20th

SCHOLARLY & **CREATIVE**
research
SYMPOSIUM

Chastain Lecture 2022

"Recipes of Resistance:
Seeking New Stories
in the Past and Present"

KEITLYN ALCANTARA, PH.D.

Assistant Professor, Anthropology
Indiana University, Bloomington

20TH ANNUAL

SCHOLARLY & CREATIVE research SYMPOSIUM

SYMPOSIUM COMMITTEE:

Annina Ruest – chair

Anna Holmes

Monica Maldonado

Warren McGovern

Cathy Trivigno

Ericca Stamper

Welcome to the 19th Annual Wilkes Honors College Scholarly and Creative Research Symposium, in which we celebrate the high-caliber, original scholarship and creativity of our students. Today we have the opportunity to watch the students we have taught, advised, and mentored share their academic research and creative projects with a broad audience of community members and their peers. Their intellectual curiosity combined with many hours spent in laboratories, in field research sites, on data collection, on reviews of literature, and on writing and revising has produced over 100 publications by our students in peer-reviewed academic journals over the past 21 years. Though it goes without saying, the pandemic has turned everything upside down during this academic year. And all year long, we have risen to the occasion. We have made the adjustments in order to hold this year's symposium virtually, and I could not be more pleased with the outcome. We hope that you enjoy this day as much as we do, and we encourage you to ask questions, engage with our students, support your peers, and challenge yourself to cross interdisciplinary boundaries.

– Dean Justin Perry

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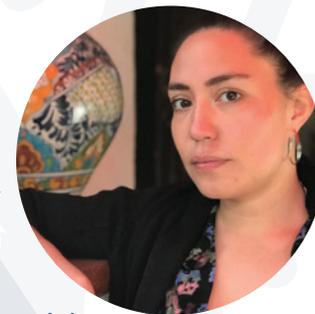# PROGRAM AND EVENT SCHEDULE

Featuring the Robert Lee and Thomas M. Chastain Honors Symposium Guest Lecture Series

KEITLYN ALCANTARA, PH.D.

Assistant Professor, Anthropology

Indiana University, Bloomington

"Recipes of Resistance: Seeking New Stories in the Past and Present"

Keitlyn Alcantara is an Anthropological Bioarcheologist in the Department of Anthropology at Indiana University Bloomington. Her work is centered on foodways as tools of empowerment. Melding bioarcheological dietary isotope analyses and ethnographic interviews, her current research contextualizes food sovereignty movements in Late Postclassic and contemporary Tlaxcala, Mexico—particularly the role of foodways in Tlaxcalteca resistance to the Aztec Empire.

As a Mexican American, she is also interested in the ways food is tied to memory, identity, and homeland among Latinx immigrants in the United States and working with the land to develop embodied pedagogies of self-decolonization.

EVENT SCHEDULE: FRIDAY, APRIL 1, 2022

Time	Event	Location
8:30-9:00	Participant Registration	AD Building
9:15-10:15 AM	Session 1: Oral Presentations	AD Building
10:15-10:30	Break	
10:30-11:30 AM	Session 2: Oral Presentations	AD Building.
11:30-1:00	Lunch Break	
1:00-2:00 PM	Chastain Lecture: Dr. Keitlyn Alcantara	AD 119
2:00-4:00 PM	Session 3: Visual Arts Creative Exhibition Research Poster Session	SR Building HC Building

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All student abstracts are included in alphabetical order on the pages following the presentation schedule grids.

● Neuroscience   ● Philosophy/Math   ● English/Creative Writing   ● Political Science   ● Kenan

○ Marine Bio/Env Science   ● Psychology   ● Chemistry/Physics   ● Data Sc./History/French Lit

ORAL PRESENTATIONS SCHEDULE

ORAL PRESENTATIONS SCHEDULE

SESSION 1

		AD 103	AD 104	AD 102	AD 205	AD 206
	9:14 AM	Ghabrielle Almedia	Maximilian Padilla-Rodriguez	Jaylene Kennedy	Bilal Mutluguler	Craig Stridinger
	9:30 AM	Juliana Booth	Zion Strasser	Hillary Moran	Aaron Caudill	Gabriella Goytizolo
	9:45 AM	Skylar Anthony	Tristan Stinchcomb	Aubrie Gibbons	Michael Berg	Rodrigo Rios
	10:00 AM	Rishiraj Bandi		Alexandra Russo	Kaitlyn Nieman	Joshua Sanderson

SESSION 2

		AD 103	AD 104	AD 102	AD 205	AD 206
	10:30 AM	Steven Shatkin	Zion Strasser	Matthew Pacheco	Renise Bleck	Madison Hecker
	10:45 AM	Frida Zavala	Hadeel Abed	Morgan Balsley	Deja Vaughn	Ashley Osuna
	11:00 AM	Vivek Sreejithkumar	Gina Marie Gruss	Andrea Carey	Karla Martinez Ochoa	Madison Brockelbank

Oral Presentations: Session 1

9:15 AM

AD103
GHABRIELLE ALMEIDA
Advisor/Professor: Erik Duboué
Sleep Deprivation in the Zebrafish Brain

AD104
MAXIMILIAN PADILLA-RODRIGUEZ
Advisor/Professor: Michael Harrawood
The Hidden Artists of Italian Renaissance Architecture

AD202
JAYLENE KENNEDY
Advisor/Professor: Mark Tunick and Christopher Strain
Voter disenfranchisement after Shelby County: the need to resume federal preclearance

AD205
BILAL MUTLUGULER
Advisor/Professor: Andia Chaves-Fonnegra
Tedania ignis Cell Fractions: Their Symbionts and Serotonin

AD206
CRAIG STRIDINGER
Advisor/Professor: Chitra Chandrasekhar
Atherosclerosis: A Disease of Inflammation

9:30 AM

AD103
JULIANNA BOOTH
Advisor/Professor: Erik Duboué
OPRL1 pharmaceuticals and the Innate stress response within Zebrafish

AD104
ZION STRASSER
Advisor/Professor: Michael Harrawood
Revealed by Redounding: Subtlety, Satan, and the Serpent in *Paradise Lost*

AD202
HILLARY MORAN
Advisor/Professor: Mark Tunick
State Level COVID-19 Vaccine Mandates: A Constitutional Analysis

AD205
AARON CAUDILL
Advisor/Professor: Jon Moore
Effect of Omega-3 Supplementation in Asian Dhole (*C. alpinus lepturus*) and African Wild Dogs (*Lycaon pictus*) on Indicators of Allergies

AD206
GABRIELLA GOYTIZOLO
Advisor/Professor: Gregg B. Fields and Tricia Meredith
A Study to Elucidate the Mechanism by which Collagen Fragments Promotes the Pathology of Rheumatoid Arthritis

9:45 AM

AD103
SKYLAR ANTHONY
Advisor/Professor: Gregory Macleod and Naomi Kamasawa
AMPA Receptors are Increased Relative to NMDA Receptors at Thalamic to Lateral Amygdala Synapses in the TBR1 Mouse Model of Autism Spectrum Disorder

AD104
TRISTAN STINCHCOMB
Advisor/Professor: Michael Harrawood
In the Vineyard of Paradise: An Epistemological Analysis of John Milton's *Paradise Lost*

AD202
AUBRIE GIBBONS
Advisor/Professor: Mark Tunick
Factors of Voter Turnout: Analyzing the Effects of Habit, Social Pressure, and Gerrymandering on Voting Habits

AD205
MICHAEL BERG
Advisor/Professor: William O'Brien and Jeffrey Morton
Replacing War? The Efficacy of Economic Sanctions

AD206
RODRIGO RIOS
Advisor/Professor: Yaouen Fily
Swimming Kinematics of Mexican Tetra

10:00 AM

AD103
RISHIRAJ BANDI
Advisor/Professor: Gregory Macleod and Roberto Hernandez
Unraveling the Mysteries of Undiagnosed Disorders with Drosophila CRISPR Mutants

AD102
ALEXANDRA RUSSO
Advisor/Professor: Mark Tunick
An Indefinite Punishment after Justice Has Been Served: How Jones v. Governor of Florida is a Fundamentally Flawed Decision

AD205
KAITLYN NIEMAN
Advisor/Professor: William O'Brien
Do Certain Species of Anchovies have a Greater tendency to consume microplastics than others?

AD206
JOSHUA SANDERSON
Advisor/Professor: Yaouen Fily, Bing Ouyang and Paul Wils
Testing the Conductivity in Gels and Development of a Miniaturized Galvanic Sensor

Oral Presentations: Session 2

10:30 AM

AD103
STEVEN SHATKHIN
Advisor/Professor: Adele Stewart
Age- and Sex-dependent Social Deficits in DAT Val559 Mice

AD104
ZION STRASSER
Advisor/Professor: Rachel Luria
The Efficacy of Invented Language in Storytelling

AD202
MATTHEW PACHECO
Advisor/Professor: Timothy Steigenga and Christopher Strain
Tutor It Forward, Democratizing Education

AD205
RENISE BLECK
Advisor/Professor: Kevin Lanning and Claire Ric
They're Just Kids: The Case Against Adult Sentencing for Juvenile Offenders

AD206
MADISON HECKER
Advisor/Professor: Annina Ruest
Circuit Builder: Creating an Online Interactive Tool

10:45 AM

AD103
FRIDA ZAVALA
Advisor/Professor: Nicholas Baima
On Humility in Medicine

AD204
HADEEL ABED
Advisor/Professor: Rachel Luria
An Analysis of Middle Eastern Muslim Women in Western Literature

AD202
MORGAN BALSLEY
Advisor/Professor: Timothy Steigenga and Christopher Strain
A Market for Change

AD205
DEJA VAUGHN
Advisor/Professor: Laura Vernon
Who Said That?: An Analysis on the Effectiveness and Implications Associated with Public Health Regulations and Guideline

AD206
ASHLEY OSUNA
Advisor/Professor: Nancy Tille-Victorica
The Conflict Between the Childhood Identity and Politics in *Petit pays*

11:00 AM

AD104
VIVEK SREEJITHKUMAR
Advisor/**Professor:** Terje Hill and Necibe Tuncer
Identifiability Analysis of the H1N1 Influenza and COVID-19 Viruses

AD204
GINA MARIE GRUSS
Advisor/**Professor:** Rachel Luria
All the Ways the World Could End: Written Word on the Apocalypse

AD202
ANDREA CAREY
Advisor/**Professor:** Timothy Steigenga and Christopher Strain
Students 4 Scholarships

AD105
KARLA MARTINEZ OCHOA
Advisor/**Professor:** Laura Vernon and Claire Rice
Empathic Deficits in Individuals with Antisocial Traits: A Predictor or Mediator of a Dysfunctional Lifestyle?

AD206
MADISON BROCKELBANK
Advisor/**Professor:** Christopher Ely and Kenneth Holloway
Civil War Behind Barbed Wire: The Political Struggles and Political Culture within UN POW Camps During the Korean War

Visual Arts & Creative Research: Session 3
SR BUILDING, ROOM 149

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QUEST CARTER
Advisor/**Professor:** Annina Ruest
Motivation Machine

GINA MARIE GRUSS
Advisor/**Professor:** Dorotha Lemeh
The World's Ending, but at Least We Have Memes

GINA MARIE GRUSS
Advisor/**Professor:** Annina Ruest
Extant

AUDUBON'S SCIENTIFIC ILLUSTRATION
Advisor/**Professor:** Jon Moore and Dorotha Lemeh

Morgan Bennett	Octavio Gonzalez	Cami Rimoldi Ibanez
Luke Berg	Braden Haggart	Nicholas Shaffer
Ashley Boswell	Patton Horton	Nathaniel Sybron
Angela Calicchio	Victoria Ives	Genevieve Sylvester
Quest Carter	Bria Kuntz	Zoe Szilagyi
Maya Clarke	Samuel Manoharan	Randolph Tubbs
Elle Cohen	Kaitly Nieman	Carlos Vaca Angus
Christina Cross	Ashley Osuna	Hannah Vinik
Victoria Cross	Julia Perez	Emmy Weisenberg
Michael Deutsch	Arielle Perry	Jessica Young
Beatrice Gil	Kasey Preisser	Matthew Zoll

Research Poster: Session 3
HC BUILDING

2:00 - 4:00 P.M.

