Welcome

Welcome to the 10th edition of the Austin College Student Scholarship Conference! We are celebrating an entire decade of this event, which showcases our students' intellectual curiosity and their participation in the pursuit of new knowledge and new achievement. Over the course of the past 10 years, there have been more than 1,700 student presentations. We are especially pleased that this year the conference is fully in person.

One of the hallmarks of an Austin College education is our belief that learning takes place everywhere. Our students go beyond the boundaries of the classroom and into the laboratory, the studio, the stage, and the community. The work presented here demonstrates how students have extended their learning across many disciplines and methods of study.

Research and scholarship are not only valuable in their own right; the process brings with it many other positive outcomes. Students develop a variety of communication skills to present their results. They gain persistence, patience, and commitment by testing their own hypotheses, considering alternate solutions, and seeing their own original research questions through to completion. All of these efforts serve students well in whatever future interests they pursue.

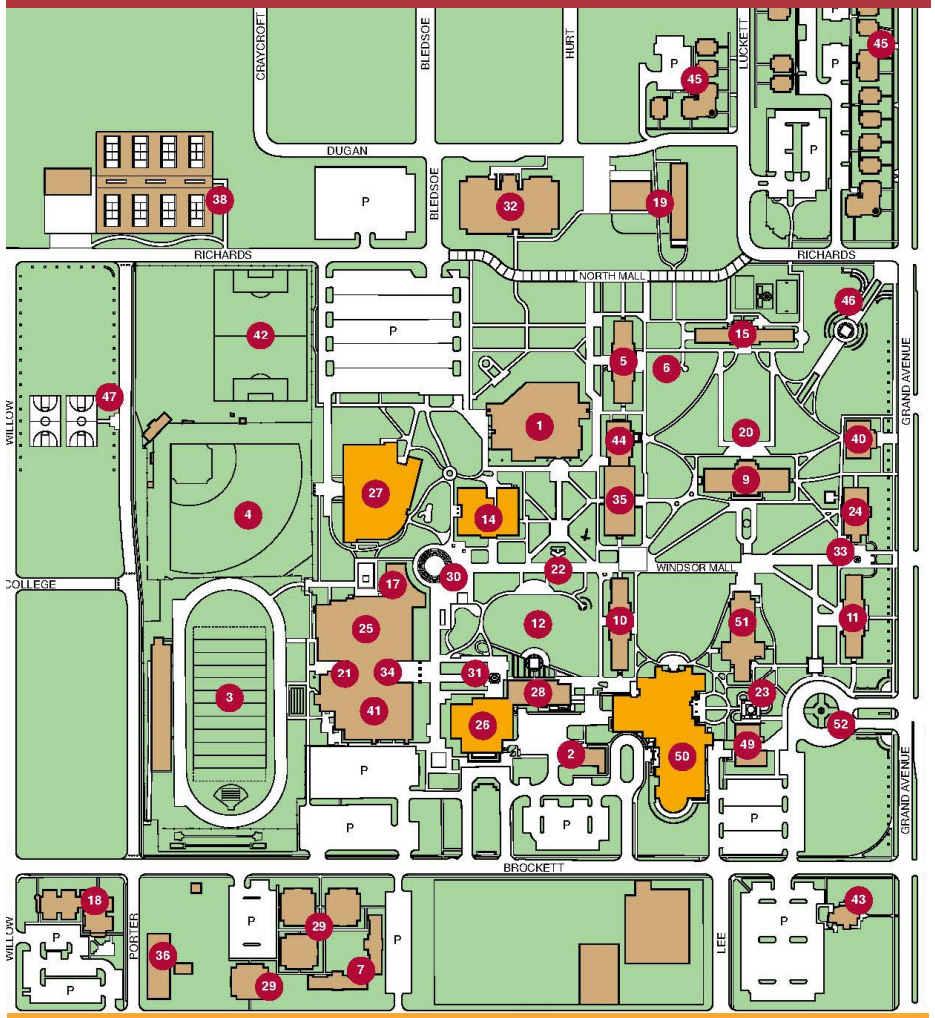
Another hallmark of an Austin College education is the individual mentoring relationships our students find here. Faculty members demonstrate their own intellectual curiosity through academic pursuits and also create structures that both engage students and provide opportunities for them to embark on independent study. Without faculty support and guidance, this conference would not be possible. I would like to particularly thank the Conference Planning Committee for the time and energy they spent providing a showcase for student achievement of such depth and breadth.

This conference is designed to encourage dialogue and engagement. We hope that you will take this opportunity to meet new people and encounter new ideas.

Sincerely,

Steven P. O'Day, J.D., L.H.D.
President
The Cecil H. and Ida M. Green
Chair of Creative Educational Leadership

Austin College Map - *Student Scholarship Conference Locations*



MAP KEY

1. Abell Library Center
2. Adams Center
3. Apple Stadium
4. Baker Athletic Field
5. Baker Residence Hall for Men
6. Ella Barker Memorial Garden
7. Bryan Apartments
8. Carruth Guest House
9. Caruth Administration Building
10. Caruth Residence Hall for Women
11. Clyce Residence Hall
12. College Green
13. Collins Alumni Center
14. Craig Hall for Music
15. Dean Residence Hall
16. Detweiler House
17. Dickey Fitness Pavilion
18. The Flats at Brockett Court
19. Forster Art Studio Complex
20. Hall Graduation Court
21. Hannah Natatorium
22. Hersh Memorial Garden
23. Honors Court and Collins Fountain
24. Hopkins Social Science Center
25. Hughey Gymnasium
26. Ida Green Communication Center
27. IDEA Center
28. Jackson Technology Center
29. Johnson 'Roo Suites
30. Jonsson Fountain
31. Jonsson Plaza
32. Jordan Family Language House
33. Kappa Fountain
34. Mason Athletic-Recreation Complex
35. Moody Science Center
36. Physical Plant Building
37. President's House
38. Russell Tennis Center
39. Settles House
40. Sherman Hall (Humanities) and Hoxie Thompson Auditorium
41. Sid Richardson Recreation Center
42. Soccer Field
43. Temple Center for Teaching and Learning at Thompson House
44. Thompson Hall (Sciences)
45. The Village on Grand
46. Williams Founders Plaza
47. Williams Intramural Complex
48. Windsor House
49. Wortham Center
50. Wright Campus Center
51. Wynne Chapel
52. Zauk Circle Drive and Garden

P = Parking

Table of Contents

Schedule of Events

Thursday

7:00 - 8:00 p.m.
Elevator Speech Competition
Wright Campus Center's Pouch Club

8:00 - 9:00 p.m.
VEX Robots in Action
Wright Campus Center's Pouch Club

Friday

1:30 - 3:30 p.m.
Poster Session I
Mabee Hall

3:45 - 5:05p.m.
Oral Session I
Wright Campus Center Rooms

5:30 - 7:30 p.m.
Theatre Reception
Ida Green

7:30 p.m.
Theatre Performance
Arena Theatre, Ida Green

Schedule of Events

Saturday

9:00 - 11:00 a.m.
Poster Session II
Mabee Hall

11:15 - 12:15 p.m.
Honor's Panel
Wright Campus Center Living Room

1:00 - 2:00 p.m.
Alumni Panel
Wright Campus Center Living Room

2:15 - 3:45 p.m.
Oral Session II
Wright Campus Center Rooms

4:00 - 4:50 p.m.
Music Recital
Craig Hall

5:00 p.m.
Raise Your Voice & Art Reception
Forester Art Complex

Student Contributors

Sawyer Ahmad
Ava Azizi
Chloe Bachofen
Amulya Balusu
Shania Banh
Charley Bartolo
Benjamin Berggren
Marianna Bert
Beau Beshire
Michael Bose
William Bridgewater
Logan Brummer
Yasmine Bukhari
Georgia Burton
Dajia Campbell
Cielo Carreno
Cosme Catalan
Sonia Charales
Chase Chavez
Electra Coffman
Carolina Coreas
Rosemary Cortez
Riley Cregg
Neil Cutting
Nicole DeLuna
Delice Dembe
Alexander DeRado
Leo Dickinson
Taylor Dornseifer
Carlos Estrada
Justus Fagan
Shannon Fagen
Brigid Fox
Taiton Fox
Megan Frank
Elizabeth Funderburk
Matilda Gajardo
Miranda Galvan
Grant Garrison
Isabel Garrison
Madison Gilmore
Frank Goodavish
Gabriel Graf
Astrid Grouls
Carmen Guerrero
Clara Harper
Eesha Hayee
Andres Hernandez
Logan Herring
Hannah Herron
Mia Hibner
Taylor-Jade Higgins
Jessica Hoffman
Deedee Jansen
Kendall Johnson
Tarah Johnson
Sarah Joseph
Jessica Junginger
Prithvi Kalkunte
Jade Kemp
Roshni Khosla
Megan Kiel
Andrew Kim
Timarea Kimbrough
Brooke Lee
Lindy Luker
Abbigal Maeng
Syd Maher
Kaitlyn Malone
Eleanna Martinez

