a prevailing social issue and this study focuses on gender differences in how USD students perceive their safety when they are informed about the crime rates of sexual assault. In particular, we compared how safe men and women feel in general, as well as after reading information about sexual assault or general crime rates in a 3 (crime information: sexual assault, general, control) x 2 (participant gender: male, female) between-subjects design. Participants who were randomly assigned to read about sexual assault, for example, learned about the definitions and rates of crimes such as rape and domestic violence at USD and in San Diego in the past few years. We hypothesized that women will feel more wary of going out at night and will feel the need to be safer after reading about sexual assault information compared to men. They may also feel less safe after general crime information because of the "shadow" of sexual assault in which other crimes create fear because of a potential link to sexual assault. Men, on the other hand, were expected to feel less safe after reading about general crime than sexual assault. Although women may naturally be more hyper-aware of their surroundings in certain situations than men, it is important for men to understand how unsafe women feel in such situations. The results of this study will have implications for finding ways to promote safety and awareness among our community.

The COVID-19 Crisis in the Cali-Baja Region: Public Health, Economic, and Social Impacts

ALLYSON TEAGUE and David Shirk

This study examines the impact of the COVID-19 pandemic in the Cali-Baja and San Diego-Tijuana region, with regard to the diverse public health, economic, and social consequences of the pandemic for people, businesses, and communities on both sides of the border. While there have been many studies of the impacts of COVID19 in the United States and in Mexico, there are comparatively fewer studies that have examined the impact of the pandemic in cross-border communities. The research methodology employed in this study includes analysis of available descriptive data on public health and economic impacts, as well as personal interviews with local stakeholders in both San Diego and Tijuana. Overall, the research provides a basis for understanding how trans-border communities have been specially impacted by (and how they have adapted) to the realities of the pandemic. The findings of this study also shed light on the lessons for policy makers on how to manage the complexities of a global pandemic in a highly integrated cross-border region. In this sense, this report provides a unique perspective that will prove useful in improving regional emergency responses to crises affecting the San Diego-Tijuana region and other cross-border regions.

The Effect of Melody Familiarity on Word List Recall

CONNOR WARMAN, Teodor Zelenskyy and Laura Getz

The Effect of Melody Familiarity on Word List Recall Connor Warman, Teodor Zelenskyy, and Laura Getz Previous research has varied in its results pertaining to the effects of music on memory; for example, Rainey and Larsen (2002) found that the memory for lyrics and melody are integrated to some extent, and that familiar melodies are more helpful to retrieval than unfamiliar. In Experiment 1 we tested the effects of unfamiliar melodies on the memorization of unrelated word lists. Participants were presented with a verbally spoken list of 15 words or the list was presented as an unfamiliar melody. After hearing each list, participants were asked to freely recall words from the list in any order. They were then presented with a longer list of words and asked to divide them into old (seen in original list) and new (not seen in original list). We found that the participants did worse on the recall task when the list was set to an unfamiliar melody compared to when the list was spoken at a similar speed. We predicted that this is may be due to the depletion of cognitive resources used to interpret the unfamiliar melody which diverted attentional energy away from the memorization task. Thus, in Experiment 2, we are investigating whether participants show a recall benefit as a result of the lists of words being presented to familiar melodies. We predict that participants will perform better in the recall task when they are memorizing words set to a familiar melody, as they will experience a cognitive enhancement associating the word list with a melody they already know.

Examining Memory for Elapsed Time in a Rodent Model of Attention Deficit Hyperactivity Disorder

ALEXA WATSON, MADISON WYATT, JAMES GHALY, RYAN NGUYEN and Jena Hales

In order to make sense of experiences, it is essential to keep track of when events occur over time. Previous studies from our lab have demonstrated a link between damage to the hippocampus or the medial entorhinal cortex and impaired memory for elapsed time. Individuals with attention deficit hyperactivity disorder (ADHD) have been shown to exhibit similar deficits in memory for elapsed time. To explore the potential connection between hippocampus/MEC-dependent elapsed time processing and ADHD, our study compared the performance of Spontaneously Hypertensive Rats (SHR), a widely used rodent model of ADHD, with control Wistar Kyoto Rats (WKR) on an elapsed time memory task. We tested rats on the time duration discrimination (TDD) task, developed in our lab, in which rats navigated a figure-8-maze with a delay box at the end of the central arm. While inside the delay box, rats experienced a 10- or 20-second time delay. When the delay box opened at the end of the delay, rats were rewarded if they made a left turn after a 10-sec delay or a right turn after 20-sec. Preliminary results indicated that the SHR group exhibited impaired TDD performance compared to the WKR group, specifically on the longer 20-second delay trials. The SHR group eventually learned the task and reached criterion performance; however, they showed a significant learning delay compared to the WKR group. These results suggest that ADHD-model rats have impaired learning of time-duration discriminations, particularly for the longer, 20-second durations, indicating greater deficits in elapsed time memory.

Examining Concordance Between Youth and Caregiver Reports of Posttraumatic Stress Symptoms Following Child Sexual and/or Physical Abuse

CLAIRE WEIL and Andrea Hazen

Witnessing or experiencing sexual or physical abuse during childhood puts youth at increased risk for developing mental health disorders, including Posttraumatic Stress Disorder (PTSD). Psychological interventions are most effective when primary caregivers are aware of the abuse event, understand their child's posttraumatic symptomatology, and are engaged in treatment. This study aims to examine the concordance, or lack thereof, between youth reported PTSD symptoms and their caregiver's perception, with associated outcomes. Participants will include youth-caregiver dyads referred to a trauma-focused psychotherapy intervention, who endorsed at least one new posttraumatic symptom, following formal disclosure of sexual and/or physical abuse at a Children's Advocacy Center (CAC) in San Diego. Statistical analyses will be conducted on the data collected from the included standardized measures. The results will be discussed in relation to previous findings on the importance of caregiver perceptions of youth PTSD symptoms and on the impact of having a supportive caregiver on youth resilience. Recommendations will be provided regarding the assessment and treatment of youth-caregiver dyads receiving services following child abuse.

Influence of Fears of COVID-19 and Overall Psychological Distress on Willingness to Use Telemental Health Services

KAITLIN WILLIAMS and Jennifer Zwolinski

The deep impacts of COVID-19 have changed many facets of our lives which has resulted in increased fears and mental health concerns. One recent study found that college students are reporting remarkable problems with academic, health, and lifestyle-related concerns given the negative impact of COVID-19 (Son et al., 2000). Given the benefit of telehealth on psychological outcomes (Pennant et al., 2015) and the clear need for college mental health support during the lockdown, the current study will investigate the relationship between one's willingness to use telemental health, COVID-19 fears, and mental health functioning. I propose that higher scores on the COVID-19 Fears scale will be associated with an increase in college students' willingness to use telemental health services. I also propose that willingness to use telemental health services will be associated with an increase in overall psychological distress across the last year. Participants will include USD college students enrolled in Psychology 101 in fall 2020 and spring 2021 who completed self-report measures including fear of COVID, distress across the last year, stress management, and perceptions of telemental health. ANOVAs will be run to evaluate my hypotheses. Findings from this study can provide insight into future outreach programs concerning mental health on college campuses.

The Impact of Gender Ideologies and Size of Sex Differences on Stereotyping

RILEY WEEDEN, JESSICA MEHANALANI WILSON, and Anne Koenig

A genderblind ideology is the belief that being blind to gender and focusing on individuality is the best approach to gender equality. Conversely, a genderaware ideology emphasizes celebrating gender identities to increase equality. In past research testing the impact of these ideologies on stereotyping, genderblindness and genderawareness are confounded with perceived size of sex differences. Therefore, it is unclear whether the ideology or the percieved size of sex differences is what caused the outcomes. Using a 2 (ideology: blind, aware) x 2 (size of sex differences: large, small) x 2 (participant gender: male, female) between-subjects design, participants read one of four randomly assigned articles designed to encourage genderblind or genderaware thinking and manipulate sex differences to be larger or smaller. They then completed an inference measure to test for gender stereotyping. Participants were presented with a series of photographs of males and females alongside various brief descriptions (e.g., this person has a private practice); participants then inferred the role of an individual, which will be coded for stereotypical responses (e.g., doctor or nurse). We hypothesized that when sex differences are described as large, participants should use more stereotypes when they believe they should pay attention to these differences (awareness) vs. when they should not (blindness). However, when sex differences are perceived to be small, there should be little difference between the aware and blind conditions. These findings could have implications for how we understand gender ideology and its impact on stereotyping in order to reduce sexism.