AMOGH ALLANI
KWANGSOO YANG
Advisor/**Professor:** KwangSoo Yang
(College of Engineering and Computer Science)
Identifying K-Routes for Maximizing Accident Coverage

BRYAN AVILES-LOPEZ
Advisor/**Professor:** William Hahn *(College of Science)*
SLAM Robot Navigation in GPS Denied Environments

ALAN BENCOSME
MARVELLE DSOUZA, JENNIFER KRILL, MALCOLM MCFARLAND
Advisor/**Professor:** Tricia Meredith & Malcolm McFarland
(Harbor Branch Oceanographic Institute)
How Temperature and Neurotoxins Released From Harmful Algal Blooms
Affect Neuron Excitability

OLIVIA BETTS
GABBY CARVAJAL
Advisor/**Professor:** Jeanette Wyneken *(College of Science)*
Determination of Loggerhead Sea Turtle Hatchling Sex Ratios Across
Florida via Western Blot AMH Protein Detection

SCOTT BUSH
Advisor/**Professor:** Kevin Lanning
Predicting Happiness on Twitter

ANA CHACON & JANNATUL BEGUM
ITZEL SIFUENTES ROMERO, ROBERT KOZOL, ERIK DUBOUÉ
Advisor/**Professor:** Erik Duboué
Molecular Assessment of Individualistic Behavior, and the Evolution
of Brain Circuits Modulating It

KAISEE CHUNG
TOUHID FEGHHI
Advisor/**Professor:** Gregory Macleod
Genetically-Encoded Fluorescent Probes Reveal Presynaptic Glutamate
Levels to be Surprisingly Low

ELIZABETH COHEN
Advisor/**Professor:** Jon Moore & Joshua Voss
(Harbor Branch Oceanographic Institute)
Underwater 3-Dimensional Videogrammetry Methods and Analysis

BRIANNA CORELLIS
LUISA GALGANI, DAVID BRADSHAW, TRACY MINCER
Advisor/**Professor:** Tracy Mincer & Luisa Galgani
(Harbor Branch Oceanographic Institute)
Microplastics in the Indian River Lagoon sediments

ISABELA DE OLIVEIRA CAIADO
QUENTIN GIBAUT, JARED BAISDEN, MATTHEW DISNEY
Advisor/**Professor:** Chitra Chandrasekhar & Matthew Disney
(Scripps Research)
Screening for novel small molecule binders of RNA repeat expansions.

MADISON ELMAN
Advisor/**Professor:** Tricia Meredith & Scott Hansen *(Scripps Research)*
Phospholipase D Links Ethanol Volatile Anesthetic Sedation

CHANCELLOR GARY

Advisor/**Professor:** William Edward Hahn *(College of Science)*

Low-cost Development of a Drive-by-Wire Platform for Autonomous Vehicle Conversion

KIA GHODS

VIVEK SREEJITHKUMAR

Advisor/**Professor:** Necibe Tuncer *(College of Science)*

Model Selection for HIV and Nutrition Dynamics

SETH GOLDIN

DEBBIE GUERRERO-GIVEN, CONNON I. THOMAS, SKYLAR A. ANTHONY, DIEGO JEREZ, NAOMI KAMASAWA

Advisor/**Professor:** Tricia Meredith & Naomi Kamasawa *(Max Planck Florida Institute)*

Gold In-and-Out: Automated Gold Particle Analysis Software

LEYA GOODWIN

Advisor/**Professor:** Qi Zhang *(College of Medicine)*

Measuring cholesterol homeostasis in iPSC-derived human neurons

RACHAEL GRIFFIN

DAVID PORTER

Advisor/**Professor:** Jon Moore & Rachel Harris *(WildPine Ecological Laboratory)*

Going Deeper with *Halophila johnsonii*

GINA MARIE GRUSS

Advisor/**Professor:** Rachel Luria

All the Ways the World Could End: Art of the Apocalypse

DAVID HARBAUGH

MARISSA SHANK, JORDAN MERRITT

Advisor/**Professor:** Catherine Trivigno & Jordan Merritt *(College of Science)*

Eliminating Breast Cancer Cells by Blocking the Immune Evasion "Don't Eat Me" Signal

MELANIE HART

Advisor/**Professor:** Jennifer Krill *(University School)*

The Effects of Haloperidol on the Neuronal Function of *Lumbricus terrestris*

MARIUM HOURANEY

Advisor/**Professor:** Timothy Steigenga

The Crossroads of Identity: Linguistic Shift and the Politics of Identity in Southwest Asia and North Africa

REGGIE JOSEPH

DANIELLE V. RIBOUL, KERDES JOSEPH, CARLOS OLIVIA, MARIA RESTIFO, DAVID HALL, KEN NGUYEN, GREGORY MACLEOD

Advisor/**Professor:** Gregory Macleod

An Analysis Of Mitochondrial Distribution Across Neuron Types In *C.elegans*

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PATRICIA SPOSATO, SARAH MILTON

Advisor/**Professor:** Sarah Milton & Patricia Sposato *(College of Science)*

Effect of Green Turtle Fibropapillomatosis on the Immune Function of Green Sea Turtles

KAITLYN KELLY

MELANIE SANDERS, LAURA VERNON

Advisor/**Professor:** Laura Vernon

Exploring Attitudes and Knowledge About Mental Health: Analysis of a New Mental Health Stigma Measure

RITVIK KESHARAJU

QI ZHANG

Advisor/**Professor:** Qi Zhang *(College of Medicine)*

Using Graphene Nanoflakes to Promote the Connectivity of iPSC-derived Human Neurons

JULIA LATCHANA

Advisor/**Professor:** Rachel Corr

The Resurgence of Forced Sterilizations of Migrant Women in the United States and the Lack of Change

KRISTINA LATCHANA

Advisor/**Professor:** Ericca Stamper

The Effects of Misinformation on the COVID-19 Pandemic

ASHLEE LI

Advisor/**Professor:** Yaouen Filyl

Semi-automation of Mitochondrial Morphology Analysis in Drosophila Brain Scans

ELEONORA LURIE

BRANDON HINDMAN, ROBERT W. STACKMAN JR.

Advisor/**Professor:** Robert W. Stackman Jr. *(College of Science)*

Novel Context Exposure Enhances Object Recognition Memory: Assessing Involvement of Norepinephrine Neurotransmission

SAMUEL MANOHARAN

SHAILAJA ALLANI

Advisor/**Professor:** Shailaja Allani *(College of Science)*

The Effect of Sulindac on Senescence in RPE Cells Using Senescence β-galactosidase Assay

LAURA MARTINEZ

DANIELLE RIBOUL

Advisor/**Professor:** Gregory Macleod

Using AI to Investigate the Distribution of Mitochondria in Drosophila Neurons

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Does Bilingualism Affect Mental Health Stigma?

HANNAH MILLER

PEDRO MILLAN, EMILY SERRANO, LAURA VERNON

Advisor/**Professor:** Laura Vernon

Examining Facets of Mental Health Stigma in a Hispanic Community

ERIC MORALES

Advisor/**Professor:** Tricia Meredith & Jordon Beckler *(Harbor Branch Oceanographic Institute)*

Analyzing Remote Sensing Images to Detect and Quantify Coastal Sediment-Derived CDOM Following Storm Resuspension Events

ARJUN NAIR

HANNAH MILLER, EMILY SERRANO, LAURA VERNON

Advisor/**Professor:** Ilyas Yildirim *(College of Science)*

Application of Dynamic Docking Methodology to Discover the Binding Properties of a Lead Compound Targeting pre-miRNA-515 Causing Cancer

CARLOS OLIVA

KARLIS JUSTS, DANIELLE V. RIBOUL, YAOUEN FILY, GREGORY MACLEOD

Advisor/**Professor:** Gregory Macleod

The Role of the Phosphagen System in Neuron

GENESIS OMANA SUAREZ

CONNOR N. BROYLES, SETH M. TOMCHIK

Advisor/**Professor:** Catherine Trivigno & Seth Tomchik *(Scripps Research Institute)*

Discrete Neural Circuits Drive ADHD like Phenotypes in the Drosophila melanogaster Model of NF1

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ASHLEY OSUNA

Advisor/**Professor:** James K. Wetterer

Red Imported Fire Ants (*Solenopsis invicta*) Infesting American Alligator (*Alligator mississippiensis*) Nests

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SAMANTHA ZANINELLI; ERIK DUBOUÉ

Advisor/**Professor:** Erik Duboué

Uncovering the Evolutionary Basis of Sensory Motor Integration Through the Analysis of Locomotive Activity and Startle Response Behavior

GRACE PUTNAM

Advisor/**Professor:** Tracy Mincer

The Neurological Effects of Domoic Acid Toxicosis on Marine Mammals and its Implications on Florida Wildlife

MARIA GABRIELA RESTIFO ROSALES

Advisor/**Professor:** Gregory Macleod

An Ultrastructural Analysis of the Relationship Between Synapses and Mitochondria Across Neuron Types in *C elegans*

EVA REYBLAT

MICHIYO HIRAI, LAURA VERNON

Advisor/**Professor:** Tricia Meredith & William Ja (*Scripps Research Institute*)

Observing the Effect of Prolonged Optogenetic Activation in the *Drosophila melanogaster* through Chrimson for Periods of 2, 4, 6, 8 and 12 Hours

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KATELYN MACIAS, LAURA VERNON, KAITLYN KELLY

Advisor/**Professor:** Laura Vernon

The Impact of Brief Peer-led Psychoeducation on Mental Health Knowledge and Stigma

TRISTAN STINCHCOMB

MICHIYO HIRAI, LAURA VERNON

Advisor/**Professor:** Laura Vernon & Michiyo Hirai (*University of Texas Rio Grande Valley*)

Ethnic Differences in OCD Symptomatology: Examining Variations between Asian-American, Caucasian, and Hispanic Groups

MAUREEN TANNER

ILAYS YILDIRIM

Advisor/**Professor:** Ilyas Yildirim (*College of Science*)

Small Molecules Targeting RNA A-bulge Sites Using Computer-Aided Drug Design

ETHAN XU

Advisor/**Professor:** Chitra Chandrasekhar & Jordan Nafie (*BioTools Inc.*)

Analysis of Stereochemistry of Menthol Extracted from Japanese Mint via VCD/IR

TIFFANY ZHANG

Advisor/**Professor:** Randy Blakely (*FAU Brain Institute*)

Assessment of a New Model for Chronic Fatigue Syndrome: Studies of the Viral Mimetic Poly I:C on Biochemical Measures of Brain Inflammation and Serotonin Signaling

JOSEPHINE ZUNDEL

Advisor/**Professor:** Tanja Godenschwege (*College of Science*)

Functional Consequence of Dsd and dMgrn1 Gain and Loss of Function on Drosophila Seizure Susceptibility

Abstracts
ALPHABETICAL BY STUDENT'S LAST NAME

ABED, HADEEL

An Analysis of Middle Eastern Muslim Women in Western Literature

Since September 11, 2001, novels featuring Middle Eastern Muslim women have become an especially popular genre for some Western authors who wished to challenge anti-Muslim stereotypes. However, in their attempts to combat Islamophobia, many of these authors actually reproduce and reinforce stereotypes, especially in depictions of Muslim women. This presentation will closely examine one such work by Australian author Randa Abdel-Fattah entitled *Ten Things I Hate About Me*. I will argue that the novel relies on the "White Savior" trope, thus undermining its attempts at presenting an empowering portrait of a Muslim woman.