Student Contributors

Nereida Martinez
Katherine McBroom
Carrie McIntyre
Roopika Menta Kishore
Rhys McComack-Morris
Isabel Murphy
Adam Myers
Aguiele Ndoungla
Henry Neal
Keegan Nichols
Tanner O'Dwyer
Madelyn Oliver
Elizabeth Pack
Hersh Patel
Bailey Payne
Enrique Pineda Jr.
Theresa Pohl
Isbah Plumber
Shruti Raghavan
Larry Ramirez
Weikai Rao
Laila Al-Rifai
Mia Rios
Diego Rodriguez
Zuemie Rojas
Zuni-Ire Rubio
Austin Rue
Apoorva Sakthivel
Diego Sanchez
Janaye Scales
Ruthann Schmiege
Sara Schuster
Amelia Schwarz
Michael Selby
Natalie Semine
Kylee Shanks
Lara Shehadeh
Kennedy Shumate
Storm Simonin
Brett Skinner
Anna Sliz
Jack Hittson-Smith
Emma Solis
Hanna Stocks
Percy Stout
Allie Straeck
Minaal Syed
Harsh Tamtam
Nikida Thayoutharaj
Mya Thomas
Sierra Thomas
Rebecca Tobias
Paola Torres
Nevaeh Trevino
Olivia Trusty
Giselle Melendez-Valles
Danya VanVuuren
Ray Vazque
Sydney Versen
Anna Villasenor
Branson Vrazel
Alyssa Vyrva
Tobias Ward
Lael Weatherby
Breana Wooten
Grace XiaYao
Michelle Zhu

Committee

Coordinator
Renee Countryman

Associate Coordinator
David Whelan

Humanities Representatives
Tom Blake
Mindy Landeck

Fine Arts Representatives
Ricky Duhaime
Kirk Everist
Mark Monroe

Sciences Representatives
David Aiello

Social Sciences Representative
Danielle Franks

Student Support
Hector Diaz

Administrative Support
Amy Parsons

"Art Contest Winner"

Congratulations to the Winner of the 2022
Abstract Book Cover Artwork
Design Contest

Ryann Ashlock '23
M: Art
m: Media Studies

If you are interested in seeing your art work on our cover or on the posters we will use to advertise our 2022 Austin College Scholarship Conference, please keep in mind that next year's due date will be at the beginning of the Spring 2022 semester.

2021 Winner Rachel Young

2019 Winner Phung Banh

2020 Nadia Hannon

Elevator Speech Competition

Thursday, March 24 from 7:00 - 8:00 p.m. in the Wright Campus Center's Pouch Club for an Elevator Speech Competition. Prizes will be awarded.
Students will be judged by special "celebrity" judges.

1st Place - Sarah Schuster '22
2nd Place - Roshni Khosla '24
3rd Place - Roopika Menta Kishore'23

What is an elevator Speech?

Imagine that you have just entered an elevator with Bill and Melinda Gates, who have enough money to fund any research project (and do in many different disciplines). They smile, say hello, and ask "why are you here this evening?" They are now your captive audience for this short elevator ride on your way to the 2020 ACSC. You have only one chance to make your "pitch" and get your project funded to be a hero to your faculty mentor … in your major … in your department … in your division … to be the most awesome person on campus forever … okay well, at least to be able to guarantee that your research project continues and that many other AC students have the opportunity and the experience that you did. What would you do with that one opportunity of a lifetime?

VEX Robots in Action

Thursday, March 24 from 8:00 - 9:00 p.m. in the Wright Campus Center's Pouch Club

Tobias Ward
Michael Bose
Justus Fagan
Cosme Catalan
Kendall Johnson
Tarah Johnson
Eleanna Martinez
Giselle Melendez-Valles
Weikai Rao

VEX U is a competition for university students with the aim of getting them involved in real hands-on engineering challenges. Teams around the country start from the same VEX robotics kit and build robots that participate in games at competitions and tournaments. Each game lasts 2 minutes and consists of an autonomous period, during which the robots move based on pre-programmed routines, and a driver control period, during which the robots can be controlled through a radio controller. In preparation for this year's competition, we have built two robots that are designed to score points by placing rings onto goals and lifting goals onto platforms. We will perform demonstrations of our robots in action.

Poster and Oral Presentations

Anthropology

The Trials and Tribulations of Conducting Research During COVID

Ava Azizi & Cate Bowman
Anthropology, Austin College
Oral Presentation

What is it like to conduct qualitative research on the experiences of essential international workers amid a global pandemic? Due to the social restrictions imposed by COVID-19, my work as a research assistant this past summer posed several challenges. This was due to both the transient nature of the group of workers we hoped to recruit and the limitations of conducting in-person interviews. In the proposed oral presentation, I will address how Austin College's faculty member, Cate Bowman, and I adapted to unprecedented circumstances and took advantage of my graphic design and online marketing skills, along with cloud-based peer-to-peer software platforms and Dr. Bowman's previous collaboration with immigrant advocates to reach our research population and broader goals for the project. I will first address our approach to the Institutional Review Board protocol, including our decision to conduct interviews via teleconference and obtain remote informed consent. Then, I'll discuss the multiple steps we used to recruit international workers, from designing appropriate, inclusive imagery to identifying social media platforms where prospective participants would most likely view and respond to our solicitation. I will also talk about how we strove to create a space online for workers to tell their stories. Finally, I will reflect on what we learned about having to improvise amid the pandemic and what tools may be worth retaining and what we lost with a remote-only approach.

The Social Support Network and Community Difficulties Faced by Individuals with Ehlers-Danlos Syndrome and Their Perspective for People Outside Their Social Group

Charley Bartolo & Terry Hoops
Anthropology, Austin College
Oral Presentation

The main interest of the paper to be discussed and analyzed is the personal social network and support system of an individual with EDS, how they can sustain it with a chronic and often complicated multi-presentational illness, and the perspective such individuals have with a highlight on the information they would like to be able to tell society at large. The social community that individuals with Ehlers-Danlos Syndrome are able to sustain is predicated on their ability to balance between official medical care, socialization time, self-care and personal medical care, and social building time, and other relevant social variables. My aim will be to determine the difficulties an EDS patient may face because of the many factors their condition present and the relevant ways they maneuver around unexpected complications. This is based on the primary understanding that most people feel a need for social integration and this social integration becomes difficult when allocated time in the day is taken up by necessary cares considerations of the individuals with EDS. Another effort will include expressing to a larger number of people the social integration difficulties individuals with a chronic condition like EDS may face and the messages those patients would like people to hear. Community education is the main goal of this work because it has the potential to significantly positively impact individuals with chronic illness directly and indirectly through community education.

An Anthropological Perspective on Gentrification in a Historic Neighborhood and the Restructuring of a City: the case of the Lavaca neighborhood in San Antonio

Nicole DeLuna & Terry Hoops
Anthropology, Austin College
Oral Presentation

Lavaca, one of the oldest neighborhoods in San Antonio, Texas, is undergoing demographic shifts, an increase in housing prices, and fighting to keep its historical integrity. This ethnographic and historical research follows the social patterns and changes categorized within the urban literature as gentrification through interviews, observations, and discourse. The perspective of anthropologist Pierre Bordieu's theory on Symbolic Capital-including social capital, cultural capital, and economic capital- is adopted to understand the connection between urban social status and gentrification. This perspective helps explore the following question: Is gentrification an inevitable externality of urban development or change? I will uncover the history of the neighborhood and the relationship between Lavaca residents, investors, and developers. Additionally, I will expand on the practice of historic preservation at the political and social level. With an understanding of the shifts in Lavaca at a local level, the restructuring of San Antonio as a city is revealed. The research reflects how reimagining the neighborhood and restructuring the city is used as a scheme in urban settings to reinforce the spread of globalization and neoliberalism.

Biochemistry

The Fibrous Co-assembly of Oppositely Charged a-helical Peptides

Austin Rue & Jim Hebda
Biochemistry, Austin College
Poster & Oral Presentations

Self-assembling peptide fibers have been shown to have many applications for medical uses and for the environment. In this study, three peptides were designed: a positively charged 35-residue peptide, a negatively charged 28-residue peptide, and a negatively charged 21-residue peptide. Peptides of opposite charges were exposed to each other to co-assembly into α-helical coiled-coils. Additionally, peptides of different lengths were used so that sticky-ends could be formed when the peptides fold into α-helices, encouraging linear growth. Finally, cysteine residues were incorporated for disulfide bond formation between individual fibers. Circular dichroism was used to receive information regarding the secondary structure of our peptides. Furthermore, aggregation assays were conducted to track the assembly of higher-order structures in our samples. Finally, a transmission electron microscope was used to examine the aggregates that formed. Through these experiments, it was confirmed that co-assembly of our peptides resulted in large fibers Additionally, it was found that these fibers were resistant to heat and salt, but that they fell apart when exposed to a reducing agent such as dithiolthreitol (DTT). It is proposed that peptides that form strong fibers when mixed, but that do not form large structures when separated, are important because they have the potential to be expressed in bacteria without being toxic to the cell.

pH Effect of Bete-2-mircglobulin Misfolding

Miranda Galvan, Hersh Patel,
Georgia Burton, & John Richardson
Biochemistry, Austin College
Poster Presentation

Beta-2-microglobulin(B2m) is a 99-residue protein that is filtered out by the kidneys. During kidney failure, B2m accumulation has a toxic gain of function leading to the disease Dialysis-Related Amyloidosis (DRA). DRA is the accumulation of amyloid fibrils and misfolded proteins that are deposited in joints and bones. The only treatment currently available is filtration which can reduce the amount of circulating B2m but does not remove the amyloid. To understand the mechanism of protein misfolding, we studied how changes in hydrophobicity affect the hydrophobic surface area of B2m. In this analysis using the Camsol software to compare solubility profiles of different mutants to wildtype at pH 2 and wildtype at pH 7 we observed that there was an apparent pH effect. Four regions of amino acids in the wildtype were identified, a comparison showed major solubility differences. In PyMol software, a 3D structure of B2m was used to look at the 4 regions' potential interactions with the rest of the molecule. Our 4 regions were also compared to regions studied by Ivanova et.al. for overlap in amino acid residues. This analysis led to several interesting positions that will be further analyzed to study if changes in electrostatics affect the hydrophobic surface area of B2m.