Elapsed Time Processing in Rats and Hippocampal Inhibition Using DREADDs

MICHELLE ZAICHIK, Akemi Ito, Ryan Nguyen, Annette Vo, and Jena Hales

Research examining the temporal aspects of memory have found the hippocampus to be critically involved in various aspects of time processing. A recent study from our laboratory determined that rats with permanent excitotoxic lesions of the hippocampus showed impaired memory for elapsed time during a Time Duration Discrimination (TDD) task. In order to manipulate brain function while leaving brain tissue and connectivity intact, we investigated the use of a chemogenetic technique involving virally-delivered DREADDs to inhibit hippocampal function. This study utilized inhibitory hM4Di DREADDs, which were expressed throughout the hippocampus in rats and, when bound by an exogenous ligand (CNO), inhibited its function. This technique allowed further investigation into the role of the hippocampus in our TDD task using a within-subjects design and reversible hippocampal inactivation. Behavioral data and histological analyses are in progress and will be discussed along with the methodology and recent data using our novel elapsed time discrimination task.

Humanities

Intricacies of “Creatorship” - Pseudonyms & the Masquerade

KARLIN BERGUM

This project will discuss the parasitic bond between an individual, their work, and audience within consumerist society. The artistic aspect of this research will include a series of purposefully designed and constructed garments; the associated paper will look at how and why artworks that have a signature (e.g. a name or specific style) weigh heavier than those with no associated identity. A signature gives artwork meaning and importance in society because of the power and notoriety of the creator. This relationship stems from Eurocentric Christian cultural constructs and their influence on "creatorship"--claiming ownership of a so-called original creation. The mandatory link between developer and creation, which I argue is imposed by Eurocentric ideals of "creatorship," is interlaced so far into our community that it is taught and reinforced by the education system and then reflected in capitalist consumerism. As I ask, can it then be inferred that an individual's identity is in fact shaped, defined, and determined by the very objects and inventions they develop?

Utopian Catholic State or Murderous Racist State? Sacralization, Myth, and Politics in Croatian Ustasha State 1941-1945

NIKA BURJA and Michael Gonzalez

Ustasha, the Croatian fascist and ultranationalist movement founded in 1929 by Ante Pavelic, used eugenics and genocide coupled with religion to reach its goal of creating an independent and purely Croatian Catholic state (NDH) free from Yugoslavian (primarily Serbian) dominance. Public statements of Ustasha military, political, and religious leaders, as well as NDH news article entries from the early 1940s show how ethnonational identity was continually reformulated in a process in which memory and myth shaped and limited the boundaries of social construction. Croat identity was deeply rooted in primordialization (recreation and reconstruction of the past), as well as constructivism, Catholicism, and Croat long struggle in defense of their homeland's freedom and independence. The foundation of NDH meant the creation of a restored Croatia through the influence of neighboring fascist ideals and the split in the Christian Church, favoring Catholicism over Orthodoxy. In pursuit of national regeneration, the Ustasha engaged in persecution and removal of non-Catholics, Serbs, Jews, and Roma. This purification campaign signaled the use of cultural politics that emphasized Catholic images of suffering, martyrdom, and sacrifice which justified the removal and destruction of "non-Croats." Thus, it was through the combination of mass terror, genocide, fascist and nationalist ideals, as well as myth, memory, and Catholic symbolism that the Ustasha regime resorted to a fantasy heritage to achieve national revival and construct a new consciousness.

Vietnam: The Impracticality of Political Victory Before 1965

GABRIEL DE ANDRADE and Kathryn Statler

The Vietnam War was a messy affair for both the people of Vietnam as well as the United States. The ever increasing American presence in Vietnam, following the withdrawal of French colonial forces, only saw the crisis worsen due to several foreign policy failures. The declining situation within South Vietnam eventually forced the United States to begin a military intervention in 1965. This is often seen as the beginning of the end for the prospect of victory for the Americans and the South Vietnamese. A series of decisions were made by multiple presidents in the years leading up to 1965 which sealed the fate of the United States. However, some scholars believe that the situation in Vietnam was in fact winnable. Historians like Mark Moyar claim that cowardly politicians ruined the chances of victory by making poor decisions. This is not the case. The notion that the conflict was winnable is wishful thinking at best, and as such, each point from these more conservative historians will need to be refuted. The reality is that the United States made questionable decisions that doomed South Vietnam's government. Some conservative historians ignore the political realities of South Vietnam and fail to realize that doubling down and expanding the war would have only provoked other players, like the USSR and China, potentially providing the setup for another global conflict.

From Imperialism to Nation-Building: Cold War Diplomacy and the American Missionary in the Belgian Congo

AMELIA LEAHY and T.J. Tallie

An examination of missionary work in the Belgian Congo reveals shifts in U.S. political rhetoric during the 1950s and 60s and in subsequent American perceptions surrounding the region. While a significant component of American identity revolves around the proclamation of secularization, missionary work during the Cold War demonstrates the falsity of this claim and encourages readers to contemplate a more complicated religious fabric within American society. Beginning in the late 1940s, American missionaries altered their posture towards colonialism and adopted a revived project of humanitarianism and democratization. The anti-imperial and pro-democratic stance that the missionaries assumed during the Cold War era mirrored a similar political and cultural re-pivot by the U.S. government, yet these shifts were tremendously complicated. Missionaries and foreign policy alike advocated for postcolonial futures but also sought to fortify American dominance in the region. This project will address the contradictions within U.S. foreign policy during the Cold War, the history of imperialism in the Belgian Congo, and the role of the missionaries in spreading American diplomacy as well as American insecurities. My research aims to spark a greater understanding of the deep and extensive history of U.S. nation-building and its intimate connection to colonial projects. This paper also seeks to highlight the tendency of colonial and nation-building projects to place unqualified individuals in positions of great power and influence.

A Cold War in the Pacific: Containing the PRC through Deterrence

SAMUEL LONGO and Randy Willoughby

While the US military and intelligence apparatus was focused on combating terrorism during the first two decades of the 21 century, the People's Republic of China has exponentially increased its military capabilities while showing increasingly expansionist tendencies in the South China Sea, the East China Sea, and Taiwan. Simultaneously, China has expanded global political and economic leverage through programs such as the Belt and Road Initiative. China's growing global influence and expansionism are a threat to the international rules-based order that requires free trade and respect for territorial sovereignty. In order to be successful in deterring China's aspirations of expansion, the US must maintain a strong military presence in the Pacific by continuing to operate its foreign base infrastructure, continuing to enforce Freedom of Navigation, and strengthening ties with allied nations through joint training and military sales.

From Venefica to Witch: the Rise of the Female Roman Scapegoat

Solaire Nazarenus-Olson

How did the patriarchal connotations of a witch character develop into the present day? Although the Ancient Romans did not use the term "witch," from 100 BCE-150CE there is a clear shift from the previously accepted saga towards the sinister narrative of the venefica, or a grotesque sorceress known for her poisoning and casting of spells. Through the gendering and vilification of the term venefica, continued persecution through the word "witch" was made possible. This shift becomes starkly present in the writings of Roman figures like Horace and Apuleius, where the Western witch forms its bedrock. Once an accepted, older woman of Roman society, the venefica turns into a fictitious caricature meant to scapegoat those seen as clearly "other."

Dodging the Draft: How Military Conscription Targets Disadvantaged Americans

ELIZABETH NICHOLS and David Miller

Military conscription in the United States has been employed during several U.S. conflicts and American political leaders have always urged citizens to step up and defend their country's values from oppressors. The "draft" as many call it, is intended to be a fair and impartial system to determine who will be called to service in the armed forces, but historically there have been many flaws in the system that have targeted disadvantaged American citizens. As a result of these faults, many groups of Americans have been disproportionately drafted into American conflicts. The systems in place historically favored white men of high social and economic status, and as a result those who are more privileged in American society were able to escape conscription during unpopular wars. The faults with American military conscription ultimately led to wars such as the Civil War and the Vietnam War drafting larger amounts of working-class Americans, as well as more people of color.