ALLANI, AMOGH

Identifying k-routes for maximizing accident coverage

Abstract: Given a transportation network, a set of accidents, the goal of the spatiotemporal hot routes (ST-HR) problem is to identify k routes that can maximize the coverage of accidents while meeting the length constraint of routes. The ST-HR problem is important for critical societal applications such as recommending the safe route or identifying abnormal trajectory patterns. The ST-HR problem is NP-hard; it is computationally changing due to the large size of the transportation network and temporally detailed accidents. In this project, we plan to develop a novel approach that produces near-optimal solutions and reduces the computation cost for identifying k hot routes. Our proposal approach will utilize a time-expanded graph and apply a dynamic programming method to find the near-optimal solution. To produce the simple route, we will relax the path constraint and use Coordinate Descent (CD) optimization techniques to improve the salutation quality.

ALMEIDA, GHABRIELLE

Sleep Deprivation in the Zebrafish Brain

Sleep is a necessity for survival and is conserved across animal taxa. Chronic sleep deprivation (cSD) is involved with several comorbidities such as heart disease; however, how cSD manifests itself on the brain—what regions are active because of cSD—remains unclear. The zebrafish, Danio rerio, was used as a model to understand how sleep deprivation alters whole-brain activity. First, baseline sleep-wake activity is measured with animal tracking software. The fish will then be sleep deprived via random mechanical disruptions, and the subsequent behavior will be compared to the baseline. Neuronal activity in the brain of sleep-deprived fish will then be observed using MAP-mapping by co-staining with tERK and pERK, immunohistochemical markers of neuronal activity. The brains are then imaged with two-photon microscopy, and the resulting images will be analyzed with previously developed brain atlases, allowing us to determine which brain regions are active following one night of sleep deprivation.

ANTHONY, SKYLAR

AMPA Receptors are Increased Relative to NMDA Receptors at Thalamic to Lateral Amygdala Synapses in the TBR1 Mouse Model of Autism Spectrum Disorder

TBR1 is a high-confidence risk gene for Autism Spectrum Disorder (ASD). Haploinsufficient (Tbr1+/-) mice exhibit ASD-characteristic behavioral changes that are often associated with amygdala circuit dysfunction. To understand why, we investigated excitatory synaptic transmission in the thalamic-lateral amygdala pathway of these mice. Preliminary data showed increased AMPA receptor (AMPAR)-mediated synaptic current in 4-week-old Tbr1+/- mice. To examine the molecular basis for this change, we measured the quantity, proportion, and density of synaptic AMPARs and NMDARs in both Tbr1+/- and wild type mice using freeze-fracture replica immunogold labeling. Receptor quantification and synaptic area demarcation were performed using supervised deep-learning networks. Our results showed an increase in the proportion of AMPARs, but not NMDARs, at synapses of the Tbr1+/- mice, which can explain the observed electrophysiological changes.

AVILES - LOPEZ, BRYAN

SLAM Robot Navigation in GPS Denied Environments

Simultaneous Localization and Mapping (SLAM) is when a robot maps out an unfamiliar environment and can recognize its location within the map that it created. The application of SLAM robots covers a large range from simple indoor robot navigation to having robotic SLAM dogs deployed in search and rescue situations. In this experiment we created a virtual environment that has an agent placed within a rudimentary room that can identify where it is in a room based on what the camera can see. The agent learned how to identify its location within its environment using a neural network that we trained on visual inputs and generated our data in a synthetic dataset that we built by placing the agent at different spots in the room simulator.

BALSLEY, MORGAN

A Market for Change

Nonprofit organizations often lack the proper tools for successful marketing, despite the fact that it is crucial for increasing their funds in the long run. Marketing internships can be overly competitive without providing valuable individual experience. There is a great opportunity to connect these two individually ineffective processes, but no one has done so yet on a large scale. A Market for Change (AMFC) seeks to do this by becoming a new third-party company that aims to expand these nonprofits' outreach and increase their funding through marketing while providing priceless personal experience to interns looking to expand their skill set. We relieve the burden off the nonprofit's shoulders by finding, training, and managing the intern during their placement. Students will benefit by receiving the training, experience, personal letters of recommendation, and potentially a scholarship to assist with their tuition and fees for the semester they are interning!

BANDI, RISHIRAJ

Unraveling the Mysteries of Undiagnosed Disorders with Drosophila CRISPR Mutants

The medical community struggles to identify nearly 25 million patients per year with undiagnosed diseases. Even with advances in medical research, physicians cannot determine the mechanisms by which these disorders progress within patients, resulting in a lack of proper treatment . A recent study identified patients who passed away with symptoms of hypotonia and lactic acidosis while having specific mutations in the mitochondrial enzyme, malate dehydrogenase (MDH2). Yet, little is known about the way in which such disorders arise from MDH2 mutations. Intriguingly, the mutations led to destabilization in hypoxia-inducible factor 1-alpha (HIF-1α). Using the CRISPR-Cas9 gene editing technique, we recapitulated the same MDH2 mutations in Drosophila. This allows us to investigate the link between MDH2 and HIF-1α through quantification of HIF-1α's activation in relation to the Drosophila's disease progression. Our ability to interrogate specific aspects of disease pathology in this model system provides exciting opportunities for developing therapeutic approaches.

BENCOSME, ALAN

How Temperature and Neurotoxins Released From Harmful Algal Blooms Affect Neuron Excitability

Neurotoxins produced during harmful algal blooms (HABs) pose numerous health risks as ocean climates change and local marine eutrophication increases. Paralytic shellfish toxins (PSTs) produced by HABs cause significant damage to coastal ecosystems, aquaculture, and human health as bioaccumulation and passage through the food chain can lead to contraction through seafood consumption. Because literature examining neuropsychological impairments from HABs is unclear, this study aims to provide insight into the effects of neurotoxins on neuron excitability. To examine these effects, Lumbricus variegatus were exposed to Pyrodinium bahamense and Karenia brevis, two neurotoxin-producing dinoflagellates commonly found in HABs, and were tested for changes in conduction velocity and threshold. The results of this study show that both dinoflagellate-produced toxins have effects on conduction velocity and threshold. The results from this study will serve as a gateway to comprehending the connection between HABs and neurodegenerative conditions.

BERG, MICHAEL

Replacing War? The Efficacy of Economic Sanctions

Following two World Wars in the 20th century, economic sanctions have been developed as diplomatic tools to coerce the behavior of states. Sanctions are intended to create more severe repercussions for targeted states than diplomatic rebukes while being less costly than explicit military intervention. Both during and after the Cold War, the United States exponentially increased its use of economic sanctions as a tool of diplomacy, with a mixed record of cooperation from other nations. While most multilateral sanctions imposed with US allies, sanctions applied by the UN Security Council have a broader range of participants. Critics of economic sanctions lambast the measures as ineffective, citing the continued existence of threats that sender countries attempt to rectify, such as human rights abuses, nuclear proliferation, and despotic rule. This research provides analysis and discussion of the effects of imposed economic sanctions in achieving the policy objectives of the sanctioning country.

BETTS, OLIVIA

Determination of Loggerhead sea turtle hatchling sex ratios across Florida via Western blot AMH protein detections

Temperature dependent sex determination (TSD) has been documented in all sea turtle species. Lab experiments demonstrate that constant incubation temperatures below 27° C produce male Loggerhead sea turtle (Caretta caretta) hatchlings, whereas temperatures above 31° C produce female hatchlings and temperatures within this range produce a mix of both sexes. Scientists fear that sex ratios may become female-biased as global temperatures are projected to increase. Tezak et al. discovered a non-invasive technique in which AMH, a sex-specific protein, could be detected in the blood of male loggerhead hatchlings (Tezak et al. 2020). Our experiment will use this innovative technique to directly measure sex ratios from two different beaches in Florida, representing two different latitudinal ranges. This research will allow us to identify current sex ratios and establish a baseline for future monitoring and management of the species.

BLECK, RENISE

They're Just Kids: The Case Against Adult Sentencing for Juvenile Offenders

Nathaniel Brazill, when 13, fatally shot one of his schoolteachers. Brazill was tried as an adult and sentenced to 28 years in prison without the possibility of parole. Such harsh sentences for such young offenders seems drastic and unfair, therefore I argue that the juvenile justice system should take not a punitive but a rehabilitative approach to minors. I first discuss different theories of why society punishes and whether they apply to the way juveniles are punished today. Drawing on research in psychology, I detail key cognitive differences between minors and adults to argue that juveniles have no place in adult correctional facilities as they are not designed to cater to the special needs of growing adolescents and expose them to harsher conditions than are found in juvenile facilities. Finally, I propose an alternative strategy that focuses more on correcting and rehabilitating convicted juveniles rather than punishing them.

BOOTH, JULIANNA

OPRL1 pharmaceuticals and the Innate stress response within Zebrafish.

Classical orphan receptors have been extensively studied whereas orphan opioid receptors have not, leaving possible forms of treatment for anxiety and addiction unstudied. Previous research suggested that opioid-related nociceptin receptor 1 (OPRL1) regulates a variety of biological functions and neurobehaviors. Activating the OPRL1 receptor with pharmaceutical drugs can lessen the effects of anxiety. Research on model organisms has been vital for understanding human disorders. Zebrafish provide a powerful genetic model in understanding stress-induced disorders and can be easily manipulated by pharmaceuticals. The novel tank assay is a great tool for modeling anxiety and the effects of anxiolytics in zebrafish. Zebrafish will be subjected to either a dosage of agonist, antagonist, or a control. Recordings were analyzed through Ethovision, separating the tank top and bottom sections. To define the relationship between OPRL1 and anxiety, time accounting for the amount of time spent within the bottom versus top of the tank. Further investigation of the OPRL1 receptor will allow for novel therapeutics and pharmaceutical drugs for treating stress-induced disorders.

BROCKELBANK, MADISON

Civil War Behind Barbed Wire: The Political Struggles and Political Culture within UN POW Camps During the Korean War

The post-World War II political situations within China and the Korean peninsula were represented in the political struggles and political culture amongst Korean and Chinese POWs during the Korean War, as Communist and anti-Communist militants alike struggled for dominance within UN POW camps, much like how Communist and anti-Communist militants alike had struggled for dominance within China and Korea. POWs within UN POW camps participated in riots and mass-demonstrations, as anxieties over repatriation increased amongst anti-Communist POWs and pro-Communist POWs. Knowing how the resistance within UN POW camps represented post-World War II political situations within China and the Korean peninsula will impact our historical perspective, showing how Chinese and Koreans living in post-World War II East Asia were put under increasing ideological and political pressure. This research might also provide some insight into the development of modern China, modern South Korea, and modern North Korea.

BUSH, SCOTT

Predicting Happiness on Twitter

The Hedonometer analyzes Twitter data using human evaluations of happiness to give a happiness score for a given day. The goal of this study was to be able to predict the Hedonometer's happiness score for a given day using the Linguistic Inquiry and Word Count (LIWC). Using a sample of over 15 million Tweets gathered from Archive.org's Twitter Stream Grab, the positive emotion dictionary of the LIWC was able to predict happiness on an independent sample, $R2 = .57$, $p < .001$. When adding seven additional LIWC dictionaries and using lasso regression, predictive power improved, $R2 = .85$, $p < .001$. This reveals that different language analysis metrics may also be able to reveal positivity and happiness within the population of Twitter.

CAREY, ANDREA

Students 4 Scholarships

Students 4 Scholarships is a nonprofit venture working under the 501(c)(3) status of Path to College that strives to assist high school students in low-income communities pay for college by providing them with the necessary information to earn scholarships and by aiding them in essay writing and scholarship application compilation. Students 4 Scholarships provides both a free in-person seminar and a fee for service online program with specialized scholarship advice, including assistance in completing scholarship applications and various essay templates. While there are thousands of scholarship finder databases available for students, our service takes the next step by providing students with personalized assistance in completing the scholarship application process. Our founders bring their own unique experiences and first-hand knowledge of how to compile award-winning scholarship applications to this venture.