B2m Aggregation

Hersh Patel, Elizabeth Pack, & John Richardson
Biochemistry, Austin College
Poster Presentation

Beta-2-microglobulin (B2m) is a toxic gain-in-function protein that leads to the disease state known as Dialysis Related Amyloidosis (DRA). Currently, the only treatment for DRA is the filtration of the amyloid aggregates by hemodialysis. Since the mechanism of protein misfolding occurring in B2m is poorly understood, studying the structure and sequence of B2m is critical to understand amyloid aggregation. Prior work has shown that the aromatic rich nature of residues 62-70 of B2m is important for amyloid formation. In this work, seven different point mutations were made within residues 62-70 to test for differences in the elongation rates of amyloid aggregations. The mutated proteins were created by first obtaining the primers, followed by mutagenic PCR, bacterial transformation, plasmid isolation, single colony scale-up, and purification. Then, kinetic readings of seeded fibril growth were performed for wild-type B2m and mutant proteins at pH 2.5 in replicates of six. The results confirm the importance of aromaticity in amyloid fibril formation as the mutants resulted in slower elongation rates in comparison to wild-type B2m.

Biology

Detection of Chytrid Fungus via Environmental DNA in North Texas

Benjamin Berggren & Loriann Garcia
Biology, Austin College
Oral Presentation

eDNA, or environmental DNA, is DNA shed by organisms in their environment. Ecologists are beginning to use this DNA shed into the environment to detect elusive species, track disease progression, or perform general biodiversity surveys. EDNA detection has been used in many different projects, and the methods can be adjusted to fit the needs of the study. In the summer of 2021, we extracted eDNA from soil and water samples from two sites in Grayson, Co. TX to detect the presence of Blanchard's Cricket frog and the Texas Smallmouth salamander. We successfully detected Blanchard's Cricket frog. This fall and spring, I used eDNA to detect the presence or absence of the amphibian chytrid fungus, Batrachochytrium dendrobatidis (Bd). I sampled two sites in Grayson Co. which border counties in Oklahoma where chytrid has been detected. Detecting this fungus as early as possible will allow ecologists to mitigate the effects on larger amphibian populations. Our tests so far have not detected Bd from our samples, but our test results show an error in our methods. To rectify this, we will update our methods, continue to sample and test, and send our current isolated eDNA to be sequenced.

Characterization of the Novel Gene Family DUF4585 in Zebrafish

Yasmine Bukhari & Kelli Carroll
Biology, Austin College
Poster Presentation

Skeletal muscle is one of the most significant tissues in the human body and plays an important role in functions, such as movement, maintenance of posture, and body temperature regulation. Mutations in genes critical for skeletal muscle development are responsible for hundreds of human muscle diseases. Because the genetic cause of many muscle diseases is unknown, identification and characterization of novel genes with unknown function is important. A new family of novel genes that share a common domain of unknown function 4585 (DUF4585) has been previously identified. In mice, these genes are expressed in cardiac and skeletal muscle, and triple knockout mice exhibit defects in organelle positioning in skeletal muscle. Here, we performed an in vivo investigation of two DUF4585 orthologs, ORF71 and E22, to determine their expression patterns in zebrafish. Expression pattern analysis by RT-qPCR shows that ORF71 is the most highly expressed gene of the DUF4585 orthologs with increased expression in 72- to 120-hours post-fertilization zebrafish. Whole mount in situ hybridization (ISH) shows that ORF71 and E22 are highly expressed in the developing skeletal muscle of zebrafish embryos. These results suggest that ORF71 and E22 also play a role in the development of skeletal muscle during zebrafish development and that their function may be conserved across vertebrates. Future studies will aim to determine ORF71's role in skeletal muscle development through knockouts using CRISPR.

Characterization of PA28γ -deficient MEF Mutagenesis in Comparison with the 4T1 Breast Cancer Model

Electra Coffman, Ray Vazquez & Lance Barton
Biology, Austin College
Poster Presentation

Cancer is a leading cause of death worldwide with breast cancer causing almost 700,000 deaths in 2020 alone. Cancer displays several hallmarks such as genomic instability and mutation, invasion, and metastasis. The nuclear 20S proteasome activator, PA28γ, has been shown to play an important role in mechanisms that, when unregulated, cause these hallmarks of cancer. These mechanisms include apoptosis, mitosis, cell proliferation, and genomic stability. Thus, PA28γ overexpression is associated with tumorigenesis. To understand the effects of mutagenesis on murine embryonic fibroblast (MEF) cells that are either PA28γ-deficient (KOMEF) or PA28γ-containing (WTMEF), the 4T1 mouse breast cancer cell line was used as a positive control while several cancer hallmarks were assessed. Cell aneuploidy, invasion, migration, and cell viability with protein expression following chemotherapeutic treatment was analyzed. While 4T1 cells showed significant increases in aneuploidy, invasion, and response to chemotherapeutic treatment, PA28γ-containing cancer clones (WTCC) and PA28γ-deficient cancer clones (KOCC) only showed select tumorigenic phenotypes. The cancer clones require further investigation to understand the impact of their mutagenesis while our investigations into the well characterized 4T1 cell line can offer insight for clinical application in breast cancer.

PA28y Regulation of H4K20me3 under Genotoxic Stress

Electra Coffman, Astrid Grouls,
Anna Sliz, & Lance Barton
Biology, Austin College
Poster Presentation

The nuclear 20S proteasome activator, PA28γ, which is overexpressed in many cancers, has shown to be important in apoptosis, mitosis, cell proliferation, and chromosomal stability. When PA28γ is deleted, levels of cellular apoptosis increase, but its role in the apoptotic pathway has yet to be fully elucidated. When PA28γ-deficient cells are treated with variable genotoxic stressors, the apoptotic responses inconsistently differ from controls. However, when targeting histone function, there is a consistent pattern in which no difference in apoptosis is observed between PA28γ deficient and PA28γ containing cells, suggesting that chromatin compaction could be involved in the mechanism for PA28γ's effects on apoptosis. PA28γ is reportedly necessary for maintaining the trimethylation of histone H4K20 (H4K20me3), which serves an important role in chromatin compaction. Therefore, the role of H4K20 trimethylation in the presence of genotoxic stressors such as cisplatin and which histone marker genes are targeted under such conditions requires further investigation. To better understand how PA28γ functions in the apoptotic pathway, this study examines whether PA28γ regulates the trimethylation of H4K20 under genotoxic stress as well as its gene-specific effects.

Effect of High Fat Diet on 13-lined Ground Squirrel Food Consumption and Metabolic Rate

Emily Davis, Carolina Coreas, Emma Solis,
Adam Myers & Jessica Healy
Biology, Austin College
Poster Presentation

Ictidomys tridecemlineatus or 13-lined ground squirrel (TLGS) is a small rodent species who manages periods of low food availability and cold temperatures by hibernating from early fall to early spring. Hibernation is a strategy for overwinter survival that includes overeating to become obese, and then reducing food intake to zero, lowering the body temperature and metabolic rate in order to survive on excessive fat stores gained during the active season. Although this yearly cycle of fattening and fasting is well understood, it is unclear how different dietary fat percentages might affect this pre-hibernation fattening. For our research, we observed the effects of a high fat (HF) versus a control diet on the amount of food eaten by an individual TLGS, on the rate of fattening, and on metabolic rate. During their fattening season prior to hibernation, we measured their food intake and body mass in order to determine their metabolic rate during their active season. We found that although animals on each diet became obese prior to hibernation (>30% body fat), and reduced food intake prior to hibernation, animals on a HF diet ate less than control animals toward the end of the pre-hibernation season. This suggests that fat content in diet affects body mass gain, potentially by reducing metabolic rate.

A Characterization of the Role of the MRTF/SRF Pathway in Zebrafish Development

Taylor Dornseifer, BIOL324, & Kelli Carroll
Biology, Austin College
Poster Presentation

Many studies have been performed to understand the function and mechanism of myocardin-related transcription factors (MRTFs) in mice and human models. It is known that MRTF genes play a significant role in skeletal and cardiac muscle formation and contraction through the regulation of actin polymerization and cytoskeletal dynamics. However, MRTF function in zebrafish has not been studied. This project attempts to determine whether the function of the MRTFs within the MRTF-SRF pathway is conserved in zebrafish. Using pharmacological manipulation, we inhibited the MRTF pathway during the first 48 hours of zebrafish development. We found that MRTF inhibition causes abnormal cardiac and skeletal muscle morphology suggesting that the function of the MRTF pathway in zebrafish is conserved. Interestingly, we also noticed inhibition of blood vessel formation after inhibition of MRTF, suggesting that MRTFs in zebrafish may be highly involved in smooth muscle formation and function. Additional research must be performed to determine the mechanism by which the MRTFs are regulating these organ systems within zebrafish, but this study provides preliminary evidence that the function of MRTFs is at least partially conserved between species.