American Women in Paris in the 1920s: Redefining What It Means to Be a Woman

LAUREN O'NEILL and Michael Gonzalez and Kathryn Statler

During the interwar period, from 1918 to 1939, the roles of women experienced change as the traditional gender stereotype of male dependency shifted to female independence and power. Much of this shift can be attributed to the women who found refuge in Paris during this time. Of the many women who realized their independence during the 1920s, Americans Gertrude Stein, Josephine Baker, and Zelda Fitzgerald stand out as trailblazers and examples of those women who reimagined the female role. Coming out of World War I, most of the Western world valued conformity, patriotism, and tradition, however, the "Lost Generation" that emerged held its value in creativity, individualism, and expression. The Lost Generation refers to a generational cohort consisting of those who reached early adulthood during World War I. Iconic members of this cohort, including Ernest Hemingway, F. Scott Fitzgerald, and T. S. Eliot are often recognized for their contributions to changing society. Their female counterparts, however, are rarely appreciated for the social changes they imagined and inspired. Ranging from the academic accomplishments of Stein to the influence of Baker on the entertainment industry and Zelda's artistic endeavors, the three women represented female empowerment, showing women in the U.S. and in Europe what they were capable of. A new female identity of independence and ability emerged during the interwar period as a result of the example they set, as women were inspired to pursue academic, career, and artistic goals, with or without the support of a husband.

Mythic Memory: Trojan Myth and the Conflicting Historical Identities of England, Wales, and Scotland, 1136-1534

REBECCA ONKEN

Where do we come from? This is a question that countless cultures have pondered and answered in a variety of ways, often mixing history with myth in pursuit of an answer. It was no different for medieval Britain. As extensive conflict arose between England, Wales, and Scotland during the late medieval era, so too did the need for a historical memory that could anchor their identities. For each, Trojan myth became part of that memory, and, in turn, that identity. The tale of Trojans fleeing the fall of their city to found new kingdoms was a narrative at least as old as Vergil's Aeneid (29-19 BCE) "itself a text that captured the medieval European imagination" and found new life amidst medieval cultures desperate to understand their own origins. My thesis seeks to examine the complex interconnections between historical memory, identity, and regional conflict that arose during this era and found a voice in Trojan myth. In doing so, I will demonstrate how mythic memory can become its own history and thus shape identity.

Heavenly Bodies: Intersections Between Gender Expression, the Catholic Tradition and Material Culture

BRYANNA RIVAS and Susan Babka

This project focuses on the intersection between gender identity in the Catholic tradition and gender expression in Catholic material culture, specifically clothing. By bridging the works of feminist philosophers and theologians, I assert that an incarnational existence of God points to a doctrine of love and acceptance for human beings. Theologically, the Divine is said to be epicene, at times androgynous or gender-free?yet our symbols, language, and institutional structures paint a more gendered picture of the transcendent. This inevitably impacts our conception of humans as Imago Dei. Given this gender tension, I dive into how this creates a patriarchal power dynamic that influences the material culture of the Catholic tradition. Dress and clothing are of particular importance when discussing gender identity and expression, as it lies directly against our skin and is a primary way of presenting ourselves to the world. Additionally, the position of textiles in the Catholic tradition is unique, as it appears in artworks, regalia of clergy members, and scripture. The material culture, including dress, of the Catholic tradition at times affirms the patriarchal power structure while sometimes ironically subverting the power dynamic. Considering dress as an avenue for serious theological contemplation opens opportunity for future engagement with other seemingly secular areas of life. By fleshing out the intersection between these topics, it opens up the field of theology to discover greater opportunities for meaning-making.

Cultivation of Compassion in Catholic Teachings: An Invitation to Relationship with Immigrants and Refugees with HIV/AIDS

ANNA SALVESTRIN and Victor Carmona

In 1989 the United States Conference of Catholic Bishops released Called to Compassion and Responsibility. This document, which articulates the official Catholic Church teaching on HIV/AIDS, emphasizes personal responsibility in limiting the spread of HIV and calls for compassion toward the sick. The bishops direct their document to Catholic clergy and parishioners and offer recommendations for government policy and parish actions that affirm human dignity. This thesis argues that the document's recommendations do not adequately consider the experiences of immigrants and refugees with HIV/AIDS and neglect sufficient attention to their lived experiences. In future documents, the bishops should use the lived experiences of immigrants and refugees with HIV/AIDS to create recommendations that more effectively nurture compassionate government policies and parish responses. The main reason this is the case is that compassion demands intimacy in each other's lives. In that light, this thesis critiques government policies that fail to reflect the compassionate response that the lived experiences of immigrants and refugees with HIV/AIDS call for. Likewise, it provides recommendations for parish actions that more fully embody God's compassion, inviting us into the intimacy of relationship with immigrants and refugees who live with HIV/AIDS today.

Cultural Appropriation: A Social Lineage Account

THOMAS SANBEG and Rico Monge

I argue that a social lineage account of cultural appropriation best grounds normative restrictions on said appropriation. Adopted from Alison Stone, a social lineage is a chain of overlapping interpretations of what it means to be a part of a given culture, and participation in that lineage constitutes the ‘essential’ activity necessary for membership to the corresponding culture. As such, the social lineage account of cultural appropriation demands a kind of cultural essentialism (such that cultural insiders share in a set of essential characteristics), though it is a ‘thin’, or soft, essentialism, in that historical cultural-nonmembers can come to acquire ingroup status; there are no steadfast barriers to participating in the practices of any culture. The social lineage account will build off of C. Thi Nguyen and Matthew Strohl’s ‘Intimacy Account’ of Cultural Appropriation, though I will attempt to explain why the preservation of a culture’s intimacy is important. I suggest that this answer is found in the threat misappropriation poses to a culture’s authenticity, which presents an aesthetic harm and a potential moral violation. Hence, a cultural outsider should need to earn the right to the practices of a given culture, to engage respectfully; a measure of protection afforded by the social lineage account.

The body, death, and occult practices in Francophone literature and film

GLORIA SENGPASEUTH and Eliza Smith

This Senior Capstone Project integrates theories and content from the following USD courses: FREN 494 “Practiques Occultes dans la littérature française et francophone”; PHIL 335 “Death & Dying”; and finally, BIO 212 “Anatomy & Physiology” by analyzing the representation of occult practices in French and Francophone literature and film through the lens of philosophy, specifically philosophical thought on death as a disease. This interdisciplinary analysis applies the human responses to ideas of death to portraits of the occult and alternative narratives of the body and death in French and Francophone literary and cinematic works, such as Sortilège haïtien (2011) by Jessica Fièvre and Bertrand Bonello’s 2019 film, Zombi Child. Through a philosophical analysis of anatomy, physiology, and death as viewed within supernatural and occultic literature and film, I argue that these images actually contain a veiled commentary on the subjectivism of European beauty ideals in the long nineteenth century (1780-1914).

Within the Shadow of the Ebony Clock: Plague, Pandemic, and Apocalypse in Literature

OLIVIA SUTTON and Jeanie Grant Moore

Unprecedented' has been the catch word of the COVID-19 pandemic, but perhaps this word is not accurate. Coronaviruses may be unprecedented, but pandemics and our experiences are not. This summer, I've researched literature from five major pandemics [Antonine Plague (165 AD), Plague of Justinian (541-542), Black Death (1346-1353), Flu Pandemic (1918), and Asian Flu (1956-1958)]. Through the lens of poetry, fiction, nonfiction, philosophy, history, psychology, and literary analysis, one discovers a clear picture of pandemic life through the ages and an eerie collection of similarities to our own experiences. From antiquity to the modern age, writers have described scenes that are so reminiscent of the present they shame the word "progress": people who scorn medicine and put their hopes in fanaticism and superstition, privileged classes that flee to the countryside, society's blaming of marginalized people for the carnage, and authorities that cover up the grisly reality for a facade of control. I plan to continue researching, exploring the literary gendering of pestilence as female and death as male as well as the other ways that sexism continues to pervade pandemics. Under an all-encompassing theme of blaming, I will also study the role of othering, marginalization, and increased hatred.