CARTER, QUEST

Motivation Machine

This game was inspired by Tim Urban's TED Talk "Inside the mind of a master procrastinator". It is an artistic simulation that attempts to showcase how difficult it is for many people to get motivated. Unbeknownst to most people, there is actually a tiny, microscopic person living inside our brain called the "Motivational Conductor". This hard worker maintains and controls the "Motivation Machine", the part of the brain responsible for generating the motivation that drives us through daily life. Unfortunately, despite the conductor's best efforts, generating enough motivation can oftentimes be a challenging task. Chemical imbalances within the brain can mess up the machine, making the delivery of motivation much harder. Furthermore, motivational black holes, created by distracting outside stimuli, are an immense nuisance for the conductor. However, the conductor remains undeterred by these obstacles and strives to do the best they can.

Itch.io WebGL link
https://kwesticles2199.itch.io/motivation-machine

CAUDILL, AARON

Effect of Omega-3 Supplementation in Asian Dhole (*C. alpinus lepturus*) and African Wild Dogs (*Lycaon pictus*) on Indicators of Allergies

The Asian Dholes and the African Wild Dogs at Zoo Miami have shown clinical signs of severe allergies, such as hotspots, excessive scratching, and ear irritation over the last few years. The goal of this study was to reduce these signs through the supplementation with omega-3's (32 mg eicosapentaenoic acid (EPA) /kg) bodyweight (Bw) + 31 mg docosahexaenoic acid (DHA) /kgBw) into their diet via fish oil. Based on the total itching observations per dog, a trend in improvement was seen in African Wild Dog Aries, while no significant effect was observed in Asian Dholes. Data analysis is in progress for additional experiments performed in fall in the African Wild Dogs. Future studies should try supplementing for a longer period of time to determine if omega-3s can be a useful management strategy for exotic canids in captivity.

CHACON, ANA AND BEGUM, JANNATUL

Molecular Assessment of Individualistic Behavior and the Evolution of Brain Circuits Modulating It

Individualism, or variations in behavioral responses within populations such as left or right-handedness, occur throughout the animal kingdom. However, little is known about its evolutionary and molecular bases. Previous work in zebrafish (*Danio rerio*) shows small fish models as potent models for individualistic behaviors. When zebrafish larva encounter illumination changes, they display hyperactivity and prolonged turning towards right or left. To determine how individualistic behaviors evolve, we are studying turning bias in an emerging model in evolutionary biology: *Astyanax mexicanus.* Our hypothesis is there will be differences in individualist turning between cave and surface forms, and Brain-Derived Neurotrophic Factor (BDNF) will have differential asymmetrical expression in fish with individual turning bias. We are analyzing behavioral data and adapting a highly sensitive in-situ hybridization chain reaction (HCR) to quantify and characterize surface fish and cavefish BDNF expression. These behavioral-molecular studies will establish a foundation to examine the evolution of individualistic behavior.

CHUNG, KAISEE

Genetically-Encoded Fluorescent Probes Reveal Presynaptic Glutamate Levels to be Surprisingly Low

Glutamate is the major excitatory neurotransmitter in the brain where it is packaged into synaptic vesicles for release at chemical synapses. Despite such an important role, its concentration within neurons and within synaptic vesicles, is virtually unknown. Certain proteins fluoresce more brightly in the presence of glutamate and so we used these "glutamate reporters" to determine the intracellular glutamate concentration in *Drosophila melanogaster* (fruit flies). We chose three different reporters, each with a different affinity for glutamate. We then created three different transgenic flies that would allow us to express each glutamate reporter in neurons of our choosing. We dissected fly larvae and examined motor nerve terminals using a fluorescence microscope. We compared the amount of fluorescence emitted at glutamate-sensitive wavelengths (green) to the amount of fluorescence emitted at glutamate in-sensitive wavelengths (red), to obtain a ratiometric estimate of glutamate concentration. The data revealed a surprisingly low intracellular glutamate concentration.

COHEN, ELIZABETH

Underwater 3-Dimensional Videogrammetry Methods and Analysis

3-Dimensional (3-D) models made from video recordings are a great method of visualizing data. Videos provide pictures aligned in sequence allowing an increase of usable information compared to individual photos. The applications of 3-D videogrammetry in this thesis are pertinent to the analysis of underwater corals and reefs. However, during 3-D model generation, errors can develop that render the model useless. When the raw video is transformed into a 3-D visual design, a distortion can cause inaccuracy. This thesis attempts an analysis of the 3-D videogrammetry process using Agisoft Metashape and Rhinoceros softwares. A 3-D printed coral and several shapes were recorded underwater using a method known as the "Lawnmower." In an attempt to increase accuracy, the addition of 45- and 90-degree angle videos of the objects were added to Lawnmower recordings. The successfully generated models were analyzed for accuracy within the modeling softwares; and models that continued to have distortions were analyzed for a probable cause and tested for a possible correction.

CORELLIS, BRIANNA

Microplastics in the Indian River Lagoon Sediments

Sediments are the ultimate resting place of plastics in the ocean and give information on what is being introduced through freshwater input, marinas, and agricultural runoff. Sediment samples taken as part of a previous study in the Indian River Lagoon may shed light on the speculation of microplastics in this environment. These samples were taken in four seasons (2 wet and 2 dry) during 2016, 2017, and 2018 in Jensen Beach, Fort Pierce, and Vero Beach areas. Plastic particles were extracted from the sediments with >95% efficiency through density separation, filtration, and analyzed using infrared spectroscopy. Analysis can identify plastics as small as 20 μm, the most common polymers being ~100μm. This study has gained evidence of microplastics in a majority of the sediments analyzed.

DE OLIVEIRA CAIADO, ISABELA

Screening for Novel Small Molecule Binders of RNA Repeat Expansions

RNA performs many vital roles in the human cell, such as turning genetic information into proteins and gene regulation. Its malfunction may lead to severe diseases such as Huntington's disease (HD) or Myotonic Dystrophy type 1 (DM1). HD, a rare neurodegenerative disease most likely inherited, is caused by the trinucleotide repeat expansion r(CAG)exp in the Huntington gene (HTT). DM1 is an untreatable neuromuscular disorder caused by the trinucleotide repeat expansion r(CUG)exp. RNA determines the biology of healthy or disease-infected cells and serve as desirable targets for chemical probe and lead compounds. Targeting RNAs with small molecules provides opportunities to affect their function and therapeutically change many pathologic cellular processes. The purpose of this study is to use a fragment-based approach to find small molecules that bind these two trinucleotide repeat expansions by phenotypic screening involving a luciferase reporter assay for r(CAG)exp, and a target-based approach involving NMR spectroscopy for r(CUG)exp.

ELMAN, MADISON

Phospholipase D Links Ethanol Volatile Anesthetic Sedation

Previous research has linked ethanol intoxication to an anesthetic effect and demonstrated how long chain alcohols act as substrates for Phospholipase D (PLD), a cellular membrane associated protein that through transphosphatidylation, generates an unnatural lipid phosphatidylalcohol which produces anesthetic effects. Due to PLD's effect in alcohol intoxication, we expect a PLD gene knockout to knockout the alcohol phenotype. We will study these effects with *Drosophila melanogaster* using our new Volatile and Aerosol Administration with Positional Recording (VAAPR) technology which can track and graph the positional movement and activity of *Drosophila*, from which we will determine the sedation effects of each alcohol and PLD's role in the process. We expect to observe that ethanol sensitivity of *Drosophila* is dependent on having a catalytically active PLD and graph two chain-link cut offs from potency and efficaciousness. A possible implication could be a separate process for alcohol sensitivity and anesthetics in the cell.

GARY, CHANCELLOR
Low-cost Development of a Drive-by-Wire Platform for Autonomous Vehicle Conversion.

Autonomous vehicles have the potential to decrease accidents, reduce variation in transport times, and increase mobility for those who cannot drive themselves. However, commercially available vehicles for autonomous development often are costly and difficult to test effectively. This project proposes a method to convert more accessible vehicles into drive-by-wire platforms that can be used for autonomous public transportation. LIDAR (Light, Detection and Ranging) units are a popular technology for autonomous perception, along with cameras. Our approach makes use of both these systems. Integral to our platform is the Robot Operating Systems (ROS) environment. ROS allows for the use of multiple separate modules for braking, throttle, steering, perception, and computation. To handle the computational cost, we use a NVIDIA Jetson AGX Xavier computer. We anticipate reaching level four driving automation. This entails mostly autonomous operation, with occasional need for manual override. This would allow for more convenient and efficient campus transportation.

GHODS, KIA
Model Selection for HIV and Nutrition Dynamics

Human immunodeficiency virus (HIV) is a serious public health concern globally. HIV infection leads to the development of the acquired immunodeficiency syndrome (AIDS). Previous studies found that improvements in nutrition acted as a form of early intervention for HIV patients; however, these studies did not create mathematical models mapping this relation. For our set of differential models, cells are grouped into the category of target cells, infected cells, and viral HIV cells. Nutrition consists of globulin and albumin proteins and the immune response consists of T-cell and B-cell attacks to the infected cells. MATLAB software was used to find the optimal within-host model that best represents this relationship. The parameters of the differential model system being developed were manipulated by the fminsearchbnd function. Iterations of the differential models were compared via the AIC (Akaine Information Criteria) to determine the most accurate differential system that represents the data.

GIBBONS, AUBRIE
Factors of Voter Turnout: Analyzing the Effects of Habit, Social Pressure, and Gerrymandering on Voting Habits

Voter participation and turnout is an essential metric for the health of a democracy; however, our nation has a particularly low rate of voter turnout. In an effort to understand and boost turnout, political scientists have studied whether gerrymandering may decrease turnout by lowering voter efficacy and confidence. While evidence of this theory remains unclear, there are studies of other factors, such as the formation of a voting habit or the influence of social pressure and social media, that help shed light on voter turnout. This thesis explores the relationship between turnout and three factors that may affect it: voting habit, social pressure, and gerrymandering.

GOLDIN, SETH
Gold In-and-Out: Automated Gold Particle Analysis Software

Membrane protein distributions in the brain reflect physiological characteristics of cells. Using a technique known as freeze fracture replica immunogold labeling, these proteins may be tagged with immunogold particles and visualized. This method requires the collection and evaluation of hundreds of electron microscopy images, for which manual analysis is time-consuming and prone to human error. To overcome these limitations, we developed a custom software package, Gold In-and-Out (GIO). GIO accepts an image, a mask identifying the region of interest, and gold particle coordinates as input. After users select evaluation methods and tweak parameters, GIO generates graphical visualizations and outputs assessed data files. GIO includes several methods for analyzing gold particle distributions including finding the nearest neighbor distance, clustering, and determining if a population is unevenly distributed relative to landmarks. With a user-friendly interface, GIO seeks to standardize the protein localization analysis methods and increase the efficiency of labor-intensive research.

GOODWIN, LEYA

Measuring Cholesterol Homeostasis in iPSC-derived Human Neurons

Amyloid precursor protein (APP) produces amyloid peptides, which are known to cause neurodegeneration in Alzheimer's Disease (AD) patients. Previous studies show that APP directly regulates neuronal membrane cholesterol (mChol). The purpose of this project is to determine whether controlling mChol homeostasis can prevent this neurodegeneration. Human neurons will be stained using various dyes to mark cell membrane areas. We will observe the change in mChol in developing and mature hiNs by comparing APP-null and wild-type hiNs. Using a fluorescence microscope, we will take pictures of these cells and analyze the images for cholesterol levels. We hope to find that with the removal of mChol, there will be swollen synaptic terminals and neuronal death in APP-null hiNs. Additionally, there should be a slow mChol turnover in APP-null hiNs, compared to wild-type hiNs. Proving our hypothesis would get researchers a step closer to finding a cure for AD.

GOYTIZOLO, GABRIELLA

A Study to Elucidate the Mechanism by which Collagen Fragments Promote the Pathology of Rheumatoid Arthritis

Rheumatoid arthritis (RA) is an autoimmune disease that affects more than 1.3 million people in the United States alone. Currently, no cure is available and treatment options do not result in long term remission. RA is characterized by degradation of collagen type II (Col II), the main constituent of the cartilage extracellular matrix (ECM). This matrix can be degraded by various members of the matrix metalloproteinases (MMPs) family of enzymes, in particular MMP-13. Under normal physiological conditions MMP-13 digests the cartilage ECM into small fragments; in RA this process is hindered resulting in longer fragments. We hypothesize that these fragments contribute to disease progression by modulating chondrocyte behavior. Thus, this study seeks to elucidate the mechanism by which the generated fragments influence disease progression using a 3D in vitro culture of human chondrocytes.