Exploration of the Biological Hallmarks of Cancer in Mus musculus cell lines A9 and Mutated PA28γ Deficient Cancer Clones

Brigid Fox, Henry Neal & Lance Barton
Biology, Austin College
Poster Presentation

Cancers are a family of diseases resulting from aberrations in normal cell physiology. These aberrations are resultant of an accumulation of mutations that affect biological hallmarks of cancer like cell migration, proliferation, and resistance to cell death. To examine how these biological capabilities have changed the overall function of cancer in the absence of PA28γ, Mus musculus immortalized, tumorigenic A9 fibroblasts and mutated PA28γ deficient cancer clones were experimentally examined for increased migration, resistance to cell death, and aneuploidy. This was done via karyotyping, cell migration assays, and treatment with known anti-cancer therapeutics. From such experimentation, it can be determined whether or not mutated PA28γ deficient cancer clones (KOCCs) exhibit more carcinogenic or tumorigenic phenotypes as it is compared to A9 fibroblasts and PA28γ deficient mouse embryonic fibroblasts (KOMEFs). Scratch assay data suggested possible migration ability in the A9 and KOCC cell lines but not indicative in the KOMEF cells. Migration assay observed similar results as to the scratch assay revealing some migratory cells in the A9 cell line. Treatment with anti-cancer therapeutics Cladribine and Taxol also caused cell death in KOCCs.

Neurocognitive Performance During Recreational Lobster Harvesting Dives

Gabriel Graf[1], Stefanie Martina[2], Benjamin Kistler[2], Grant Dong[1], Rhiannon Brenner[1], Elizabeth Helfrich[1], Catherine Harris[1], Elissa Scherer[1], Robert Furberg[3,4], & Frauke Tillmans[1]
Biology Department, Austin College[1], Divers Alert Network, Durham, NC[2], RTI International Research Triangle Park, NC[3], Eir Labs, Chapel Hill, NC[4]
Poster Presentation

Harvest diving often involves cognitive and physical exertion. While performance may initially improve from increased arousal, cognitive resources may eventually become taxed, leading to performance decrements. Effects of harvest diving on neurocognitive performance are not known. We conducted an observational field study to assess the effects of recreational lobster diving during Florida's 2-day lobster sport season on neurocognitive performance. Scuba divers diving to 85 fsw were recruited to provide a urine sample, perform a validated neurocognitive test battery (included a motor praxis test [MPT], digit symbol substitution test [DSST], fractal NBACK, and 3-minute psychomotor vigilance test [PVT]), and fill out a questionnaire about their perceived fatigue level pre-dive, during the surface interval (SI), and post-dive. Data from sixteen participants (average age [SD] = 50 yrs [10 yrs]; 11 males) were analyzed. DSST accuracy decreased across timepoints, and reaction time (RT) was highest post-dive compared to predive and SI. For PVT and NBACK accuracy and speed, SI scores indicated improved performance compared to pre- and post-dive. Our results suggest that complex scanning and visual tracking, as indicated by DSST performance, may be affected by repeated harvest diving. The increase at SI and then decrease post-dive of several parameters may suggest arousal effects. These results may especially have implications for commercial and competitive harvest diving.

The Selectivity of Plant and Pollinator

Frank Goodavish & Loriann Garcia
Biology, Austin College
Poster Presentation

The codependence between plant and pollinator is a complex relationship. Many plants and pollinators have evolved together to become more specific towards each other, resulting in not every pollinator being able to pollinate every plant. This results in a higher pollination rate for the plants and allows for the pollinator to have a source of nectar/pollen that others cannot easily get to. Metabarcoding is a technique that is becoming more common to determine what plant species are in the pollen, allowing to determine the link between plant and pollinator. This data can be used to determine how selective plants are which can help determine which plants/pollinators need protecting. Metabarcoding requires DNA extraction from pollen, which then can be used with PCR to determine what exactly is in the pollen. After the bee has been ID, a "map" can be created to see which bees pollinate what, allowing us to map selectivity. Some plants that are planned to test for their selectivity are milkweed, lady tresses, beard tongues, and coral roots. We expect the rarer plants, coral roots and lady tresses, to be much more selective, whereas beardtongue and milkweeds, or more common plants, to be less selective.

Glyphosate's Effects on the Development of Zebrafish (Danio rerio)

Mia Hibner & Kelli Carroll
Biology, Austin College
Poster Presentation

Glyphosate is a nonselective herbicide that has been popular in the United States since 2001. Glyphosate, the active ingredient in the popular herbicide Roundup, kills plants by targeting a plant-specific enzyme belonging to the Shikimate pathway. Although animals do not have a Shikimate pathway, Roundup exposure has deleterious effects on humans and other vertebrates such as the development of non-Hodgkin's lymphoma. However, its mechanism of toxicity in humans is unknown. Previous research reveals that glyphosate results in decreased body length and spinal curvature in zebrafish (Danio rerio). To assess specific organ abnormalities due to glyphosate exposure, zebrafish were immunostained at 48 hours post-fertilization (hpf) to visualize motor neurons, which revealed less intense staining along the central nervous system and somites of the exposed embryos. We picked six genes involved in the development of the central nervous system for initial study - pax2a, pax8, otx2b, pax6a, hoxb1a, and egr2b. We will assess their expression and resulting morphology at 24, 48, and 94 hpf following glyphosate exposure. Along with the central nervous system, we hope to study organogenesis of the kidney, liver, and heart to identify additional abnormalities In total, a more in-depth analysis of the effects of glyphosate on zebrafish development may aid in identifying this pesticide's mechanism of action in vertebrate animals.

Investigating the Role of Epithelial to Mesenchymal Transition (EMT) on PA28γ Expression

Taylor-Jade Higgins, Shania Banh,
Riley Cregg, & Lance Barton
Biology, Austin College
Poster Presentation

Many tumors overexpress PA28γ, a ubiquitin- and ATP-independent proteasome activator that assists in protein degradation via the 20S proteasome, and studies have found that its overexpression promotes epithelial to mesenchymal transition (EMT). As both PA28γ and EMT play critical roles in cancer progression, the objective of this study is to identify whether EMT impacts PA28γ expression and activity induced by Transforming Growth Factor β-1 (TGF-β1). TGF-β was applied to EpH4 epithelial cells to induce EMT and compared to 4T1 mouse breast carcinoma cells. RT-qPCR showed no statistically significant differences in PA28γ mRNA or protein expression across all cell lines. Through Western blot analysis, PA28γ downstream targets demonstrate an elevated pattern of expression, but there is no statistically significant difference in phenotypes between the EpH4 and 4T1 cell lines. Migration rates measured by scratch assays showed a progressive increasing migration spectrum from epithelial to cancerous cell lines after 24 hours. Our findings suggest that an increasing gradient of mesenchymal phenotypes was observed from EpH4 and TGF-β-treated EpH4 to 4T1 cells, however, the EMT process may not be involved in the expression of PA28γ; thus further analysis is required to reveal their relationship. In understanding how the transformation process affects PA28γ and its targets, we may elucidate the relationship between transformation and the cancer therapies that may be developed.

Phenotypic Analysis of Cancer Cell Lines Following PA28γ Reduction Through CRISPR/Cas9

Jessica Hoffman & Lance Barton
Biology, Austin College
Oral Presentation

PA28γ is a proteasome activator that is overexpressed in several cancer types and positively correlated with cancer severity. Moreover, PA28γ deficient mice treated with a tumor inducing agent form fewer and smaller tumors as compared to wild type mice, further suggesting that PA28γ might play an important role in tumorigenesis. Additionally, PA28γ may interact with p53 to contribute to chemotherapy resistance in tumorigenic cells. In order to determine whether the overexpression of PA28γ is essential to maintaining tumorigenic properties within cells, the CRISPR/Cas9 genome editing tool was utilized to engineer partial heterozygous deletions of the psme3 gene, which encodes for PA28γ, in the A9 murine tumorigenic cell line. The main goal of this project focuses on phenotypic analysis of reducing PA28γ expression in cell clones to understand how PA28γ contributes to tumor formation. Early evidence suggests that reducing PA28γ expression inhibits both growth and migration in tumorigenic cells as demonstrated through MTS assays, flow cytometry, and wound healing assays. Results from apoptosis assays are less conclusive regarding the relationship between PA28γ, p53 and chemotherapy resistance. Overall, these findings indicate that PA28γ may be crucial for maintaining tumorigenic properties within cells.