Is America to Blame for Mexico’s ongoing drug violence?

Marcello Trafeli

The relationship between ethics and aesthetics is seldom clear. Some philosophers go so far as to deny the relationship altogether, claiming that moral value should have no bearing on aesthetic appraisals of artworks. Others believe that ethical flaws can constitute real aesthetic flaws in a work, but that positive ethical traits are incapable of lending aesthetic merit. This view is otherwise known as the asymmetry claim. I seek to refine this view as it is presented by A.W Eaton in her paper 'Where Ethics and Aesthetics Meet: Titian's Rape of Europa,' by addressing The Merchant of Venice and Titus Andronicus and their treatments of the virtue of mercy. I argue that positive ethical traits may increase the moral understanding of the viewer and lend themselves to establishing aesthetic virtues such as subtlety or harmony in a work. I focus mainly on the characterization of Aaron the Moor in Titus Andronicus, arguing that his virtuous act of sparing his son's life adds invaluable moral complexity and aesthetic merit to an otherwise brutal narrative. The asymmetry claim as Eaton presents it focuses on how works that are propagandistic and attempt to positively influence our ethical behavior are at best aesthetically inert. However, through Shakespeare, I will discuss why it is impossible to assert that all instances of positive ethical traits in art must be of this nature, and how some may truly enhance the aesthetic qualities of a work.

Losing America’s Longest War: Critical Mistakes and Failures by the United States Government in Afghanistan

BERK WATSON, Michael Gonzalez

This research seeks to analyze why the United States failed to build a stable, western-style democracy in Afghanistan that could protect itself from a Taliban insurgency after a twenty-year war that cost tens of thousands of lives and more than two trillion dollars. The research initially focuses on Afghanistan's war torn and turbulent political history and how the Bush Administration's ill-fated decision to invade Iraq in 2003 after nearly two years of relative peace and great strides re-building Afghanistan allowed a Taliban resurgence and became the first major mistake in losing the war. The failure of the Obama Administration to reign in massive Afghan government corruption and waste and its decision to draw down U.S. troops while increasing the use of drone strikes also helped create distrust and anger at the U.S military. The use of Guantanamo Bay prison camp for Taliban fighters along with U.S. military war atrocities further turned the Afghan people against the United States. Firsthand accounts and analysis by the U.S. military and civilian leaders who worked in Afghanistan detail how a combination of these factors as well as a lack of a long-term commitment ultimately led to the United States chaotic withdrawal and collapse of the Afghan government in August 2021.

Engineering, Math and Computer Science

Quasi-Periodic Oscillations in Black Hole X-ray Binaries

Kathryn Anawalt and Theodore Dezen and Nicky Zecchini

Sufficiently massive stars end their lives as black holes, which may be surrounded by an accretion disk, formed by drawing material from the outer layers of a companion star. As the hot (>107 K) and ionized accreted gas spirals in closer to the black hole, a significant fraction of the liberated gravitational potential energy is radiated away as light. Such systems are known as black hole x-ray binary (BHBs) because the radiation is primarily in the X-ray regime. BHBs are observed to dim and brighten at almost regular intervals, with frequencies ranging from 40 Hz to 450 Hz, in a phenomenon called quasi-periodic oscillations (QPO). While the frequencies are thought to depend only on fundamental black hole properties such as mass and spin, the strength (brightness) and sharpness (coherence) of QPO power spectra are poorly understood. In this work we study the dependence of properties of the QPO power spectra peaks on dissipation fraction, which is defined as the fraction of accreted gravitational potential energy that goes into heating the region around the disk photosphere.

Our Carbon Footprints

SOPHIA AUSTIN and Susan Lord

Capitalizing on an internship that I had with the electric utility company Southern California Edison, where I learned about carbon emissions and their impact on air quality, I designed and facilitated a class session for a USD engineering class focused on solar energy for my honors thesis. At Creative Collaborations, I will highlight some key concepts from this work, with a focus on our carbon footprints. Many of our daily activities - such as using electricity or driving a car - generate greenhouse gas emissions, which is the direct cause of climate change. The sum of all of the greenhouse gases that we release, both directly and indirectly, is known as our carbon footprint. The average carbon footprint for a person living in the United States is 16 tons, which is four times higher than the global average. Fortunately, there are steps that we can take to reduce our individual carbon footprints. This work will help attendees to identify and explore many ways that they can do their part in combating the climate crisis we are facing, one footprint at a time.

Encouraging Early STEM Exposure in Today's Youth

GEDEON BAENDE and DEMILI PICHAY and Marissa Forbes

When hearing "STEM", one might have an inclination to back away due to intimidation. In the United States, younger age groups often have limited exposure to some STEM fields (Science, Technology, Engineering, and Mathematics) , and this lack of exposure can foster apprehension when approaching STEM. This intimidation can be a major barrier to today's youth engaging in the STEM fields. The assumption that STEM is unapproachable or unattainable turns away a multitude of students. However, an earlier introduction to STEM has the capability to foster passion in students from an elementary level all the way to a high school level. It has the potential to spark excitement in students and overcome the stigma that STEM is a daunting topic. Early introduction to STEM-based activities is integral, and we plan to contribute to this effort by designing a curriculum plan that will be tailored to younger audiences. We aim to develop a curriculum plan revolving around the creation of tide clocks for implementation at a middle school-level, as an engineering and environmental science activity. This research and development project will be completed in partnership with the USD Water Justice Exchange. We hope that as a result of this fun and interactive project, our youth can begin to embrace STEM at an earlier level, furthermore orienting them towards the idea of exploring a future in STEM.

MathSpark: Sparking Student Curiosity Through Hands-On, Inquiry-Based Mathematics Explorations Inspired By Funds of Knowledge

KALIYAH CLYDE, MIKAELA MORRIS, KATRINA BAHA and Perla Myers and Amanda Ruiz

Oftentimes when students are being taught math, importance is placed on students remembering information rather than students utilizing their curiosity. Moreover, attention is typically centered on teachers during math lessons and students are usually unable to connect the material to their personal lives. For this research project, our research team took the time to explore these issues. We read about inquiry-based learning, funds of knowledge and the importance of curiosity in math. Inquiry-based learning is a teaching style that centers students as they navigate through problem-based lessons. Funds of knowledge represent the life experiences of individual students, thus implementing funds of knowledge into math teaching allows students to further interact and understand the material. Furthermore, students engage with material more if they are curious about it. Student's questions stem from their curiosity, therefore student questioning can enhance the math learning experience. A lot of research on the types of questions teachers ask exists, however there is a minimal amount of research on the type of questions students ask. Our main goal of this research project was to create a categorization of types of questions students ask which can potentially be a useful tool for math educators. Our categorization was influenced by Bloom's Taxonomy and the Van Hiele Levels. We created inquiry-based lessons for students that nurtured students' curiosity and encouraged students to bring their funds of knowledge in hopes of fostering student question asking. We will collect questions students ask during our lessons and categorize them according to our scale.

Wastewater Treatment and Uses

INBAL DANIELI, JOSIAH DANILO, NICOLE KOUTELOS, BRIANA REYNOSO, EYAL BEN YITZHAK and Yaal Lester and Frank Jacobitz

Wastewater, from industrial, agricultural, and domestic water usage, is a significant source of water. Domestic wastewater primarily consists of sewerage, which contains biological waste. Agricultural wastewater can also consist of biological refuse as well as additional contaminants such as pesticides. Industrial wastewater can contain a slew of pollutants, including metals, bacteria, oil, and even radioactive waste. Each of these sources requires specialized treatment in order to render the water safe enough to be reused or re-incorporated into the environment. Treatment facilities employ a wide range of technologies, each specialized for removing a specific type of pollutant. These include filtration via various mediums, biological and chemical processes, oil-water separators, and even more complex techniques such as electrodialysis. It is increasingly important to develop cost-effective methods of wastewater treatment, as underdeveloped nations lack critical infrastructure to properly treat their used water in the wake of an ever-increasing population. This project will detail some of the wastewater treatment methods employed in Israel and utilize those techniques for a potential treatment method suitable for restoring water to be reused. This project is a joint effort between students at the University of San Diego and the Azrieli College of Engineering Jerusalem.