GRIFFIN, RACHAEL

Going Deeper with *Halophila johnsonii*

The seagrasses in the Loxahatchee River estuary have declined overall and become sparse and patchy in areas. The purpose of this experiment is to determine if the depth at which you find the *Halophila johnsonii* influences their stress levels. When the Johnson's seagrass is stressed it may manufacture more pigmentation. I worked alongside the Loxahatchee River District Laboratory to collect seagrass blades at two sites and at 2 depths. Then the leaves were frozen, manually scraped, ground up, centrifuged, and run through a spectrophotometer. According to my data, the seagrass blades at the first site from the deeper locations had overall higher values of absorbance. Whereas the seagrasses from the second site had more variability in their absorbance values. This data indicates that there may be an association between depth and absorbance values, but may not be linked to stress specifically.

GRUSS, GINA MARIE

The World's Ending, but at Least We Have Memes

"The World's Ending, But At Least We Have Memes" is a dark, satirical Photoshop piece crafted in Professor Lemeh's Honors Photoshop class in Spring 2022. It presents the subtle, slow, and current environmental apocalypse in the world behind the room's blinds; the feeling of faulty, insufficient escapism of online spaces replacing physical ones by bright colors and jarring text; and the sense of shared helplessness and dread through dark blue coloration and tone. The existential dread only widens, deepens, and darkens in the shadows.

Meme culture is a way to inform, to cope, and to lighten the mood. This piece is a visual understanding of how, and why, memes exist and pervade culture quickly—and how their lighter tone carries sadness within. It is a cross section of online spaces, contemporary comedy, and environmental and sociological issues. What else can you do in the face of the apocalypse but laugh?

GRUSS, GINA MARIE

Extant

"Extant," created in Professor Ruest's 3d Computer Game Development class in Spring 2021, is a first-person interactive narrative piece made in Unity in which you take the role of an immunocompromised person in the age of COVID. They are trapped in their apartment, and you, the player, walk through the room through varying passages of time as the space becomes more and more abstracted as they begin to hallucinate and pull away from reality. This is a multi-sensory experience, which includes an audio soundtrack that changes with the character's movements, as well as strange, twisty visuals. Themes of isolation, disability, selfhood, and existential horror are within.

GRUSS, GINA MARIE

All the Ways the World Could End: Written Word on the Apocalypse

This is an interdisciplinary thesis composed of short stories, poetry, traditional art, photomanipulation, comics, and experimental games, with a through line of the apocalypse. Individual works are genre-spanning, focusing on varied theological, sociological, environmental, and/or fantastical armageddons, while featuring diverse, queer, and disabled narratives. Award-winning pieces have been featured by Amazon Prime Video, Wattpad, FCHC, Coastlines, and F(r)iction Literary Magazine.

The oral presentation will provide research on apocalypses tropes, conventions, and how they shift over time; a brief overview of the written works, and a reading. Written piece examples are: "The Body of God, the Truth of God," a horrifically satirical piece which recontextualizes religion, a zombie apocalypse, conspiracy theory, propaganda, and American culture in a post-COVID world. "Alone" is a retelling of the Orpheus mythos with the last human alive. "Wasps and Bees," examines identity, borders, and selfhood in an environmental armageddon, featuring Mexican folk magic and magical realism.

GRUSS, GINA MARIE

All the Ways the World Could End: Art of the Apocalypse

This is an interdisciplinary thesis composed of short stories, poetry, traditional art, photomanipulation, comics, and experimental games, with a through line of the apocalypse. Individual works are genre-spanning, focusing on varied theological, sociological, environmental, and/or fantastical armageddons, while featuring diverse, queer, and disabled narratives. Award-winning pieces have been featured by Amazon Prime Video, Wattpad, FCHC, Coastlines, and F(r)iction Literary Magazine. The poster presentation will feature the artworks created in the thesis.

Certain pieces investigate religious armageddons, like the breakdown of Catholic symbolism in "Thoughts and Prayers," to a Chiaroscuro image of the Rapture through a modern American lens in "Raptured." Others like faux-disaster-movie comic "8 Minutes" include illustrated stills of a movie, eight minutes before Earth is destroyed. "Florida, Underwater" is a collection of painted and drawn works that centralize a sinking Florida. By examining potential apocalypses, we all can work together to make our present world better.

HARBAUGH, DAVID

Eliminating Breast Cancer Cells by Blocking the Immune Evasion "Don't Eat Me" Signal

Cancer is a disease that features dysregulated cellular proliferation associated with evasion of immune response mechanisms. The human breast cancer cell line MCF-7 upregulates CD47 on its cellular surface to interact with signal-regulatory protein alpha (SIRPα) on THP-1 macrophages to evade phagocytosis, enabling cell survival and proliferation. Prior research demonstrates that targeting CD47 with anti-human CD47 antibodies is an effective strategy to block the CD47-SIRPα interaction. Similarly, we expect to inhibit the CD47-SIRPα interaction by outcompeting SIRPα with known ligand thrombospondin-1 for CD47. This interaction will elicit an immune response from THP-1 macrophage resulting in the phagocytosis of the MCF-7 cells and production of pro-inflammatory cytokine IL-1α. Further understanding of ways to manipulate the CD47-SIRPα interaction between cancer cells and immune cells could lead to combinational therapies that are more effective than the individual therapies administered separately.

HART, MELANIE

The Effects of Haloperidol on the Neuronal Function of *Lumbricus terrestris*

This project aimed to investigate the impact of haloperidol on nerve conduction in *Lumbricus terrestris*. Earthworms were exposed acutely or chronically to a solution of saline, DMSO, or haloperidol. Electrophysiological techniques were employed using the PicoScope to collect neural data in each of the groups. The average threshold and conduction velocity decreased when exposed to haloperidol for both chronic and acute exposure. Conduction velocity was generally lower in the lateral giant fibers (LGFs) than in the median giant fiber (MGF) for both chronic and acute exposure to saline, DMSO, and haloperidol. The threshold was generally greater in the LGF than in the MGF for all solution and exposure groups. The results of this experiment can provide insight into the function of haloperidol on neuronal activity in an earthworm specimen. The decrease in conduction velocity and threshold in the experimental groups demonstrates that haloperidol has a depressant effect on neuronal activity.

HECKER, MADISON

Circuit Builder: Creating an Online Interactive Tool

Circuit Builder is an asynchronous mini-course for children that combines online tools with hands-on experiments. Online tools are a convenient format for education, and there is an increasing need for them. Circuit Builder has three sections: electricity, conductors and insulators, and resistors. Each section begins with a video explanation followed by an interactive simulated circuit building environment. Circuit Builder was designed using Unity 2D, with scripts in C#, then incorporated into an HTML page along with videos. Throughout the design process, we center children's perspectives and abilities. Circuit Builder contributes to the field of asynchronous online STEM education or as an independent computer-based activity in an elementary school classroom or afterschool program.

HOURANEY, MARIUM

The Crossroads of Identity: Linguistic Shift and the Politics of Identity in Southwest Asia and North Africa

After the Arab Spring, many ethno-linguistic minority groups in the Southwest Asia and North Africa region found themselves at odds with both their governments and themselves. Periods of Arab conquests, Ottoman rule, European colonialism, Arab nationalism, and most recently, brutal wars and conflicts, have shaped the nationalist ideologies that countries in the region adopted as an attempt to strengthen their states, ultimately resulting in the oppressive policies they direct towards minorities. Kurds, Copts, Assyrians, Amazigh, and other linguistic minorities are some of the last communities keeping indigenous cultures and languages alive. Through utilizing four case studies to examine relations between minority groups in the SWANA region and their respective states and an analysis of the viability of internal preservation efforts and questions of autonomy, I argue that the survival of minority linguistic heritage in the region depends most directly on state tolerance and policies promoting preservation.

JOSEPH, REGGIE

An Analysis of Mitochondrial Distribution across Neuron Types in *C. elegans*

Parkinson's disease is known to have a greater impact on dopaminergic neurons when compared with other neurons. Dopaminergic neurons regulate muscle movement and coordination, and mitochondria supply the energy needed for that function in the form of ATP. Along with ATP production, mitochondria play an essential role in various other cell processes, and it is quite plausible that neurons of different functional and neurotransmitter types have different dependencies on mitochondria. To further investigate this possibility, mitochondrial distribution was analyzed in different neuron types in electron micrographs of Caenorhabditis elegans. Mitochondria were longest (1.65 ± 0.12 μm) in cholinergic interneurons, and shortest in GABAergic motor neurons (0.86 ± 0.11 μm). Glutamatergic sensory neurons had the greatest mitochondrial density ($7.8\pm1.2\%$), and vulval muscle motor neurons had the lowest ($3.6\pm0.3\%$). Understanding mitochondrial distribution will foster a deeper understanding of mechanisms neurons use to regulate mitochondria, better equipping us for the treatment of disorders with mitochondrial pathology.

JUNO, LIBERTY

Effect of Green Turtle Fibropapillomatosis on the Immune Function of Green Sea Turtles

In this experiment, the effects of green turtle fibropapillomatosis (GTFP), a debilitating tumor causing disease, will be explored on the immune function in green sea turtles (*Chelonia mydas*). This will be determined by opsonizing fluorescent beads and measuring the percent of phagocytosis occuring. Blood samples will be taken from turtles from two different populations: those with GTFP and those without tumors. Through flow cytometry, the response to opsonized particles will be recorded in both populations. It is expected that opsonization will lead to higher percentages of phagocytosis, as this process makes the beads "stickier" and predictably have a greater chance of being ingested. Furthermore, it is hypothesized that healthy turtles will have a higher percentage of phagocytosis, as prior literature claims that sea turtles with this disease are immunocompromised. This research allows us to attempt to confirm the identity of phagocytic B1 cell subsets through quantification and analysis of phagocytosis.

KELLY, KAITLYN

Exploring Attitudes and Knowledge about Mental Health: Analysis of a New Mental Health Stigma Measure

Mental health stigma creates problems by discouraging people from seeking treatment and reporting symptoms for mental illnesses and from learning more about mental illness and available support resources. Currently, most stigma measures focus exclusively on participant's attitudes toward the mentally ill population and fail to include a mental health knowledge or resource component. To investigate whether knowledge is an important part of stigma, a new measure called "Mental Illness Attitudes and Resource Knowledge" was created. This measure had 27 items that explored traditional stigma beliefs, suicidality attitudes, knowledge about mental illness, and knowledge about appropriate interventions and available resources. Data was collected by surveying 63 undergraduate students and the exploratory factor analysis conducted suggested four factors: Stigma, Shame, Resource Knowledge, and Applied Knowledge. Five items were excluded due to cross-loading on multiple factors or failing to strongly load on any factor. The implications of this new measure will be discussed.

KENNEDY, JAYLENE

Voter Disenfranchisement after Shelby County: the Need to Resume Federal Preclearance

The Voting Rights Act of 1965 expanded the 14th and 15th amendments by outlawing the discriminatory practices adopted by many southern states to keep many African-Americans from voting. Section 4(b) of the VRA required that states with a previous history of voter suppression obtain federal preclearance before enacting any new voting laws. In 2013, the Supreme Court held in Shelby County v. Holder that Section 4(b)'s preclearance requirement is unconstitutional. I argue that Shelby County has opened the door to numerous recent efforts to restrict voting. While these restrictions have been justified to counter illegal voting, I argue that the removal of preclearance has led to restrictions on voting that do not facilitate the integrity of voting, but 'suppress voting', and have a disparate impact on minorities.