Presence of Deer Mice (*Peromyscus maniculatus*) and Hantavirus Cases Correlated with Human Population Densities in Texas

Abbigal Maeng & Jessica Healy
Biology, Austin College
Poster Presentation

Growing human population densities have led to increased urban development, which in turn increases human-wildlife interaction as humans move into areas previously dominated by wildlife. This increase in wildlife interactions has led to the rising prevalence of zoonotic diseases as more species become adapted to urban environments shared with dense human populations. One such urban-adapted species is the deer mouse (Peromyscus maniculatus), a known carrier for a Hantavirus that causes the zoonotic disease Hantavirus Pulmonary Syndrome. Using historical and recent records from museum collections, primary literature, and the citizen science platform iNaturalist, correlations between deer mouse presence and Hantavirus cases were quantified across Texas through a comprehensive mapping analysis. Recent sightings of deer mice on iNaturalist mostly overlapped with major metropolitan areas of Dallas, Austin, and Houston, whereas historic records of deer mice tended to be reported from more rural counties. Overall, deer mouse detections were found to positively correlate with denser human populations. Hantavirus presence also positively correlated with denser human populations. Within the counties with reported Hantavirus cases in the past decade, deer mouse presence positively correlated with counties that had the largest population gains between the reported year and 2019. This analysis emphasizes the potential usefulness of citizen science efforts in epidemiological studies of zoon

Species Distributions of Small Mammals in the Blackland Prairie Coregion Change Over Time

Kaitlyn Malone, Abby Maeng,
Adam Myers & Jessica Healy
Biology, Austin College
Poster Presentation

Zoogeography is the study of animal geographic distribution. Species ranges change over space and time, but recent studies have focused on shifts in response to anthropogenic factors like habitat fragmentation, overexploitation/eradication efforts, and climate change. Our research explored recent and historic sightings of mammals across Texas, focusing on small mammal community structure at a prairie restoration site, and surveys of pocket gophers across North Texas. Historic species distributions (pre-1970) were derived from primary literature and from AC's museum collection. Modern species distributions (post-1970) were estimated using data from the citizen science database iNaturalist, and mapped using QGIS. Changes were seen between historic and modern ranges of small rodents (specifically pocket gophers). Distribution of pocket gophers (a burrowing species) across north Texas appears mostly constrained by soil type, but may be slowly expanding into urban areas as natural habitats are fragmented. These results suggest that human interference is likely significantly impacting zoogeography of mammals, which has implications for conservation and the ability of certain species to survive anthropogenic climate change.

Temporal Changes in Mammalian Carnivore Distribution in the Texas Blackland Prairies

Adam Myers & Jessica Healy
Biology, Austin College
Poster Presentation

Zoogeography is the study of where animals live and why. As the climate changes, species ranges change, and therefore it is important to consider how and why those range shifts occur. Our project focuses on the comparison of the current range, diversity, and population of mammalian carnivores in the Blackland prairie with their historical diversity, ranges, and populations. We developed a historic data set (prior to 1970) of species presence in Texas by County by reviewing primary literature as well as tag data from Austin College's museum collection. A modern dataset, using County-level sightings from 1970 onward, was developed using the citizen science database iNaturalist and by camera trapping at Sneed Prairie. We detected a total of 19 species across our modern and historic Blackland prairie data sets, with 4 species detected by camera trapping at Sneed prairie. Four species present in the historic dataset were not detected in our modern dataset. In addition, population estimates of larger carnivore species in the modern dataset were below what would be considered historical levels. These results suggest that 1) smaller or more cryptic mammalian carnivore species are likely to be overlooked by citizen science efforts like iNaturalist, which tend to overcount mesocarnivores in urban areas and undercount those in rural areas, and 2) that prairie restoration sites are in themselves inadequate to restore carnivore diversity to pre-modern levels.

Native Bee Biodiversity of Grayson Co.

Keegan Nichols, Ben Berggern,
Frank Goodavish & Loriann Garcia
Biology, Austin College
Poster Presentation

Native bee populations are on the decline world wide, this trend would affect the plant landscape and our agricultural needs. Bees are an integral pollinator of the native flora of Grayson county. Native bees are more effective pollinators than the invasive honey bee as they have developed behaviors that specifically target pollen instead of nectar. We chose the Blackland prairie habitat for study as it was the original ecosystem of North Texas. This was modeled by the restoration site, Edith Sneed Prairie. We also surveyed an urban college campus to compare how bee diversity changed with the landscape. We captured bees using active sweeping techniques so we could also take metadata of the plants the bees were found on. Also employed tri-colored bee bowls in plots for a more passive survey technique. In the span of a month we were able to catch 155 bees, covering 30 species from 4 out 5 families. Metadata from community projects, such as iNaturalist, were compiled to add our data to create a more comprehensive list of bee diversity.

Investigating the Downstream Effect of the HOG and CWI MAPK Pathways on Gene Expression Changes Observed in the Saccharomyces Cerevisiae pgm2Δ mutant

Madelyn G. Oliver[1], Mandy R. Eckhardt[1], Keara D. Malone[1], Spencer L. Nystrom[2], Rachel V. Jimenez[1], Ashley Charales[1], Courtney D. Goldstein[1], Ruthann H. Schmiege[1], & David Aiello[1]
[1]Department of Biology, Austin College, Sherman, TX [2]Curriculum in Genetics and Molecular Biology, University of North Carolina at Chapel Hill

Oral Presentation

In Saccharomyces cerevisiae, the enzyme phosphoglucomutase (PGM) catalyzes the interconversion of glucose-1-phosphate (Glc-1-P) and glucose-6-phosphate (Glc-6-P). Previous research has shown that the loss of PGM2, the major isoform of PGM, in the context of galactose-grown cells results in a slow growth phenotype and altered ratio of Glc-1-P to Glc-6-P. Interestingly, the pgm2Δ mutant also exhibits defects in calcium homeostasis, including altered calcium uptake and accumulation and sensitivity to the calcineurin inhibitor, cyclosporin A. One area of interest in understanding the defects which occur due to loss of PGM2 is to investigate the changes in gene expression which occur in the pgm2Δ mutant relative to the wt strain. Previous research using RNA Seq and DESEQ-2 analysis identified that there is differential expression between strains. Further analysis using K-means clustering and DREME analysis suggested that these changes might be coordinately regulated by specific transcription factors. The current working model of the lab suggests that these changes in gene expression are mediated through hyperactivation of stress responses. This study seeks to characterize the role of the HOG (high osmolarity glycerol) and CWI (cell wall integrity) MAPK cascades in mediating the defects observed in the pgm2Δ mutant, specifically by observing the role of downstream targets from both of these pathways on gene expression changes within the mutant cell.

Examining Growth Phenotypes of the pgm2Δ Mutation in Saccharomyces Cerevisiae Lacking or Overexpressing TPS1, NTH1, and ATH1

Shruti Raghavan, Lara Shehadeh & David Aiello
Biology, Austin College

Poster Presentation

Phosphoglucomutase (PGM) is the enzyme responsible for interconverting glucose-1-phosphate (G1P) and glucose-6-phosphate (G6P) in Saccharomyces cerevisiae carbohydrate metabolism. Yeast lacking PGM2 (pgm2Δ), the major isoform of PGM, exhibit slow growth, calcium homeostasis defects, and an accumulation of glycogen when metabolizing galactose as a carbon source. The overexpression of GPH1, a glycogen breakdown gene, partially rescues pgm2Δ mutant defects. We hypothesized that the partial rescue was due to the protective effect of the increased trehalose levels, a carbohydrate source often produced in the absence of glucose. Overexpression of trehalose-6-phosphate synthase 1 (TPS1) successfully rescues pgm2Δ growth sensitivities, while tps1Δ mutation exacerbates pgm2Δ mutant phenotypes, revealing a potential link between trehalose synthesis and glycogen accumulation. To further examine this link and relationship with calcium homeostasis, we knocked out and overexpressed the genes encoding for two enzymes that hydrolyze trehalose to free glucose: an acid vacuolar trehalase encoded by ATH1 and a neutral cytosolic trehalase encoded by NTH1. Preliminary data exhibits an exacerbation of pgm2Δ growth defects upon ATH1 overexpression and a partial rescue of pgm2Δ associated with the ATH1 knockout, suggesting that vacuolar trehalose stores may be more relevant to pgm2Δ mutant defects than cytosolic stores.

Investigating the role of RNA polymerase II stalling in spt4Δ-mediated rescue of Saccharomyces cerevisiae mutants lacking PGM2

Ruthann Schmiege & David Aiello
Biology, Austin College
Oral Presentation

In Saccharomyces cerevisiae, the enzyme phosphoglucomutase (PGM) allows the cell to interconvert glucose-1-phosphate (G1P) and glucose-6-phosphate (G6P). Loss of the gene encoding for the major isoform of PGM, PGM2, causes a slow growth phenotype and an increased ratio of G1P to G6P when cells utilize galactose as their primary carbon source. In addition, the pgm2Δ strain displays calcium homeostasis defects, including sensitivity to cyclosporin A and increased calcium uptake and accumulation. Previous research in the Aiello lab has found that loss of SPT4, the nonessential component of the DSIF complex, rescues many of the pgm2Δ mutant growth defects, but the altered ratio of G1P to G6P is unaffected. DSIF is known to play an important role in promoting transcription elongation in S. cerevisiae, but evidence also suggests that Spt4 may play a role in negatively regulating transcription of certain genes. Previous research indicates that the loss of SPT4 may relieve transcriptional pausing or stalling at certain gene loci, resulting in an increase in gene expression. This study aims to investigate whether Spt4 mediates increased RNA polymerase II stalling in the pgm2Δ mutant, as well as whether select genes that show higher expression in the pgm2Δspt4Δ strain play a role in the spt4Δ-mediated rescue of pgm2Δ phenotypes.