Surface Water in Israel and California

ROI ERNESTI, KATIE LONG, LAUREN SMITH, EYAL TANCHUM, LIOR TRINK, SAVANNA WALTER, Yaal Lester, and Frank Jacobitz

Surface water includes all water resting above ground from oceans and seas to rivers and lakes. Due to its exposure to the surface, this water is frequently affected by pollutants that have been categorized into two main groups: point source pollution and non-point source pollution. Point source pollution originates from a known source such as a factory. Non-point source pollution is typically observed as agricultural and stormwater runoff from heavy rain events accumulating debris and pollutants which is then dumped into the nearest body of water. The combination of these two sources leads to an overabundance of pesticides, metals, pathogens, and sediment leading to the endangerment of the surrounding ecosystems along with the inability to support human use as well. As of 2012 82 percent of California's publicly supplied water comes from surface water. Mainly water is used from the Colorado River and the Feather River watershed. The state has implemented the Surface Water Protection Program to manage pesticide runoff but pollution issues are still present. The year-round surface water source in Israel consists principally of Lake Kinneret, which suffered over the last decade from overexploitation and pollution from nearby settlements. Due to this long-lasting overexploitation and the growing use of desalinated seawater, Lake Kinneret water presently provides principally local domestic and agricultural use. This project with overview the challenges of surface water use in both California and Israel. The project is a joint effort between students at the University of San Diego and the Azrieli College of Engineering Jerusalem.

Properties and Uses of Water from Desalination Plants

JOSEPH GRAZUL, KEITH HARRIS, MATHIAS LANE, NOA LEVIN, CARLO SANCHEZ, MOSHE BEN SHOCHET and Yaal Lester and Frank Jacobitz

Water is essential to our survival, but most of the water available to us is in oceans and provides little to no use for us. Due to its high salt content, seawater is harmful to humans and most plants. Because there is little fresh water available to us and plenty of sea water, we would like to explore techniques to turn seawater into consumable fresh water. This solution includes desalination, a process which removes salt from water to make it safe for human consumption. The main commercially available desalination techniques are Mechanical Vapor Compression (MVC), Multi-Effect Distillation (MED), and Reverse Osmosis (RO). The technology of RO has substantially reduced the cost of desalination and is currently being used at large desalination plants in both California and Israel. The largest facilities in each of these locations is Carlsbad and Soreq, respectively. The amount of water that can be processed in these facilities is approximately 50 million gallons/day in Carlsbad and 165 million gallons/day in Soreq. RO is a process of putting saltwater under pressure and forcing it through semi-permeable membranes, thus extracting salt and other contaminants, leaving water that is safe for human consumption. This report will look at the design and operation of desalination plants, their positive and negative effects on drinking water supply and the local environment in California and Israel. This project will be completed using combined efforts and perspectives from students at the University of San Diego and the Azrieli College of Engineering Jerusalem.

Everywhen: Emergence Art Sculpture Installation

Jane Kim

Emergence was a 10' tall, 30' long, LED illuminated wooden sculpture displayed at Everywhen: Electric Universe. The piece, installed as the US began to emerge from covid-19 restrictions, explored the confinement and discomfort we collectively experienced during the global pandemic. After many months of isolation, we all expected harmony and healing, yet all we received was chaos and confusion. Despite this disappointment, Emergence is meant to emphasize the power of perspective. Going through the tunnel, you will be squished, you will be cramped, you will be bothered. But that is okay, for it is after our darkest hour, our loneliest moments, that we can find true happiness. Enduring these painful times can be consoled by finding comfort in discomfort, which is represented by the LED's warm and constantly changing tones. For fear is something we should not run away from, but rather embrace as an opportunity for growth. In order for us to understand ourselves, we must take the time to explore ourselves. We must take the time to grow in our struggles to become the best versions of ourselves. Embrace the face of trouble as our beginning days are small and confined, and our latter days will be great just as the tunnel illustrates. The expansion and compression of the parabolic tunnel is meant to capture what it means to be human: what we see, what we feel, and what we hope to become. While this journey of self-exploration may be difficult, especially during the uncertain times of the pandemic, it allows us to see the endless possibilities of what we can be.

Stokes Polytopes

KELLI KUFTA, PAYTON ASCH and Satyan Devadoss

Mathematicians studying combinatorics and topology have been obsessed with the associahedron and permutahedron for the past 30 years. During the SURE program of 2021 we researched a largely unknown set of shapes called Stokes Polytopes. These shapes fall on a spectrum between the most simple shape, the n-dimensional cube, and the most complex, the n-dimensional permutahedron. From papers written by Yuiley Barishnykov, Frederic Chapton, Vincent Pilaud and many others we were able to understand the different ways these shapes are defined. We focused on hyper planes as a way to realize the Stokes Polytopes. Baryshnikov defined a method for realizing n-dimensional Stokes polytopes in n-dimensions. This summer we defined a method for realizing n-dimensional stokes polytopes in (n+1)-dimensions. We hope this method aids us in creating a partially ordered set for a given Stokes polytope. This research motivated by Baryshnikov can be used to further understand the connection between mathematics, physics and chemistry.

Lōkahi: Unity in Identity and Space for Native Hawaiian Engineers

AUSTIN PETERS and Susan Lord

Native Hawaiians successfully navigated the Pacific Ocean and maintained large population densities using interdisciplinary and sustainable engineering practices. In 1893, the Kingdom of Hawaii was forcibly and illegally overthrown by the United States of America beginning the era of colonization leading to statehood and the loss of cultural practices and traditions for Kanaka Maoli or the Native Hawaiian people. Although there is a renaissance of Hawaiian culture and pride in the present day, there are still conflicts that persist from the trauma of colonization. One of these areas of conflict is in engineering as it represents Western development. Thus, many Native Hawaiian engineering students feel they are betraying their Native Hawaiian culture if they become engineers. In addition, their cultural knowledge and lived experiences are deemed insignificant in the engineering space creating a larger identity crisis. Through one-on-one interviews with current Native Hawaiian engineering students and recent Native Hawaiian graduates, we hope to look back to the engineering past of Kanaka Maoli and use their holistic mindset to explain how our cultural and engineering identities can be mutually beneficial. This mindset can bring about the Hawaiian value of lokahi. Lokahi translates to unity or harmony, and has deeper meanings of reuniting what is broken and to bring about agreement through diversity. Native Hawaiian engineering students can use lokahi to reconnect their personal and professional identities while the engineering space can use lokahi to be inclusive and gain wisdom from long-standing Native Hawaiian sustainable practices.

Configuration Space for Winged-Cube

GIACOMO RADAELLI, Phillip Miller and Diane Hoffoss

How does flexibility relate to mathematics? One possible answer is through flexible geometric shapes. In this presentation, we will discuss how a shape called the Winged-Cube can flex. The Winged-Cube originates from a regular cube, where two opposite faces are cut along three of their four edges to create door-like movements of each of those two faces along their remaining edge. This structure has three main categories of distortion: two door-like movements and a fence that folds flat and wraps around the base of the Winged-Cube. We will explain why one only needs values from four angles in order to uniquely determine any possible configuration for this object. At the end of the presentation, we will illustrate the results of our research (through virtual reality) with an interactive model in 3D of all the possible flexes of the Winged-Cube, known as the configuration space. When one "walks" inside the configuration space, the visual of the Winged-Cube will move based on the user's positioning, indicating the current flex of the object at the corresponding point within the configuration space.