KESHARAJU, RITVIK

Using Graphene Nanoflakes to Promote the Connectivity of iPSC-Derived Human Neurons

iPSC cells (induced pluripotent stem cells) can be differentiated into various types of cells leading to regenerative medicine, especially for Alzheimer's disease. However, it is difficult to differentiate them to neurons and even more difficult to obtain neurons bearing functional synapses. Previous findings indicate that graphene, a novel carbon nanomaterial, can promote synapse formation in neurons. To utilize this feature in making neurons from iPSC's, graphene will be applied to iPSC-derived neuronal precursor cells and to determine if it promotes the maturation of neuronal precursor cells to neurons bearing functional synapses. Previous studies have also indicated that cholesterol in the cell membrane mediates graphene's pro-neuron effect. So, this study will further that by examining the change of membrane cholesterol in iPSC-derived neurons. Improving the transformation of iPSCs to neurons will be a breakthrough with broad impact from bench side to bedside, especially in our quest for curing Alzheimer's disease.

LATCHANA, JULIA

The Resurgence of Forced Sterilizations of Migrant Women in the United States and the Lack of Change

Female sterilization is a medical procedure used to prevent pregnancy. The United States has a history of disproportionately coercing women of disadvantaged socioethnic backgrounds into getting sterilized over others. For instance, a recent resurgence of forced sterilizations of migrant women have come to light in the American press. In this talk, I will discuss how the concepts of fit vs. unfit that informed early anthropological theories and scientific racism describe why women in particular are targeted for reproductive control. Though these theories are now thoroughly discredited in anthropology, their lasting impacts still carry weight in modern-day policymaking. Current migrant laws, past incidents of sterilization, and other forms of reproductive control continue to allow these incidents to occur in the present day.

LATCHANA, KRISTINA

The Effects of Misinformation on the COVID-19 Pandemic

Since December 2019, the COVID-19 Pandemic has led to millions of deaths and created something of a 'new normal'. However, along with the virus came an additional "infodemic,": a veritable flood of misinformation about vaccines and treatments. I will examine how misinformation has affected the pandemic in the United States by looking at relationships between indicators of the prevalence of misinformation and COVID numbers in a geographical region.

LI, ASHLEE

Semi-Automation of Mitochondrial Morphology Analysis in *Drosophila* Brain Scans

Mitochondrial dysfunction is the core of several neurodegenerative diseases that include Amyotrophic Lateral Sclerosis (ALS), Frontotemporal Lobe Dementia (FTD), and Alzheimer's Disease (AD). One strategy to understand these diseases is to analyze the geometry of mitochondria in different neuron types: motor (ALS) and brain neurons (FTD/AD). A bottleneck in assessing the quality of mitochondria in healthy versus ALS/FTD/AD flies was performing image analysis on hundreds of microscope images. We collaborated with the Ron Davis Laboratory at Scripps Florida, using the fruit fly, *Drosophila*, as the model organism. In this project, we developed a program to automate this tedious process. We were able to cut processing time from one week to a couple hours. Importantly, changing parameters is straightforward and simple to edit in spreadsheet form even without programming knowledge. Furthermore, our automation approach is easy to extend to any image analysis workflow based on the software ImageJ.

LURIE, ELEONORA

Novel Context Exposure Enhances Object Recognition Memory: Assessing Involvement of Norepinephrine Neurotransmission

Brief exposure of mice to a novel context following encoding of object memory significantly enhanced consolidation of the object memory. The memory-enhancing effect of post-training novelty may rely on locus coeruleus tyrosine-hydroxylase expressing neurons which co-release norepinephrine and dopamine in the hippocampus. To test the contribution of norepinephrine to this novelty effect, mice received propranolol, a synthetic beta-adrenergic receptor antagonist (10 mg/kg), to block norepinephrine or 0.9% saline as a control post-training, but pre-novel context exposure and object memory was tested 24 hours later. Results revealed that propranolol did not block the memory-enhancing effect of post-training novel context exposure. Further, the memory performance of the propranolol-treated mice was comparable to that of saline-treated mice. These findings support the view that enhanced consolidation of object memory brought about by post-training novel context exposure is not dependent upon norepinephrine neurotransmission.

MANOHARAN, SAMUEL

The Effect of Sulindac on Senescence in RPE Cells using Senescence β-galactosidase Assay

Age-related macular degeneration (AMD) is the leading cause of blindness in industrialized countries. One of the potential contributors to AMD pathology is retinal pigment epithelial (RPE) cell senescence. We have shown that sulindac protects normal cells such as retinal cells against oxidative damage through a preconditioning mechanism. To test this, in vitro, we established an RPE senescence model by a treatment of hydrogen peroxide (oxidative stressor) for 12 hours followed by incubation for four days. We assayed for senescence by Beta-galactosidase assay to stain senescent cells. Effect of sulindac was tested by pre-treating cells with sulindac at different concentrations for 24 h prior to TBHP treatment. The data shows that there was a reduced number of senescent cells in the samples treated with sulindac compared to the control groups. These findings indicate that oxidative damage induces cell senescence and, sulindac can lower the amount of senescence by protecting from oxidative damage.

MARTINEZ, LAURA

Using AI to Investigate the Distribution of Mitochondria in *Drosophila* Neurons

This study seeks to determine the volume and distribution of mitochondria along the length of motor and sensory neurons in *Drosophila* 3rd instar larvae. Such data has the potential to reveal mechanisms that control mitochondria and provide an insight into the links between mitochondrial dysfunction and neurodegenerative diseases. With the help of the Max Planck electron microscopy core, we obtained micrographs of serially sectioned *Drosophila* (fruit fly) brain and peripheral nervous system. However, the amount of detail in these images is overwhelming and so we explored the use of artificial intelligence (AI) to automate steps in the analysis. Specifically, we adopted the Dragonfly ORS software platform. By training this AI to recognize neurons and mitochondria we are now able to process a far greater number of images. This in turn provides large sets of numerical data that might be interrogated to reveal phenomena otherwise overlooked in smaller data sets.

MARTINEZ OCHOA, KARLA

Empathic Deficits in Individuals with Antisocial Traits: a Predictor or Mediator of a Dysfunctional Lifestyle?

It is no secret that individuals with antisocial or psychopathic traits experience affective deficits and tend to lead dysfunctional lifestyles such as breaking the law. However, the extent to which callous-unemotional traits can act as a driving force of said dysfunctional lifestyles is poorly understood. The first objective of this literature analysis is to examine the overall effect of empathic deficits as a predictor or mediator of violent offenses in people with psychopathic traits. Also explored is the generalizability of this relation to non-offender populations with psychopathy. The last section of this paper encompasses a review of current treatment models emphasizing how the management of affective impairments may guide individuals with antisocial tendencies towards a functional lifestyle away from crime.

MILLAN, PEDRO

Does Bilingualism Affect Mental Health Stigma?

Cultural frame-switching (CFS) is the process by which an individual subtly alters their inner cognitive processes in a manner allowing them to best fit their cultural surroundings. In a world becoming increasingly bilingual, a great deal of attention has been paid to the implications of fostering a second language. Code-switching (the alternation between one's languages) is an effective trigger of CFS and an area of interest within bilingualism research. This study focuses on the intersection between these two processes for an English/Spanish bilingual: do they report different levels of mental health stigma depending on the language? We compare the responses of participants to mental health surveys in English and Spanish. Spanish is a language embedded within a culture that is less accepting of mental illness and treatment-seeking behaviors compared to American English culture. This investigation aims to elucidate the relationship between language and mental health attitudes and stigma.

MILLER, HANNAH

Examining Facets of Mental Health Stigma in a Hispanic Community

Previous research shows that Hispanic cultures tend to have more mental health stigma than mainstream American culture. This study will examine acculturation, language, treatment preferences, religious beliefs related to mental health and stigma. The questions we hope to answer are how stigma can influence treatment seeking preferences for mental illness, and how religious beliefs can impact mental health stigma. The purpose of this study is to determine what factors may be strongly correlated with increased mental health stigma among the Hispanic relative to non-Hispanic college students. This information can be used to help spread awareness about mental health stigma, and hopefully lower stigma and encourage more people to seek proper treatment for mental illness.

MORALES, ERIC

Analyzing Remote Sensing Images to Detect and Quantify Coastal Sediment-Derived CDOM Following Storm Resuspension Events

As climate change heats up our oceans, we can expect stronger storms to make landfall in coastal regions. When storms approach areas with shallower waters, storm winds stir up the water column, potentially reaching deep enough to disturb sediments covering the ocean floor; these sediments contain large amounts of trapped dissolved organic carbon (DOC), which when resuspended, become available to marine ecosystems in the water column. This project will use NASA remote sensing data to detect and quantify organic carbon in coastal regions, particularly near Texas and Louisiana. We expect that remote sensing will be effective in detecting sediment-derived CDOM, and that sediment-derived CDOM contributes significantly to the carbon in coastal water columns. If these hypotheses are true, remote sensing could prove to be a novel and effective tool in monitoring the impacts of climate change on coastal regions anywhere in the world.

MORAN, HILLARY

State Level COVID-19 Vaccine Mandates: A Constitutional Analysis

The coronavirus pandemic has upended our daily lives, especially regarding our civil liberties. With the development of a vaccine, many Americans are concerned about the possibility of vaccine mandates. Regardless of whether states should implement these mandates, the first question that needs to be answered is whether they can. Although the Supreme Court's recent National Federation of Independent Business v. Department of Labor, Occupational Safety and Health Administration decision put an end to a vaccine mandate implemented through OSHA's workplace safety standards, the possibility of state level mandates remains. Although there have been legal challenges to localized mandates, it is clear from Jacobson v Massachusetts that state vaccine mandates are constitutional.

MUTLUGULER, BILAL

***Tedania ignis* Cell Fractions: Their Symbionts and Serotonin**

Sponges (phylum *Porifera*) are the most basal of all animals, yet, paradoxically, they still puzzle scientists with their complexity. One mystery baffling researchers since its discovery in the mid-1960s, is the presence of serotonin in these brainless animals, which lack neurons. The current controversy is who produces serotonin, the sponge cells or the sponge-associated microbes? Sponges are holobionts, composed of both the sponge cells themselves and the affiliated microorganisms that live with them (like bacteria and archaea). This honors thesis aims to determine whether the *Tedania ignis* cells or their associated symbionts contain serotonin detected in previous studies. A Percoll gradient was used to create sponge-enriched cell fractions and symbiont-enriched fractions. Each fraction was then analyzed by an ELISA (enzyme-linked immunoassay) to measure serotonin levels. Results of this project will contribute to the possible source of serotonin in sponges.

ABSTRACTS ALPHABETICAL BY STUDENT'S LAST NAME

ABSTRACTS ALPHABETICAL BY STUDENT'S LAST NAME

NAIR, ARJUN

Application of Dynamic Docking Methodology to Discover the Binding Properties of a Lead Compound Targeting pre-miRNA-515 Causing Cancer

This project focuses on analyzing the effectiveness of a lead compound in targeting specific sites of a microRNA precursor compound. This study takes a theoretical approach that utilizes dynamic docking to target microRNA precursor compound sites. Dynamic docking is a computer-based method of discovering potential small molecule designs by exploring the energetic points modeled by a binding simulator. This study aims to simulate binding energy shared by a lead compound, Targaprimer-515, to analyze its potential for inhibiting a precursor compound, miRNA-515. As methods of dynamic docking allow us to compute the binding affinity of Targaprimer-515 and miRNA-515, we hope to simulate binding in which CU (Cytosine-Uracil) loops are targeted and inhibited. To further explore the issue of mutation stemming from pre-miRNA compounds, dynamic docking methods that utilize AmberMD, a software used for building molecular models, are used to simulate the binding energy shared by Targaprimer-515 and the miRNA-515 precursor compound.

NIEMAN, KAITLYN

Do Certain Species of Anchovies Have a Greater Tendency to Consume Microplastics than Others?