Exploring the Effects of MG Exposure on Cytosolic Ca2+ levels in the Absence of HACS and Intercellular Ca2+ Efflux Channels

Michael Selby, Katherine McBroom, & David Aiello
Biology, Austin College
Poster Presentation

The major isoform of phosphoglucomutase, PGM2, interconverts glucose-1-phosphate (G1P) and glucose-6-phosphate (G6P) in carbohydrate metabolism. Saccharomyces cerevisiae mutants lacking PGM2 exhibit altered G1P:G6P ratios due to an inability to interconvert the two. Additionally, the pgm2Δ mutant shows slow growth on galactose-containing media, cyclosporin-A sensitivity (CsA), greater induction of the unfolded protein response, and higher levels of intracellular Ca2+. Calcium influx across the plasma membrane is mediated by LACS (Low-Affinity Ca2+ Influx System), a protein encoded by FIG1, and HACS (High-Affinity Ca2+ Uptake System), an integral membrane protein complex encoded by MID1, CCH1, and ECM7. Loss of single HACS genes exacerbated the slow growth phenotype of pgm2Δ on galactose, and combinations of HACS gene deletions were near-fatal to the pgm2Δ strain. In lieu of observing the expected decrease in total cell Ca2+ in mid1Δ and cch1Δ mutants, we saw a rise in total cell Ca2+, further amplified in pgm2Δ strains. Previous work demonstrates that the addition of exogenous methylglyoxal (MG) rescues pgm2Δ growth defects, likely by increasing cytosolic Ca2+ levels through vacuole- and ER-independent mechanisms. MG additions rescued pgm2Δ HACS mutants' growth phenotypes. Current efforts are focused on the impact of MG on pgm2Δ mutants with various combinations of gene mutations that prevent influx of calcium into the cytosol from either internal or external sources.

Evaluation of the Relationship Between a High-fat Diet and Gut Microbiome Health in Hibernating Ground Squirrels (Ictidomys tridecemlineatus)

Emma Solis & Jessica Healy
Biology, Austin College
Oral Presentation

Hibernating species typically undergo extreme cycles of fat accumulation and loss throughout the year as they maintain their normal circannual rhythm of euthermia and torpor. With feeding patterns changing drastically during the year, there have been several papers detailing subsequent seasonal differences in gut microbiota structure and diversity according to a standard hibernation cycle. However, little research has been done to evaluate if other factors such as dietary fat content or natural vs. lab diets have any direct effects on the gut health and microbial community of hibernating species. In this project we are using behavioral (food intake), morphological (body mass and composition), and molecular (qPCR) techniques to evaluate the physiological effects of a high-fat diet on our animal of study, the thirteen-lined ground squirrel (Ictidomys tridecemlineatus) to observe potential differences that emerge as wild-caught animals are transitioned to a lab diet.

Exploring the Effects of MG Exposure on cytosolic Ca2+ Levels in the Absence of HACS and Intracellular Ca2+ Efflux Channels

Harsha Tamtam, Michael Selby,
Katherine McBroom, & David Aiello
Biology, Austin College
Oral Presentation

The major isoform of phosphoglucomutase, PGM2, interconverts glucose-1-phosphate (G1P) and glucose-6-phosphate (G6P) in carbohydrate metabolism. Saccharomyces cerevisiae mutants lacking PGM2 exhibit altered G1P:G6P ratios due to an inability to interconvert the two. Additionally, the pgm2Δ mutant shows slow growth on galactose-containing media, cyclosporin-A sensitivity (CsA), greater induction of the unfolded protein response, and higher levels of intracellular Ca2+. Calcium influx across the plasma membrane is mediated by LACS (Low-Affinity Ca2+ Influx System), a protein encoded by FIG1, and HACS (High-Affinity Ca2+ Uptake System), an integral membrane protein complex encoded by MID1, CCH1, and ECM7. Loss of single HACS genes exacerbated the slow growth phenotype of pgm2Δ on galactose, and combinations of HACS gene deletions were near-fatal to the pgm2Δ strain. In lieu of observing the expected decrease in total cell Ca2+ in mid1Δ and cch1Δ mutants, we saw a rise in total cell Ca2+, further amplified in pgm2Δ strains. Previous work demonstrates that the addition of exogenous methylglyoxal (MG) rescues pgm2Δ growth defects, likely by increasing cytosolic Ca2+ levels through vacuole- and ER-independent mechanisms. MG additions rescued pgm2Δ HACS mutants' growth phenotypes. Current efforts are focused on the impact of MG on pgm2Δ mutants with various combinations of gene mutations that prevent influx of calcium into the cytosol from either internal or external sources.

Identification and Characterization of Tango6 in Development

Sydney Versen, Hannah Herron, & Kelli Carroll
Biology, Austin College
Poster Presentation

The Undiagnosed Disease Network (UDN) is a collection of clinicians and researchers that utilize modern technology to help diagnose individuals with rare or previously uncharacterized diseases. One of the genes that the UDN predicted as causal in developmental disease was Tango6, as a UDN participant with multiple point mutations in Tango6 presented with heart and brain abnormalities. Tango6 was originally discovered in Drosophila, where it was predicted to play a role in Golgi body organization. Additionally, it is also required in murine development as knockouts are embryonic lethal. In order to understand the role that Tango6 plays in development, we utilized embryonic zebrafish to analyze the quantitative and spatial expression of Tango6. In zebrafish, Tango6 is expressed at low levels between 24 and 120 hours post fertilization (hpf). In situ hybridization demonstrated that Tango6 is expressed in a bilateral tube in the hindbrain beginning at 48 hpf and by 120 hpf, it is present in the gastrointestinal system in addition to the brain. Preliminary data of mosaically edited Tango6 knockouts generated using CRISPR has shown an accumulation of blood in the gut by 96 hpf, suggesting defects in gut morphogenesis or function. In total, these data indicate that Tango6 may be involved in brain and gut development. Further analysis of knockouts and spatial expression patterns is underway to determine the precise role of Tango6 in development and disease.

Chemistry

Purification of Beta-2-microglobulin

Georgia Burton & John Richardson
Chemistry, Austin College
Poster Presentation

Beta-2-Microglobulin (B2M) is a small protein expressed on the surface of all nucleated cells in the body to identify them as part of self. This protein is normally filtered out of the body through the kidneys. However, in cases of kidney failure, B2M builds up in the blood and begins to misfold, leading to the formation of aggregates which collect in the joints of the body—a condition known as Dialysis Related Amyloidosis (DRA). Little is known about the events that initiate B2M misfolding so research into this phenomenon could lead to a better understanding of DRA as well as other protein aggregate related diseases such as Parkinson's and Alzheimer's. The purpose of this work was to express and isolate site directed mutant proteins for seven mutations between the aromatic residues 62-70 of B2M protein, which has been shown by previous research to be a significant hot spot contributing to B2M aggregation. Methods of purification included centrifugation, denaturation and refolding, anion exchange, dialysis and lyophilization. Once purified these proteins will be characterized using for kinetic assays to determine the effects of the mutation on the misfolding reaction.

A Greener Approach to the Synthesis of Bis-Urea Organogelators

Jade Kemp & Andy Carr
Chemistry, Austin College
Oral Presentation

Organogelators are molecules capable of gelling solvents through intermolecular forces and have recently grown in popularity due to their applications in pharmaceuticals and oil spill recovery. This research focuses on the formation of a bis-urea organogelator, whose synthetic method is practiced by students at Austin College in organic chemistry teaching laboratories. Currently, the synthesis of the organogelator utilizes toxic chemicals, such as dimethylformamide (DMF) and dichloromethane (DCM), which are considered carcinogenic and environmentally hazardous. This study explores alternative, more environmentally friendly solvents throughout the synthesis of the molecule to produce a greener synthetic method. Acetonitrile is shown to be a successful replacement solvent to DMF in the initial alkylation of the starting compound, while 2-methyltetrahydrofuran (Me-THF) and tetrahydrofuran (THF) are able to replace DCM in the bis-urea formation. Product yields are maintained when substituting the greener solvent alternatives. These replacement solvents improve the green chemistry of the reaction, decreasing the amount of hazardous solvent utilized during the synthetic method and waste produced by Austin College.

Efforts Towards the Total Synthesis of Anisucoumaramide

Andrew Kim, Beau Beshires,
Jack Hittson-Smith, & Ryan Felix
Chemistry, Austin College
Poster Presentation

Anisucoumaramide, a coumarin-based molecule, has been found to have properties that may inhibit the MAO-B isozyme which is notably associated with neurodegenerative diseases. This compound was recently isolated from Clausena anisum-olens, a plant commonly found throughout South China and Southeast Asia. A previous research group successfully extracted the compound and identified its structure. There are several advantages for the total synthesis of anisucoumaramide. A practical pathway for anisucoumaramide synthesis would increase the commercial availability of this novel compound to allow testing for potential therapeutic applications. Recently, the Felix lab has been exploring new synthetic pathways for the formation of this coumarin -based compound, while improving the percent yields of various intermediate reactions. This summer, one project explored several ways to perform a decarboxylation reaction, in pursuit of subsequently adding a bromine to the decarboxylated product. Another project focused on protecting a hydroxy-epoxide to ring-open the epoxide and create a bromofuranone product. The final project for the summer involved synthesizing 2-methoxyresorcinal from 2,6-dibromoanisole.

Investigation of the Role of Anions in the Coordination of Bipyridinium Ligands with Platinum(II) Dithiolene Complexes

Henry Neal & Brad Smucker
Chemistry, Austin College
Poster Presentation

The syntheses and anion metatheses of Mebpym and Mebpyme ligands (Mebpym = 1,1'-Methylenebis-4,4'-bipyridinium, Mebpyme = 1,1'-Methylenebis (4-((E)-2-(pyridin-4-yl)vinyl))pyridinium) were investigated. The role of the anion in the coordination of these pyridinium ligands with Pt(qdt)(qdt= quinoxaline-2,3-dithiolate)were also explored with an overall goal of generating platinum-based supramolecular metallocycles. The compounds were characterized using UV-vis and 1H-NMR spectroscopy as well as x-ray crystallography.