The Reception of Mughal Built Heritage Under British Imperialism

ANA AGUILAR and Can Bilsel

Over the past couple of decades, histories of colonization and the appropriation of material culture in the Global South have become a topic of extensive discussion. The scholarship on culture and colonialism shifted from a critique of representations to a critique of expert practices that actually framed material culture, particularly historical monuments. Focusing on the restoration and reception of India's Mughal monuments under the British Raj, I examine in this research how colonialism shaped built heritage and national identities in the nineteenth and early twentieth centuries. I begin by reviewing critical literature on "Orientalism" since Edward Said and Linda Nochlin, moving to more recent interpretations such as Lucia Allais' Designs of Destruction (in which total war and the formation of expert committees by Western authorities influenced the protection and reconstruction of architectural heritage in the Global South). I then examine the primary historical sources during the British Raj such as James Fergusson's multiple volumes, History of Architecture, and Sir Banister Fletcher's A History of Architecture. My research also documents the significance of printed media (such as the Aligarh Institute Gazette) in the creation of a new Muslim-Indian identity and its relation to British imperialism. Informed by these approaches, I found that British colonialism not only implemented modern systems of appropriating Mughal architecture, but also transformed Mughal heritage.

Finding “Missing Middle Housing” in San Diego

SIMONA RODRIGUEZ, DANIELA LLAGUNO and Daniel Lopez-Perez

California as a whole is currently in a housing crisis. As one of California's major cities, San Diego finds itself in the midst of the problem. Alternatives to California's housing crisis must be found in order to tackle the problem from many directions. On Jun 16, 2020, the San Diego Council proposed the 2021-2029 Housing Element. The document is released every eight years and describes the city's plan to meet the housing needs of the current population. San Diego City describes that the regional housing need target for the next eight years is 108,036 built units. This means that it is essential to find locations where units may be built to satisfy this need. Additionally, the Housing Element also describes that 50% of the city of San Diego's population spend more than 30% of their income on either rent or mortgage payments compriming their financial stability in other areas of life. However, the Housing Element also includes goals for the future such as affordable housing and sustainable development & growth. Finding "Missing Middle Housing" research surrounding the Housing Element would include diving into the document and transferring the city's goals and needs into adequate sites in order to start a conversation on where this plan can be implemented. All adequate sites will be mapped out using geographic information system (GIS) technology. Subsequently, Finding "Missing Middle Housing" would continue on to the development of plans for the available sites. In the Los Angeles Mid Rise competition, the focus is on four types of sites: fourplex, subdivision, redistribution, and corners. Units must be no smaller than 300 feet squared and no larger than 1000 feet squares. Furthermore, units must offer layouts from studio units to 2 bedroom apartments. With this competition as a model, our research will create the possibility for middle typologies in San Diego.

Fabric Metamorphosis

GIDEON SAWYER and Farrah Karapetian

We often hear the phrase, "don't judge a book by its cover," but we rarely hear "don't judge a person by their outfit," yet we do it daily. It is usually unconscious, but it exists nonetheless. This project, Fabric Metamorphosis, is the study of just that. I used clothing and other materials as a medium for exploring the relationship between different identities and the environments they move through, and how this relationship is represented in the curation of one's physical image. I refer to my current works as "skins" because of their shared qualities with the word, emphasizing the "space" that makes up society's understanding of individuality. The title of my project, Metamorphosis, foregrounds the skin as surface, the identity as structure, and individuality as substance; each shifts and changes over time and the culmination of the three makes up our understanding of "the self." While the "skins" pose questions about the lives around us, they simultaneously inhabit their own space, creating questions about their own existence, to the point that one must ask, are they alive too?

Writing, Making, and Sharing the Story of the Environmental Impact of Modern Computing.

Taniah Ayala, CHRISTY DODSON, SARA FELDMAN, DANIEL LONG, George Porter, Soroya Rowley, and Monica Stufft.

Our project was a collaboration between two disciplines: theatre and computer science. Three theatre student researchers worked closely with Soroya Rowley (a community-based theatre expert), Dr. George Porter (a computer scientist from UC San Diego), and Dr. Monica Stufft (a theatre professor from USD). We started by writing two scripts that were based on issues relating to the environmental impact of modern computing. We then made two creative videos, two supporting educational videos, and a guidebook. Our goal was to translate science-based material about the environment into something not just entertaining but also accessible to the general public. We should all be doing what we can to make a difference about the climate crisis. We used our theatre skills to model a solution-based approach and are also sharing the process so that others can do this kind of work themselves. We plan to continue to develop this project with the goal of creating workshops and lesson plans for wider use such as in K-12 education.

Falling Through the Cracks: Black and South Asian Muslim Survival and Solidarity

SARAH BABAR and May Fu

Within the fractured systems and institutions that plague the US, two groups in particular have fallen through the cracks: Black and South Asian Muslims. Black Muslims and South Asian Muslims constitute about 20% and 60% of all Muslims in the US, respectively; however, both groups are disregarded and misrepresented in US discourse and media. In 1619, Black Muslim slaves were the first to bring Islam to the US and played a foundational role in the development of Islam in the Americas; yet, they are erased from Islamic and US historical memory. Similarly, South Asian Muslims have resided in the US since the 1700s, but it was not until 9/11 that they entered mainstream discourse as hostile terrorists who were criminalized and subjugated to state-sanctioned harassment and surveillance. Today, both groups are targets of counter-terrorism iniatives which shape their racial formations, racialized narratives, and intra-Muslim interactions. Programs like Countering Violent Extremism (CVE) have exceedingly vilified Black and South Asian Muslims, weaponizing members of their own communities against them. While deconstructing their individual and distinct issues regarding racism, discrimination, and injustice, both groups have found pathways towards solidarity and allyship. This research project examines the relationship between Black and South Asian Muslims, analyzes the differential impact of societal and state violence and hyper surveillance, and explores strategies for cross-racial solidarity.

The relation of parenting style to treatment rationale acceptability in Behavioral Parent Training interventions

ROSALBA BONILLA and Kristen McCabe

Current research demonstrates that behavioral parent training programs (BPT) are effective in treating young children with disruptive behavior disorders, but many families do not fully benefit from these programs for reasons such as parents not enrolling, engaging, or completing the programs. One reason why families may benefit less is because of incompatible parenting styles to the skills taught in BPTs. The main goal of BPT interventions is to teach parents ways to increase their warmth and consistent limit setting with their children, reflecting an authoritative parenting style that is high in both areas. This parenting style can be contrasted with authoritarian and permissive parenting which differ in their levels of warmth and limit setting. Parents who are authoritarian or permissive may find that their parenting strategies are in conflict with some specific goals and techniques of the therapy, making it difficult for parents to implement taught techniques. One approach that may improve engagement with authoritarian and permissive parents is to tailor treatment rationales to better fit with the beliefs that they may possess. There is little existing research on the effect of manipulating treatment rationales to increase treatment acceptability for parents with specific characteristics, and no studies have examined how varying treatment rationales might appeal differentially to authoritarian versus permissive parents. The current study will address this need by examining whether treatment rationales tailored to appeal to either authoritarian or permissive parents will differentially increase the acceptability of parent training interventions when matched to a particular parent's style.

Student's Experiences with their University's Diversity Initiatives

MELISSA CABRERA and Jennifer Nations

Recently diversity has become a significant part of a student's experience in higher education. Studies have found that undergraduate students that hold marginalized identities experience diversity differently than majority students at most universities. Many universities are aiming to increase diversity by implementing initiatives, such as events and policies, that promote the value of diversity. All universities approach diversity initiatives differently, therefore this research will look at one university as a case study for the impact of diversity initiatives on a college campus. The current project focuses on a mid-size, private, Catholic, liberal arts college in Southern California that is a historically predominantly white institution. To collect data for this research, private interviews were conducted with undergraduate students from the university. Students from a range of marginalized identities were interviewed to reflect the different statuses that are considered in conversations about diversity. In the individual interviews, participants were asked to respond to diversity statements given by the university. They were also asked to reflect on their experience as a student to determine if they believe the diversity policies were sufficient and helpful to underrepresented students. The goal of this study is to use student's reflections and experiences to better understand how diversity is valued on campus and potentially identify initiatives that would improve diversity on campus.

Global E-Commerce Readiness of U.S. SMEs towards the Mexican Market: Are American Small Businesses Prepared for Digital Commerce to Mexico?