Plastic pollution has gained notoriety in recent decades as it continues to enter the ocean, degrade into microplastics, and be ingested by commercial fishes, such as anchovies, that are harvested for human consumption. Because anchovies are most often eaten whole, including its digestive tract and the microplastics within it, I have assessed whether certain species of anchovies have a greater tendency to consume microplastics than others, with the intent that my conclusion will assist consumers in making informed dietary decisions. I evaluated the plastic consumption of six major species of anchovies: the Northern anchovy (*E. mordax*), Silver anchovy (*E. eurystole*), European anchovy (*E. encrasicolus*), Cape anchovy (*E. capensis*), Japanese anchovy (*E. japonicus*), and Australian anchovy (*E. australis*). I examined reports done on the foraging behavior of these species and analyzed other factors that contribute to an increased likelihood of exposure to microplastics, including patterns of oceanic gyres and sources of pollution from nearby coasts.

OLIVA, CARLOS

The Role of the Phosphagen System in Neurons

De novo generation of ATP through glycolysis and oxidative phosphorylation is too slow to sustain intense neuronal activity and stabilize ATP levels. The phosphagen system is an ATP regeneration pathway that produces ATP through ADP rephosphorylation, using up creatine (arginine in arthropods) phosphates and replenishing them when cells are at rest. The energy intensive nature of neuronal activity requires a lot of ATP, so neurons would likely benefit from the presence of a phosphagen system. Currently, however, little is known about how the phosphagen system satisfies neuronal power demands. Calcium levels, ATP levels, and pH were measured during high-frequency stimulation and compared between wild-type and arginine kinase mutants in *Drosophila melanogaster* to gauge the contribution of the Drosophila phosphagen system during neurotransmission. Elucidating the role of the phosphagen system in neurons will provide a better understanding of neuronal bioenergetics, and perhaps, insight into the causes of various neurodegenerative disorders.

OMANA SUAREZ, GENESIS

Discrete Neural Circuits Drive ADHD Like Phenotypes in the *Drosophila melanogaster* Model of NF1

Neurofibromatosis type 1 (NF1) is a genetic disorder that predisposes individuals to develop a range of symptoms, including tumor formation and cognitive deficits. Because the neurofibromin protein in *Drosophila melanogaster* shares high homology to humans, the fruit fly makes a suitable model to perform genetic screens to elucidate genotype-phenotype relationships of NF1. Increased grooming behavior has been previously reported following NF1 knockdown in large neuronal clusters, however, this phenotype does not replicate in microcircuits. Thus, the requirement of Nf1 could be additive across circuits. Moreover, the ability of the fruit fly's disease model to adapt to a novel environment is yet to be established. Finally, to assess habituation in the NF1 knockdown model and a matched control clone, we quantified grooming followed by an environment modification stimulus. These results, together with other ongoing experiments, contribute to our understanding of how neural circuit dysfunction impacts motor behavior and environmental adaptation.

OSUNA, ASHLEY

Red Imported Fire Ants (*Solenopsis invicta*) Infesting American Alligator (*Alligator mississippiensis*) Nests

The red imported fire ant (*Solenopsis invicta*) is known for its impacts on Florida wildlife, harming both newborns and hatchlings of ground nesting herpetofauna. This study aims to examine what factors may correlate with fire ant infestation of nests belonging to the American alligator (*Alligator mississippiensis*) 24 nests were surveyed at Orange Lake located in Alachua County, Florida. Nests surveyed using a bait card system, where bait cards were left for approximately two hours and then collected. *S. invicta* was the most commonly observed species at nests, with *S. invicta* present at a total of 12 of the 24 nests. There was no significant difference in the proportion of nests with *S. invicta* present for floating nests (8 of 14) versus land-based nests (6 of 10). This may have been influenced by the limited sample size of the study, something which future studies should aim to address.

OSUNA, ASHLEY

The Conflict Between the Childhood Identity and Politics in *Petit pays*

Childhood identity is a motif seen in a number of literary works. In *Petit pays* by Gaël Faye, Faye examines the shift in identity of a young child living in a politically unstable Burundi. This work provides a unique perspective on the influence of politics on a developing childhood identity. In doing so, Faye establishes a number of parallels between the inner conflict of the young protagonist and the changing political climate of his home country. Additionally, it is through this perspective that one is able to more clearly see the consequences of political violence, as the child perspective removes the influence of adulthood and allows one to observe the issues at hand under a guise of an innocent. It should be noted that an oral presentation of this research paper will be presented in French.

PACHECO, MATTHEW

Tutor It Forward, Democratizing Education

One answer to the many challenges faced by students in underserved schools is tutoring. The majority of private tutoring services are prohibitively expensive for students experiencing poverty, leading to achievement gaps between them and privileged students in terms of grades, standardized testing, and college acceptance rates. Although free tutoring is available at some underserved schools, administrators note that students do not always avail themselves of the opportunity due to schedule and transportation constraints. Tutor It Forward seeks to address this systemic problem in Palm Beach County by providing no-cost tutoring for under-resourced students. This is a community-centered tutoring service operating on a one-for-one model. For every tutoring plan purchased, an under-resourced student will receive the same service at no cost. In addition to a flexible in-person scheduling, Tutor It Forward provides online sessions to ensure every student benefits from the opportunity.

PADILLA-RODRIGUEZ, MAXIMILIAN

The Hidden Artists of Italian Renaissance Architecture

In his architectural designs for the duomo of the Santa Maria del Fiore, Filippo Brunelleschi deploys the principle of "concealing the artist". This principle, found within many 15th century architectural works, emulates the scale and atmosphere of natural structures. To accomplish this, the architect designs seemingly implausible shapes and formations that defy traditional architectural understandings. Such a technique masks the man-made foundations of an architectural structure and inspires a perception of the building as a natural formation. The manipulation of perception through this practice also allows the architect to construct imagery centering around one's placement within a structure, thereby incorporating the individual into the architect's designs. Finally, this presentation will examine the concealment of the artist as a means of preventing plagiarism by other architects, allowing technical innovators like Brunelleschi to maintain exclusive knowledge of their designs in an era that preceded copyright laws.

PAZ, ALEXANDRA

Uncovering the Evolutionary Basis of Sensory Motor Integration through the Analysis of Locomotive Activity and Startle Response Behavior

Startle response and locomotive activity are evolutionarily conserved behaviors that play a key role in important animal behaviors, including sleep and foraging. While the neuronal mechanisms underlying these behaviors are well understood, less is known about the evolutionary mechanisms that modify them. This study uncovers the evolutionary basis of sensory motor integration through the analysis of startle response and locomotive activity, while identifying the specific genes involved. We address these questions using the emerging evolutionary model, *Astyanax mexicanus*, which consists of 2 different populations: a river-dwelling and a cave-dwelling fish. Analyzing genes that are orthologous to the human genome can be helpful to identify the genes that play a role in human diseases. Specifically, analyzing startle response behavior can identify the standing variation of how a specific gene can contribute towards diseases that are commonly inherited in humans, such as Schizophrenia.

PUTNAM, GRACE

The Neurological Effects of Domoic Acid Toxicosis on Marine Mammals and its Implications on Florida Wildlife

The algae *Pseudo nitzschia* was a novel find for the Indian River Lagoon (IRL) in 2017. This algae produces Domoic acid (DA), an excitatory neurotoxin that has detrimental effects on marine mammals. Amidst the IRL's history of harmful algal blooms, the chances of a *Pseudo nitzschia* bloom could be looming with unknown consequences for the already dwindling manatee population. The neurological effects of DA toxicosis on sea lions has been well studied, and was used to predict the neurological responses of manatees. Previous studies on DA effects in California were used to predict the ecological effects of DA in the IRL.

RESTIFO ROSALES, MARIA GABRIELA

An Ultrastructural Analysis of the Relationship between Synapses and Mitochondria Across Neuron Types in *C. elegans*

De novo gThe brain consumes approximately 20% of the body's energy, most of which is used at synapses. Mitochondria provide most of the brain's energy and because of this role, it is probable that synapses need mitochondria close by. The goal is to test if mitochondria are randomly distributed with respect to synapses by analyzing their degree of co-localization in 15 neurons, using EM data from a hermaphroditic *Caenorhabditis elegans* nematode. The synapse-mitochondrial relationship can be tested by calculating the average difference in distance and volume between these subcellular components. Another objective is to determine whether there are co-localization differences based on the function of the neuron or its neurotransmitter type, or according to whether the synaptic compartment is pre- or postsynaptic. This analysis aims to better understand neuronal energy dynamics and any essential requirements of synaptic transmission through uncovering hitherto uncovered relationships between synapses and mitochondria.

REYBLAT, EVA

Observing the Effect of Prolonged Optogenetic Activation in the *Drosophila melanogaster* through Chrimson for Periods of 2, 4 , 6, 8 and 12 Hours

Disruption of normal circadian rhythms is associated with physical and cognitive defects including insomnia, depression, daytime sleepiness, and lack of energy. The use of the *Drosophila melanogaster* (fruit fly) enables studies on how circadian rhythms are regulated. Without a proper sleep/wake cycle, flies display a decline in activity and cognitive function. Here, we use optogenetic activation to trigger increased sleep to demonstrate a potential intervention for sleep disorders. Previous studies have shown that stimulation of sNPF neurons in the fly brain increases sleep. In this study, red light-sensitive Chrimson, expressed in sNPF neurons, induces Drosophila sleep upon stimulation. This project serves to expand upon this research by continuing to uphold the positive correlation between optogenetic activation and sleep. By optogenetically activating the sNPF neuron for periods of 2, 4, 6, 8 and 12 hours, the *Drosophila melanogaster* should experience prolonged sleep. This could potentially inform future interventions for sleep-related illnesses such as insomnia. behavior and environmental adaptation.

RIOS, RODRIGO

Swimming Kinematics of *Mexican Tetra*

The *Mexican Tetra* is notable in the field of evolutionary biology due to it being primarily suited for the surface waters of Central/Eastern Mexico, yet over time has colonized various underground caves. Each of these caves, presenting slightly different evolutionary pressures, has caused the *Tetra* to adapt and evolve into what is known as a set of similar cave populations. Given this traceable lineage of evolution, much attention has been directed to see how the evolutionary divergence manifests in the *Tetra*'s swimming behavior. This project focuses on attempting to describe the individual swimming kinematics of both forms of the *Mexican Tetra* using this agent-based modeling approach. The parameters of the models are extracted from experiments conducted in the Kowalko Lab at Florida Atlantic University on juvenile surface and cavefish at various ages. Specifically, this model focuses on capturing the way isolated fish respond to the presence of a nearby boundary as a function of the distance to the boundary and the orientation of the fish relative to the nearest boundary normal.

RUSSO, ALEXANDRA

An Indefinite Punishment after Justice has Been Served: How *Jones v. Governor of Florida* is a Fundamentally Flawed Decision

The right to vote is a fundamental part of a representative democracy. As of 2020, 48 states have laws limiting a felon's participation in the franchise. In 2018, Florida passed Amendment 4 with a 65% popular vote, allowing felons to be re-enfranchised after completing the terms of their sentence. In 2019, the state enacted a law defining "terms of the sentence" to include court costs and fees, barring indigent felons from regaining their constitutional right. In *Jones v. Governor of Florida*, Judge Pryor upheld this law. I argue the opinion is flawed for failing to use intermediate scrutiny, and by appealing to social contract theory, and theories of punishment. I argue that the law not only fails to serve a legitimate governmental interest, but undermines democracy, perpetuates racial disparities, and makes felons an unequal party in the social contract solely because of their indigent status.

SANDERS, MELANIE

The Impact of Brief Peer-led Psychoeducation on Mental Health Knowledge and Stigma

Although nearly half of all adults in the United States experience issues with mental health, the stigma around it remains a highly pervasive and stalwart barrier to treatment-seeking. In order to learn how we can better address this, we set out to see if university students would express fewer stigmatizing views on mental health after completing a remote workshop-style intervention and if students with more mildly stigmatizing views would be more swayed than their peers with more stigmatizing views. We surveyed 63 undergraduate students before and after intervention and results showed that they significantly improved in some areas of stigma-reduction and resource knowledge, but students with middling stigma scores did not improve more than their higher stigma scoring classmates. We conclude that this realm of education shows promise in reducing the stigma around mental healthcare and improving students' overall wellbeing.