Electrostatic Interactions in the C-Terminus of aB-Crystallin

Christian Peterson, Javier Moya & Jim Hebda
Chemistry, Austin College
Poster Presentation

αB-Crystallin belongs to a category of proteins called small Heat Shock Proteins which act as molecular chaperones. αB-Crystallin's main role as a molecular chaperone is to prevent the aggregation of misfolded proteins, preventing diseases such as cataracts and Alzheimer's. αB-Crystallin forms dimer subunits which interact with each other through their C-Termini to form large, polydisperse, less molecularly active oligomers. During this process, the dimers can interact in two different ways without electrostatic preference in the wild type variant. In this paper we tested the chaperone ability of different variants which prefer one intermolecular interaction over another by affecting the charge-charge interactions at the 92, 156, and 164 residues. We found that one variant, K92E, prevents aggregation more than the wild type with more variations needing to be tested to see if there is a larger trend for how structural intermolecular interactions affect αB-Crystallin's ability to act as a molecular chaperone, and how they can oligomerize in specific orientations.

Investigation of Anion Influence on 1,1'-methylenebis-4,4'-bipyridinium and its Coordination to (maleonitrile-2,3-dithiolato)platinum(II))

Sara Schuster & Brad Smucker
Chemistry, Austin College
Poster Presentation

The synthesis, ionic metatheses, and characterization of 1,1'-methylenebis-4,4'-bipyridinium(X)2 (X = BF4-, PF6-, SbF6-, and BPh4-) and the influence of the anions on coordination to (maleonitrile-2,3-dithiolato)platinum(II) were investigated. Anion-bipyridinium interactions were observed in NMR spectroscopy with the anions having an influential role in the coordination of the bipyridinium salt.

Synthesis of Carboxylic Acid Mono-Urea Ligands and Coordination to +2 Transition Metals

Rebecca Tobias & Andy Carr
Chemistry, Austin College
Poster Presentation

Limitations in solubility of thermoreversible bis-urea gels has brought interest in examining organometallogels as an alternative to organogels to form gels in -situ at room temperature. Work by Carr et al found success in gelling THF solutions untilizing a mono-urea ligand with a metal coordinating pyridyl group. In an effort to develop a complimatary coordinating motif a carboxylic acid containing mono-urea ligand was designed, synthesized, and studied. It is believed that the carboxylic acid urea containing ligand when deprotonated in the presence of a +2-metal cation will coordinate to the metal in a tetrahedral or square planar complex, creating a bis-urea gelator in-situ. Synthesis of mono-urea ligand begins with 3,5-dihydroxybenzaldehyde, which was alkylated under basic conditions in dimethylformamide with 1-bromododecane, yielding the diether in 99% yield. The aldehyde of the diether was then converted to the benzylic amine in one pot by the reaction of the in-situ oxime in 93.5% yield. The amine was protected by phenylchloroformate in 63% yield. The carbamate was transformed to the urea by substitution with 4-aminobutyric acid under basic conditions in ethanol, in 89% yield. The resulting crude carboxylic acid urea underwent gel testing with Zn(OAc)2 giving a gel at 1.7 wt % after 12 hours.

English

The Creation of Contemporary Indian American Poetry

Sonia Charales & Greg Kinzer
English, Austin College
Oral Presentation

Given the events of the last few years, it has become more important than ever for marginalized voices to come forward to talk about the experiences and struggles of being a person of color in America. My poetry collection provides such a perspective through an Indian American lens. The poems address different topics like multilingualism, racism, stereotypes, and reclaiming aspects of Indian culture from the view of an American-born individual. My collection utilizes a variety of forms that range from the adaptations of Indian musical structures to found poetry. Poems written also discuss topics of struggles within Indian immigration and historical events like the Bellingham Riots. As a thesis-length collection of poems, this project is organized around a movement from silence into vocality and the development of confidence in culture for the speakers of the poems. A goal of my work is to serve as a voice of minority Americans and marginalized groups that is relatable to them. For those who have been told to be silent, I inspire to encourage vocality during times when it is becoming more important than ever before.

History

Women in Circus

Clara Harper & Felix Harcourt
History, Austin College
Poster Presentation

Carnivals and circuses became increasingly popular in the United States during the 19th century. Many of these performers were women traveling town to town to captivate Americans across the nation. This research investigates the working conditions for circus women beginning in the 18th century and continues into current times. This research includes excerpts of interviews with circus performers in the 20th century, newspaper clippings, and photographs. Together, these primary sources provide a complete depiction of the daily struggles and inequities circus women faced in their work. Circus women drew large crowds thanks to their publicized oddity or beauty which made them frequent subjects of public examination in the media. The inherent danger to circus work only made the scrutiny more prevalent as newspapers described the circumstance of the audience instead of the performer when an injury occurred. Despite the challenges, circus women continued to work and entertain thus setting the stage for performers today.

Mathematics

Curvature and Closed Geodesics in Staircase Metric Manifolds

Justus Fagan & Jack Mealy
Math, Austin College
Poster Presentation

The staircase metric (SCM) geometry scheme is utilized to analyze and define various curvatures related to closed SCM surfaces, and subsets of same. Specific surfaces defined and studied include tori with a.e.-positive Gaussian curvature, a.e.-zero curvature, and yet others with a.e.-negative Gaussian curvature. We also exhibit closed geodesics in newly defined non-compact SCM cylinders, and that further involve df-boundaries that are scaled normal distribution curves; in the space-time case, non-trivial closed orbits result; the corresponding 'gravity effect' is then illustrated.

Who's Really Your Neighbor? Investigating the Minimal Neighborhood Property in Topological Spaces

Prithvi Kalkunte & Andrea Overbay
Math, Austin College
Oral Presentation

This thesis aims to investigate the minimal neighborhood property in topological spaces. Specifically, this is an audience-first interactive presentation that introduces topology to a lay audience, as well as what the minimal neighborhood property is. We then figure out what types of spaces have this property by going through examples. Finally, we get to the heart of the research, which proves properties of the minimal neighborhood property and connects this entire process to the bigger picture: how this property helps us understand limits in topology. Ultimately, this presentation hopes to introduce non-mathematicians to an example of theoretical math research by expanding the limits of the minimal neighborhood property.

Utilizing Python to create a 2D Model of the Incompressible Navier-Stroles Equations

Enrique Pineda Jr. & Huy Nguyen
Math, Austin College
Poster Presentation

The Navier-Stokes equation is a set of partial differential equations that describes the motion of viscous fluid. These equations are used to model fluid dynamics for water, F1 cars, and airplane designs. For example, these equations could be used to model pollution flowing down a river and finding where it may end up. At the basic level, the equations describe conservation of mass and momentum. We wanted to use the incompressible version of the Navier-Stokes equation to create animations that simulates water flowing. In order to model the Incompressible Isothermal Navier-Stokes equation we implemented the finite difference method with Neumann boundary conditions using Python. Our program allowed us to model the equations in a two-dimensional simulation that represents water flowing through different cavities creating a "cavity flow" and a "double vortex flow."

Neuroscience

The Effect of Ampicillin Treatment on pCREB and c-Fos Expression in the Hippocampus of Male, Long-Evans Rats

Roopika Menta Kishore, Danya Van Vuuren,
Janaye Scales, Anna Villasenor, & Renee Countryman
Neuroscience Austin College
Poster Presentation

Antibiotics are globally used to treat bacterial infections by limiting or stopping bacterial growth. Studies have shown that there is a direct correlation between gut microbiota and brain health specifically in regards to memory. While high doses of antibiotics have a detrimental effect on gut microbiota and ultimately brain health, the impact of normal doses of antibiotics on brain health and gut microbiota is inconclusive. In this study, thirty-six male Long-Evans Rats were divided into 4 treatment groups: 50mg/kg of amoxicillin daily for 5 weeks, 4 hours of environmental enrichment, 50mg/kg of amoxicillin daily for 5 weeks as well as 4 hours of environmental enrichment, and a control group with neither antibiotic treatment or environmental enrichment. The rats underwent behavioral tests, such as the Barnes Maze, to gauge their learning and memory. After sacrifice, their brain tissue was analyzed and stained for the proteins c-Fos and PCREB in the CA3 and Dentate Gyrus regions of the hippocampus. PCREB and c-FOS are both activity markers, however PCREB is specifically used as a marker for memory formation. It was expected for the rats that had environmental enrichment to recover from any impacts caused by the antibiotic treatment. When the cells were analyzed there were no significant results found. This indicates that normal doses of antibiotics do not have a detrimental effect on brain function.

The Effect of Diet Manipulation on Long-Evans Rats as Represented in the Hypothalamus and Hippocampus

Danya Van Vuuren, Roopika Menta Kishore,
Janaye Scales, Anna Villasenor, & Renee Countryman
Neuroscience, Austin College
Poster Presentation

The recent increase of obesity levels across the United States has allowed the Ketogenic ("Keto") diet to rise in popularity. The Keto diet is characterized by a state of ketosis in which the body uses ketones in the place of glucose for energy production. While the effect of the ketogenic diet on epilepsy is apparent the effect of a ketogenic diet on learning and memory is inconclusive. Twenty-four male Long-Evans rats were divided into 3 treatment groups: Standard Chow, Western diet, and Ketogenic diet. The rats underwent behavioral tests, such as the Barnes Maze, to gauge their learning and memory. After sacrifice, their brain tissue was analyzed and stained for the proteins GFAP and BDNF in their hippocampus and hypothalamus. GFAP is an inflammation marker while BDNF is an overall health marker. It was expected for the Western diet treatment group to express the highest GFAP levels and the lowest BDNF levels. Conversely, the Keto group's protein expressions had no preexisting indications of what the results may yield. While the majority of the findings were null, it was found that the Keto rats expressed significantly higher GFAP levels in their Arcuate Nuclei of the hypothalamus when compared to the Western diet rats. This indicates the need for further research in the field of dietary effects on learning and memory.