RICARDO CARDOZA and Eileen Daspro

The entry into force of the United States-Mexico-Canada Trade Agreement on July 1st, 2020, ushered in a new era of regional trade for the region. The modernized agreement's inclusion of a chapter specifically focused on expanding digital trade and investment reflected a business phenomenon that had expanded markedly over the last ten years: cross-border e-commerce within the former NAFTA region. This article examines the literature needed to assess the readiness of U.S. small and medium-sized businesses (SMEs) to sell to the Mexican market online based on the degree of localization of their firm's websites towards the Mexican market. First, a comprehensive review of export readiness will be presented, highlighting the critical role of market readiness in the internationalization process of SMEs. Next, a detailed overview of key findings in the international marketing literature will be surveyed on the advantages and disadvantages of standardization-localization in international firm expansion and the critical role that localization plays in determining the international success of an SME. Finally, the author will examine the role of website localization as an integral aspect of adaptation to foreign markets, including assessment frameworks, identification of its role in export marketing success, and critical localization components. Future research includes assessing the global e-commerce readiness of U.S. firms in Mexico by using established frameworks to evaluate their website's degree of localization for the local Mexican context.

Effects of Water Availability on Floral Morphology and Gamete Characteristics of Passiflora caerulea

RYAN CHANG and Wilnelia Recart-Gonzalez

Climate change is a main driver for influencing species interactions as we study ecological responses of different species populations. Water availability in plants can vary with environments undergoing drought due to climate change. Flowers directly affected by climate change, like those raised to dry environments for the plant's lifetime, can lead to consequences in growth of different floral traits, like decreased resources for leaves, flowers, and seeds. Controlled water manipulation treatments can yield responses in plants, such as effects to reproductive traits or floral morphology. Changes to floral traits can impact pollinator effectiveness and possible fitness success in pollinator-dependent plants. Plant reproduction includes pollination and all the factors before and after pollination that leads to population growth. Pollination is the process of pollen movement that leads to fruit and seed formation in angiosperm plants. Previous research has studied effects of varying water treatments on agricultural plant systems and how effects of drought change the development of floral traits and physiological responses in angiosperm plants. However, there is still research lacking on the effects of water availability on plant reproduction and pollination on native plants in non-agricultural systems. To address this knowledge gap, I conducted water manipulations to Passiflora caerulea, to observe: floral morphology and ovule production/quality of Passiflora caerulea under high and low water treatments. I hypothesize that low water treatment will lead to reduced development of P. caerulea floral traits, causing them to be smaller overall and lower ovule production. Species interactions happen at all trophic levels. Understanding how climate change, specifically drought, can affect pollination could be key in how we understand fitness tradeoffs of angiosperm flowers.

Effects of Water Plant Conditions and the Consequence of Parasitism on Diet Preference of Caterpillars

KATHERINE GARCIA and Arietta Fleming-Davies and Wilnelia Recart Gonzalez

Arthropod species depend on various plants as a source of food and survival, and as global precipitation patterns change, plants are exposed to different watering conditions. Factors such as pathogens, food quality, and water supply are important factors in relation to herbivory and plant population dynamics (Meyer and Richard 1993). Since the crop plant Passiflora caerulea is the food source of the Agraulis vanillae caterpillar, climate change could affect the plant altering the interactions between A. vanillae and nucleopolyhedrovirus (NPV), which is a lethal virus to the caterpillar. It is currently unknown how A. vanillae will respond to new environmental conditions and plant resource quality, and how it will affect the crop plant Passiflora caerulea. I studied whether parasitism by the nuclear polyhedrosis virus (NPV) affects the diet preference between low water versus high water Passiflora plant leaves of the Agraulis vanillae caterpillar. The aim of my experiment was to investigate the influence of diet preference between infected versus uninfected Agraulis vanillae caterpillars. Additionally, I compared the amount of low water and or high water plant leaf consumption between infected and uninfected A. vanillae caterpillars at 24 and 72 hour marks. I am currently analyzing data from diet preference trials that can help provide information on whether herbivores prefer plants under different water regimes and whether pathogens influence these preferences.

Catechol / Guaiacol Uptake into Aerosol Particles Containing Fe and/or Sulfate

Samson Hui

Catechol and guaiacol are produced in forest fires, a major portion of plants when burned release phenolic compounds such as catechol and guaiacol. Aerosols form in the atmosphere and we do not know exactly where they come from. Uptake is a fundamental parameter of how well a gas can react with a particle to form aerosols. By measuring the uptake of catechol and guaiacol we can quantify the extent of which aerosols are generated by catechol and guaiacol to see how important they are in the formation of aerosols.

The Effects of Plant Quality and Virus Dose on the Herbivory Rate of the Agraulis Vanillae Caterpillar

KIANNA JACKSON and Wilnelia Recart González and Arietta Fleming-Davies

As global temperatures continue to rise, the ecological impacts of climate change are becoming more apparent. This increase in global temperature is interrupting the plant, herbivore, and pathogen tritrophic framework, interactions that occur at three different trophic levels. A decrease in water availability due to drought can alter a plant chemically and physically, indirectly affecting the feeding behavior and fitness of the herbivore that relies on the plant for energy. The fitness of the herbivore may be further affected by exposure to pathogen. I have emulated environmental conditions in a controlled lab setting to demonstrate how the herbivory rate of the Agraulis vanillae caterpillar is altered by the effects of plant quality and pathogen exposure. I infected Agraulis vanillae caterpillars with nuclear polyhedrosis virus, NPV, a type of baculovirus used in this study system to observe sub-lethal effects. This experiment also involves subjecting the infected caterpillars to different Passiflora caerulea plant diets: high and low water. The manipulation of high and low water conditions reflects the constantly changing environment. Rate of herbivory is measured by weighing and recording how much the caterpillar consumes post-infection until pupation or death. With the data I collected, I expect to see a relationship between low virus dose and lower rates of herbivory and high virus dose and higher rates of herbivory. My research is important because it aids in the understanding of how species are affected by changing environmental conditions. My research will also contribute to the greater context of host-pathogen dynamics in which COVID-19 is embedded.

Can We Get There From Here?: Improbable Possibilities of Empathetic Change

ALYSSA MUGAVERO and Carlton Floyd

When we find ourselves in unfortunate circumstances of financial hardship, social inequality and inequity, and political injustice, we often think to ourselves, "how did all of this get so bad so fast?," as if the badness undisguised itself for a brief moment, making it possible for us to see the exploitive conditions embedded into our everyday lives. Michel Foucault identifies these brief moments as "ruptures" in a system that causes us to momentarily question the social and economic structures of our livelihoods. This research takes Foucault's idea of ruptures and applies them to analyze the lasting fissures within the dominant metaphors we use to express ways to achieve social change. As metaphors are ways of understanding and experiencing one kind of thing in terms of another, it is evident that the metaphors we use to think and speak about social change offer us a conceptual framework that highlights particular realities over others. When our nominal understandings of change are comprehended only in economic terms, it becomes challenging to recognize progress in alternative ways outside this presumed norm. This project will look at how dominant metaphorical fissures within select science fiction texts by W.E.B. Du Bois, Octavia Butler, Ursula Le Guin, and Derrick Bell imagine the possibilities and limitations of empathy. This project examines how various metaphors frame reality and will focus on science fiction as it is a literary space that allows for an expanded, less bounded, view of the real world.

The Effects of Baculovirus Disease Transmission and Climate Change on Gulf Fritillary Butterflies

ISABELLA NG and Arietta Fleming-Davies

In many study systems different methods of disease transmission, the transfer of disease between individuals, are responsible for disease spread. Studying methods of disease transmission is important for understanding host-pathogen relationships. Nucleopolyhedrosis virus (NPV) infection in Gulf Fritillary butterflies is geographically widespread in San Diego, yet the virus only infects the caterpillars which don't often travel from between plants. Vertical transmission, the transfer of disease from parent to offspring, may provide an explanation: traveling parental butterflies may carry dormant forms of NPV that become activated in their caterpillar offspring. My research looked for evidence of NPV vertical transmission, while also investigating the ecological connections between disease transmission and climate change. In my experiment, parental Gulf Fritillary butterflies were infected with NPV in the caterpillar stage, and the survivors were mated to produce an offspring generation, which was observed to determine the rate of vertical transmission. To test the effects of climate change on vertical transmission, diet quality variations were tested in both the parental and offspring generation. Results suggest evidence of NPV vertical transmission (effect of virus dose LR = 1.83, df = 1 , p = 0.18). However there was no effect of diet quality on vertically transmitted infections (effect of water treatment LR = 3.60, df = 1 , p = 0.058). Data also showed high infection in negative control groups, indicating possible cross-contamination. Further research is being conducted to determine whether infection in the control groups resulted from contamination in the lab, or vertically transmitted NPV from the field-collected grandparent generation.