SANDERSON, JOSHUA

Testing the Conductivity in Gels and Development of a Miniaturized Galvanic Sensor

Marine life is very sensitive to the concentration of oxygen dissolved in the water. If it drops below a certain threshold, most life will die. Fisheries are particularly interested in monitoring this concentration. Drones are a good way to automate that process. In this project, we explore two strategies to make those drones lighter and cheaper. First, we study conductive gels as a replacement for the wires connecting the sensor to the drone. Second, we develop a custom galvanic oxygen sensor.

SHATKHIN, STEVEN

Age- and Sex-Dependent Social Deficits in DAT Val559 Mice

Dopaminergic dysfunction has been implicated in multiple neuropsychiatric diseases including autism spectrum disorder (ASD). The dopamine transporter (DAT) is responsible for the reuptake of synaptic dopamine, and mutations in DAT have been identified in ASD subjects. The DAT Val559 substitution, found in two boys with ASD, drives aberrant dopamine efflux and leads to alterations in dopamine homeostasis in DAT Val559 mice. Here, I investigate the impact of the DAT Val559 mutation on sociability, central to the diagnostic criterion for ASD, utilizing the tube test of social interaction. DAT Val559 males, not females, exhibit an increase in wins in the tube test as adolescents/young adults. Surprisingly, as adults, DAT Val559 mice display a decrease in wins. The antipsychotic sulpiride, which inhibits dopamine receptors, also differentially impacts sociability in mice of different ages, sexes, and genotypes. These data provide new insight into how dopamine controls social behaviors of relevance to ASD.

SREEJITHKUMAR, VIVEK

Identifiability Analysis of the H1N1 Influenza and COVID-19 Viruses

Mathematics is useful in modeling biological phenomena, such as the spread of infectious diseases in a population. This research applies mathematical modeling to investigate the spread of H1N1 influenza in the United States and of COVID-19 in Florida. The model parameters represent epidemiological characteristics of the disease and validating the model with data allows for the estimation of the model parameter values. The identifiability of the model, or the reliability of the parameter estimates, is determined with Monte Carlo simulations. This research demonstrated successful curve-fitting of H1N1 influenza/COVID-19 data to a mathematical model and generating identifiable parameter estimations. Furthermore, this research quantified the effectiveness of social distancing in preventing COVID-19 spread and demonstrated that social distancing prevented about 185,000 weekly COVID-19 incidences and about 8,500 weekly deaths. Using mathematical modeling, epidemiologists and public health officials direct the implementation of disease control measures such as vaccines, treatments, mask-wearing, and social distancing.

STINCHCOMB, TRISTAN

In the Vineyard of Paradise: An Epistemological Analysis of John Milton's Paradise Lost

This presentation considers how Milton creates a network of tropes in Paradise Lost to explore a major epistemological shift. This shift moves man from within God's presence into a universe constructed out of language; one where information is no longer gathered from the outside inwards, but instead is projected outwards onto the world in a futile attempt to describe said world. Using Ivan Illich's In the Vineyard of the Text as a gloss, I claim that the Fall is not only a fall from Paradise; it is also a fall into language. Adam and Eve fall into a form of communication that is symbolic and uncertain rather than their unfallen state which was eternal and unchanging. By coming to know things dichotomously instead of non-binaristically, they must now contend with a reality where objects can exist in opposing states rather than possessing singular, immutable qualities.

STINCHCOMB, TRISTAN

Ethnic Differences in OCD Symptomatology: Examining Variations between Asian-American, Caucasian, and Hispanic Groups

This study investigated whether there exist variations in the presentation of obsessive-compulsive disorder symptomatology across ethnic boundaries and, if so, what these differences are. Padua Inventory and Disgust Emotion Scale scores were collected from Asian-American, Caucasian, and Hispanic individuals. The results showed that the Asian-American and Hispanic groups both had significantly higher mean obsessive-compulsive symptom and trait disgust scores than the Caucasian group; this difference was notably greatest on the Contamination/Washing and the Checking symptom subscales. Additionally, Asian-American obsessive-compulsive total scores were significantly higher than Hispanic scores. These findings support the existing literature and suggest that the overall severity and pattern of obsessive-compulsive symptoms varies by ethnicity, with Asian-American and Hispanic groups displaying higher scores than Caucasian groups.

STRASSER, ZION

The Efficacy of Invented Language in Storytelling

Many storytellers, especially writers of the fantasy genre, have invented languages for their works, J.R.R. Tolkien being one of the most notable ones. An invented language may be as simple as a few words or as extensive as an entire grammar and vocabulary that rivals an actual language. But its very existence begs a question: is invented language a useful component of storytelling? Yes—it is. For by spanning the chasm between characters and setting, it increases the scope, consistency, and believability of a story. Rather than relying on the writer's language to orient characters within a world, invented language grants the characters the ability to connect to their own world via a language suited to their culture and experience. In creating or "uncovering" an invented language of my own as well as studying the invented languages of others, the immense creative benefit of invented language becomes obvious and undeniable.

STRASSER, ZION

Revealed by Redounding: Subtlety, Satan, and the Serpent in *Paradise Lost*

John Milton's epic poem Paradise Lost repeatedly characterizes Satan, its antagonist, as redundant, a word signifying his inability to self-exist or create something new. At the same time, Satan is subtle—the quality of being quiet and crafty, and a quality that the serpent also shares. In order to tempt Eve, Satan chooses the serpent because of its subtlety and indwells it, trusting that Eve cannot detect his true nature through the creature. However, the serpent itself shares the redundant qualities of Satan, and in overlooking them, Satan critically weakens the subtlety of his own tempting. The analysis and contextualization of subtlety and redundancy in Paradise Lost beautifully complicate the role of its antagonist and inspire a deeper understanding of the legendary English poem.

STRIDINGER, CRAIG

Atherosclerosis: A Disease of Inflammation

Atherosclerosis is a disease characterized by plaque lesions forming in arteries which result in the narrowing and hardening of the blood vessel. This process causes a restriction in blood flow and can lead to further complications including heart disease and myocardial infarction. For many years, atherosclerosis was thought to be a disease resulting from hypercholesterolemia. Recent evidence shows that the atherosclerotic process is a process of inflammation, and that plaque lesion formation is mediated by leukocytes, monocytes, and macrophages. The goal of this presentation is to discuss the atherosclerotic inflammatory process, discuss the genetic factors of atherosclerosis, and how early detection of these inflammatory markers and genetic profiling can be used to prevent an acute coronary event.

TANNER, MAUREEN

Small Molecules Targeting RNA A-bulge Sites Using Computer-Aided Drug Design

Alzheimer's Disease (AD) is a neurodegenerative disease that affects memory. One mechanism correlated to AD is an overproduction of imbalanced tau proteins caused by a mutation in the microtubule-associated protein tau (MAPT) mRNA, which results in an RNA adenosine bulge (A-bulge). Targeting the A-bulge motif in the MAPT can stabilize the junction site and balance the imbalanced tau isoforms produced. Past research discovered three unique compounds (6va2, 6va3, and 6va4) that stabilizes the A-bulge sites. We investigated the binding properties of these three compounds and their stabilities using molecular dynamics (MD) calculations. We hypothesized the three compounds would stabilize the RNA A-bulge site. Prior data have shown that the bound states match partially well with the MD predictions. Our future studies will involve optimization of these three compounds using dynamic binding methodology to discover novel drugs having potent binding affinities and specificities.

VAUGHN, DEJA

Who Said That?: An Analysis on the Effectiveness and Implications Associated with Public Health Regulations and Guidelines

Given our current state of the world, it is fair to state that most individuals have a general understanding of what a public health document is as well as what it is supposed to do. In order to be successful, it must effectively communicate either regulations or guidelines that best fit the needs of the population in order to stop the spread of whatever pathogen is currently negatively affecting said population. The medium that is utilized in order to communicate that message has very strong implications on the level of receptiveness to its target audience. This literature analysis seeks to uncover the explicit and implicit drawbacks associated with the mediums used to spread public health information and track how the public actually puts it to use.

XU, ETHAN

Analysis of Stereochemistry of Menthol Extracted from Japanese Mint via VCD/IR

Compounds that have differing connectivity of functional groups (isomers) can have different properties. Many biochemical processes possess selective recognition of these isomers based only on their stereo orientation (optical isomers), allowing them to rotate plane polarized light in a certain direction. One example are enantiomers, which are two chiral forms of molecules that are non-superimposable mirror images and share an equal but opposite rotational effect on plane-polarized light. Without verification of the individual effects of the enantiomers, a potential drug can have unintended consequences, such as in the case of thalidomide, in which the S enantiomer was found to have teratogenic properties while the R enantiomer had the desirable effect. In this presentation, the determination of the enantiomeric form of menthol isolated from the Japanese mint Mentha arvensis was accomplished using VCD/IR spectroscopy, and the experimental spectrum was compared with the spectra of known enantiomers and those from DFT computational predictions.

ZAVALA, FRIDA

On Humility in Medicine

Medical virtues are character traits that allow physicians to deal with their co-workers, themselves, and, most importantly, their patients virtuously. Though much attention has been paid to virtues like compassion and integrity, the virtue of humility has been overlooked. This is unfortunate because humility, I will argue, is deeply important to being a virtuous physician. The humble physician collaboratively works with their patients to understand their concerns and find a solution in the patient's best interest. In addition, I will argue that humility is the backbone of other virtues such as compassion and integrity.

ZHANG, TIFFANY

Assessment of a New Model for Chronic Fatigue Syndrome: Studies of the Viral Mimetic Poly I:C on Biochemical Measures of Brain Inflammation and Serotonin Signaling

Chronic fatigue syndrome (CFS) is a debilitating, multisystem disease characterized by severe fatigue without medical explanation. Currently, there are no established diagnostic tests or FDA-approved treatments. To develop treatments and understand its etiology, we need to study valid preclinical models, which are currently lacking. Evidence shows that infection may play a role in the development of CFS and prolonged fatigue may be due to changes in central serotonin homeostasis. Thus, we aim to examine whether a viral mimetic (PIC) can trigger prolonged fatigue behavior and neuroinflammation. Three mouse strains were examined for their reaction to PIC and only CD1 mice demonstrated prolonged fatigue. Next, examination of brain tissue will reveal whether our mouse model displays similar alterations in markers of neuroinflammation and serotonin-related genes compared to the clinical CFS population. Development and optimization of this model ultimately allows for the development of treatments that target these unique pathways.

ZUNDEL, JOSEPHINE

Functional Consequence of Dsd and dMgrn1 Gain and Loss of Function on Drosophila Seizure Susceptibility

Transmembrane protein Atrn and E3-ligase Mgrn1 have been linked to metabolic disorders and neurodegeneration. Atrn and its paralogs have been shown to negatively regulate various G-protein coupled receptors (GPCRs) in conjunction with Mgrn1 but the GPCRs relevant to neurodegeneration have not been identified. Our lab has preliminary data suggesting that the Drosophila homologs Distracted (dsd) and dMgrn1 regulate GABAB receptors, in which have a neuroprotective role and play a role in epilepsy and seizures. Here, we determined effects of Dsd and dMgrn1 gain (GOF) and loss of function (LOF) on seizure susceptibility in flies using electrophysiological recordings. A greater seizure susceptibility in Dsd GOF mutants and a lower seizure susceptibility in Dsd null mutants relative to control flies were observed. These results further support a function for Dsd in regulation of GABAB receptors, which has fundamental roles in metabolic regulation, sleep behavior, and neuronal survival.

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Harriet L. Wilkes Honors College will celebrate its 20th graduating class on **MAY 5, 2022**

Medallion Ceremony*
10:00 am
Osher Lifelong Learning Institute Complex, Auditorium
Jupiter, FL

Commencement Ceremony*
5:00 pm
Carol and Barry Kaye Performing Arts Auditorium
Boca Raton, FL

*tickets are required for all guests

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5353 Parkside Drive

Jupiter, FL 33458

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