Influence of Fears of COVID-19 and Overall Psychological Distress on Willingness to Use Telemental Health Services

KAITLIN WILLIAMS and Jennifer Zwolinski

The deep impacts of COVID-19 have changed many facets of our lives which has resulted in increased fears and mental health concerns. One recent study found that college students are reporting remarkable problems with academic, health, and lifestyle-related concerns given the negative impact of COVID-19 (Son et al., 2000). Given the benefit of telehealth on psychological outcomes (Pennant et al., 2015) and the clear need for college mental health support during the lockdown, the current study will investigate the relationship between one's willingness to use telemental health, COVID-19 fears, and mental health functioning. I propose that higher scores on the COVID-19 Fears scale will be associated with an increase in college students' willingness to use telemental health services. I also propose that willingness to use telemental health services will be associated with an increase in overall psychological distress across the last year. Participants will include USD college students enrolled in Psychology 101 in fall 2020 and spring 2021 who completed self-report measures including fear of COVID, distress across the last year, stress management, and perceptions of telemental health. ANOVAs will be run to evaluate my hypotheses. Findings from this study can provide insight into future outreach programs concerning mental health on college campuses.

Sublethal Effects of Nuclear Polyhedrosis Virus and Water Availability on Adult Agraulis vanillae

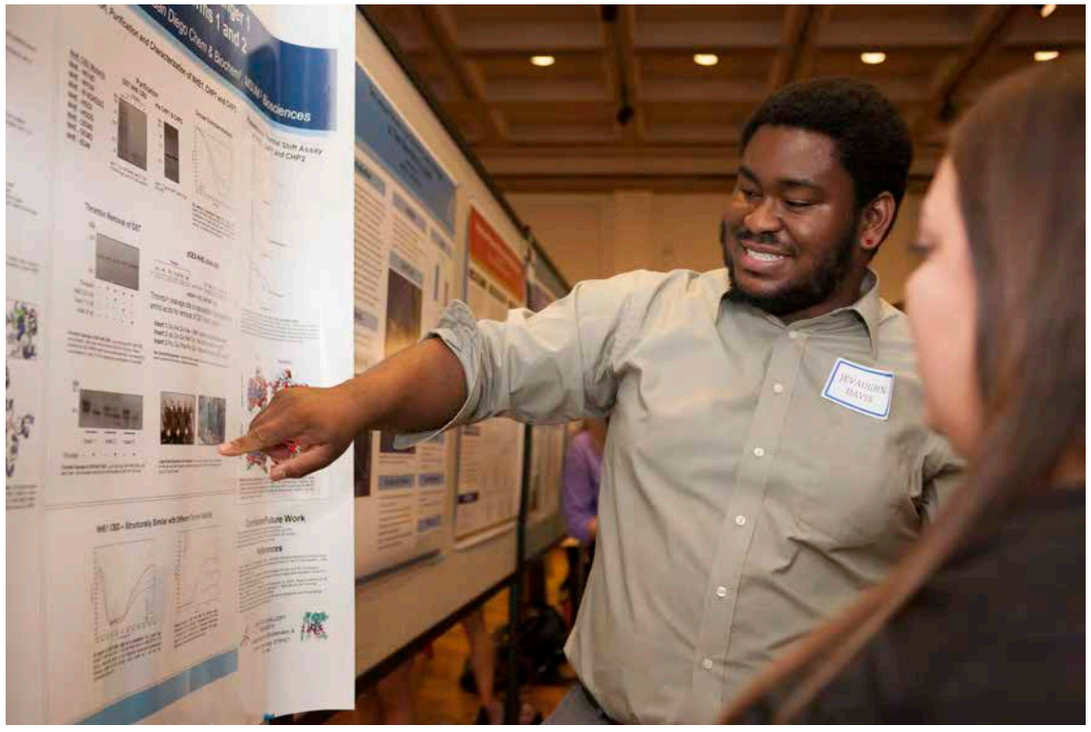
SEREN VENTULLO and Wilnelia Recart Gonzalez

Diseases have the ability to cause significant changes to their hosts, for example, a fetus can undergo physical changes when a woman is pregnant and infected with rubella. Pollinators, such as butterflies, may also be at risk for similar morphological impacts from pathogens which will, in turn, affect their interactions with other organisms. Simultaneously, these interactions are under the threat of climate change: increased drought influences the quality of the plant these caterpillars feed on. To understand the interaction of water stressed plants and Nuclear Polyhedrosis virus on A. vanillae butterfly morphology, my research separated caterpillars into water treatment groups. One group consumed high water available plants and the other, low water. Under each water treatment group, three infection groups were compared to a control group with no infection. Butterfly morphological traits, such as wing length, proboscis length, sex ratio, and pupae weight were observed and collected as data from the different water treatment and infection groups. The adults provide pollinator services to other plant species and as such, we focused on pollinator related traits. With this, we were able to observe the sublethal effects of pathogen exposure and climate change on A. vanillae morphology.

Elucidating Fitness Tradeoffs Between Two Argraulis Vanillae Virus Strains

AUSTIN YNIGUEZ and Arietta Fleming-Davies

The lethal Nuclear Polyhedrosis Virus (AgaNPV) that infects larvae of the Gulf Fritillary butterfly has been endemic to San Diego for hundreds of years. Despite strong competition between pathogen strains infecting the same host population, we have observed multiple strains coexisting within San Diego. I investigated whether fitness tradeoffs in different traits are permitting the coexistence of these competing strains. To test this hypothesis, I used laboratory infections to measure two important traits-- speed of kill and the viscosity in the liquefied caterpillar remains post-infection-- in two AgaNPV virus strains from San Diego. Healthy A. vanillae caterpillars were bred in a lab at the University of San Diego, and their lab raised offspring were infected with either 0, 100, 1,000, or 10,000 occlusion bodies of their respective treatment group. The speed of kill post infection was recorded every 12 hours, along with the viscosity of the virus-killed caterpillar. If data supports my hypothesis of a tradeoff between life history traits, I expect that the less infectious, slower-killing strain will make up for this disadvantage by better liquefying its host to allow for the spread of viral particles in the environment.



University of San Diego

OFFICE OF UNDERGRADUATE RESEARCH

Maher Hall, Room 252
5998 Alcalá Park
San Diego, CA 92110-2492
(619) 260-7840

Email: ugresearch@sandiego.edu
www.sandiego.edu/ugresearch

In keeping with USD's commitment to sustainability, the 2022 Creative Collaborations abstract book will be available on the MySDMobile app and on the Office of Undergraduate Research web page.

With Gratitude

Many thanks to faculty across all disciplines for their dedicated mentoring of undergraduate students in research, scholarship and creative works. We would especially like to acknowledge the 2022 recipient of the Glenn D. White Award, Dr. Gregory Severn (Department of Physics and Biophysics, College of Arts and Sciences), and the Outstanding Undergraduate Research Mentor Award recipients, Dr. Chad Kishimoto (Department of Physics and Biophysics, College of Arts and Sciences) and Dr. Gordon Hoople (Department of Integrated Engineering, College of Arts and Sciences), as well as all the mentors that oversaw the student projects and mentored them through the CCURC submission process.

Special thanks go to Anna Garretson for the design of the brochure, flyers and graphics; Steffanie Hoie, Christopher Wray, and Rahul Dhiman for creating the online abstract portal and MySD app; Theresa Andersen at University Copy for poster printing; Flora Elman for assistance with the set-up; and the staff at the Office of Undergraduate Research, Rachel Shellstrom and Landon Cendejas, for their enthusiasm and commitment to putting the entire event together.

Support for the Creative Collaborations Undergraduate Research Conference comes from the Office of the Executive Vice President and Provost. The research conducted by the students is supported by generous donors and foundations, including the USD Institutional Effectiveness and Strategic Initiatives office, Keck Foundation, Genentech, Beckman Coulter and other industry partners.