Physics

A Tale of Three Widgets: Solutions for Improved Focusing of the Adams Observatory Guide Camera

Taiton Fox, Tanner O'Dwyer & David Baker
Physics, Austin College

Oral Presentation

The Adams Observatory at Austin College offers excellent opportunities for undergraduate research, in large part due to the telescope's ability to track a celestial object throughout the night. Ultra-fine tracking with minimal drift over a three-hour observation or longer is accomplished through use of an additional guide camera. The guide camera observes a single star with high frequency exposures and sends correction signals to the telescope if the star shifts position from one image to the next. Unfortunately, the guide camera must be focused manually rather than electronically. Often the guide camera must be adjusted by millimeters of distance to achieve good focus, difficult to do by hand with adequate precision.

Our goal was to produce an accessory for the guide camera to allow for precision manual focusing. Following the Engineering Design process, three different solutions were designed using Autodesk Fusion 360 modeling software and produced using the Morris Product Lab 3D printers. The three designs were evaluated using stringent criteria for success, and the best version was determined. The final product will act as a long-term solution to the focusing issue and will improve data collection at the Adams Observatory.

The Spectral Type of Algol C

Megan Frank, Jessica Junginger, & David Whelan
Physics, Austin College
Poster Presentation

We present a study on the Algol star system, a system of three stars that appears in the constellation of Perseus as one of the brightest stars in the autumn sky. Algol is a variable star, and its variations can be seen by the naked eye over a period of just 2.87 days. These dramatic variations have been studied since the time of the Ancient Egyptians, who called Algol "The Raging One". The variations of this star system are caused by the two inner components of the system, Algols A and B, eclipsing one another. When Algol B eclipses the brighter component Algol A, which is called primary eclipse, the hidden light of Algol C is finally able to be shown. Algol C, a star only known about for a little over a century, is the third component of the Algol system that orbits the inner binary pair. We captured spectra of this system at the Adams Observatory, and were able to classify Algol C, ending a debate on its temperature and luminosity that has lasted nearly a century.

Exploring Robotics Through Competition: Roodolph, the Large Robot Representing the Roos at VEXU

Lindy Luker, Neil Cutting, Diego Rodriguez,
Zuemie Rojas & Andra Petrean
Physics, Austin College
Poster Presentation

The objective of this project was to construct, design, and code a 24" by 24" by 24" robot (Roodolph) to participate in a VEXU robotics tournament. VEXU is an annual competition, and during the last academic year, the theme of the competition was called "Change Up." The competition consisted of two teams that competed against each other by scoring plastic 6" balls into cylindrical shaped goals during a designated time. Each team builds robots starting from the same kit, through an iterative process. The games last 2 minutes, and consist of an "autonomous" period, during which the robots move based on pre-programmed routines, and a driver control period, during which the robots can be controlled through a radio controller. In our presentation, we'll describe how we built Roodolph and our experience in participating in the VEX tournament.

Synthesis and Characterization of Thin Films

Nereida Martinez, Paola Torres,
Kylee Shanks, & Andra Petrean
Physics, Austin College
Poster Presentation

Au in its bulk form is useful for many electronic applications because it is a good electrical and thermal conductor; however, at nanoscale, gold's properties change. For example as Au gets thinner its density decreases, it absorbs green light and appears red, and becomes less electrically conductive. Some of these characteristics make it a good candidate for developing optical biosensors. The purpose of this research is to synthesize and characterize nanoscale Au films at varying thicknesses, for future use in developing biosensors. The Au thin films were synthesized using a SPI-Module sputter coater and were characterized through atomic force microscopy, X-ray photoelectron spectroscopy, optical absorbance, and Hall effect measurement system. Our results showed that after annealing, the Au thin films presented a peak in absorbance. A shift in this peak when introduced to biological mediums could be utilized as a sensor.

Exploring Robotics Through Competition: Rooster, the Small Robot Representing the Roos at VEXU

Enrique Pineda Jr., Sakib Al Saba,
Branson Vrazel, Diego Sanchez, & Andra Petrean
Physics, Austin College
Poster Presentation

The objective of this project was to construct, design, and code a 15" by 15" by 15" robot (Rooster) to participate in a VEXU robotics tournament. VEXU is an annual competition, and during the last academic year, the theme of the competition was called "Change Up." The competition consisted of two teams that competed against each other by scoring plastic 6" balls into cylindrical shaped goals during a designated time. Each team builds robots starting from the same kit, through an iterative process. The games last 2 minutes, and consist of an "autonomous" period, during which the robots move based on pre-programmed routines, and a driver control period, during which the robots can be controlled through a radio controller. In our presentation, we'll describe how we built Rooster and our experience in participating in the VEX tournament.

Synthesis and Characterization of Materials for Radiation Detection

Kylee Shanks, Paola Torres, & Andra Petrean
Physics, Austin College
Poster Presentation

An this project, we are synthesizing and characterizing perovskite systems for particle detection and electromagnetic detection. The materials are synthesized through Close-Space Sublimation and their morphology is studied through Atomic Force Microscopy and Scanning Electron Microscopy. Their properties are studied through optical and electrical measurements. These new materials are designed to be a low-cost alternative to existing expensive radiation detectors. The devices built from these materials can be used in a variety of fields. In the medical field, they can monitor the radiation exposure of patients and medical staff. In the field of national security, they can be used to scan for nuclear materials used in dirty bombs.

Undergraduate Research in the Time of COVID: NASA TESS Follow-Up Observations at Austin College's Adams Observatory Assist in Exoplanet Discoveries

Brett Skinner, Neil Cutting,
Lindy Luker, & David Baker
Physics, Austin College
Poster Presentation

Launched in 2018, NASA's Transiting Exoplanet Survey Satellite (TESS) searches for faint dips in the amount of detected starlight as a planet passes in front of, or transits, its host star. Because the TESS space telescope provides a wide survey of the night sky, each pixel spans a relatively large area. Higher resolution ground-based observations are needed to confirm possible transits. Austin College's Adams Observatory has been a member of the TESS Follow-Up Observing Program (TFOP) since 2018. However, the global COVID-19 pandemic placed unique challenges on our exoplanet research program, forcing a completely remote experience in 2020 and a hybrid environment in 2021. Here we report results from our 2020-2021 TFOP research filled with exoplanet discoveries, verified planet candidates, false positives, and rewarding collaborations with TESS scientists during the COVID-19 pandemic

Are Delta Scuti Stars Different if They are in Algol-type binaries?

Brett Skinner & David Whelan
Physics, Austin College
Oral Presentation

Algol-type binary systems are semi-detached systems with active mass transfer from the evolved secondary onto the young and bright primary. Delta Scuti stars are stars that pulsate and have a variable brightness. Often, these Delta Scuti variables are the primary star in the Algol system, creating a new class of binaries called the oscillating Eclipsing Algols (oEA). Our goal is to study the Delta Scuti stars that are in binaries and compare them to Delta Scutis that are singular. We hope to determine if there is a difference or similarity in the pulsational nature between these two differently inhabited Delta Scuti stars. This difference or similarity would shed light on this new class of oscillating Eclipsing Algol systems.

Psychology

Health Behaviors and Outgroup Prejudice during COVID-19

Cielo Carreno, Alexandra DeRado
& Michele Helfrich
Psychology, Austin College
Poster Presentation

This research expanded on behavioral immune system theory, an evolutionary process whereby humans isolate themselves from perceived diseased outgroups in times of high disease prevalence (Huang et al., 2011). Past research indicated that those who engage in protective health behaviors, such as vaccinations and hand-washing, tended to report less prejudice and negative views towards outgroups, compared to those who do not engage in protective health behaviors during the 2009 swine flu pandemic (Huang et al., 2011). This study aimed to examine how health behaviors impacted perceptions towards immigrants and racial minority groups during the COVID-19 pandemic. It was hypothesized that those who do not engage in protective health behaviors against COVID-19 would demonstrate more prejudice against immigrants and racial minority outgroups compared to those who do engage in protective health behaviors. 85 Austin College student participants were exposed to a scenario concerning an African American, Asian, Hispanic, or Caucasian male, rated their agreement with statements concerning immigration, and reported their COVID-19 health behaviors. Preliminary results suggested that unvaccinated participants exhibited more anti-immigration attitudes compared to vaccinated participants. Subsequent research should investigate the role of political ideology in these findings.

The Influence of Different Political and Social Views on Adult Child-Parent Closeness

Shannon Fagen & Peter Marks
Psychology Austin College
Oral Presentation

For many, the transition to college provides exposure to novel political and social views, which may conflict with parents' beliefs. The current study investigates the way that disagreement across different worldviews might be related to closeness of relationships between college students and their parents. Separate samples were drawn from Austin College (N = 98) and from Amazon Mechanical Turk (N = 205). Participants completed a questionnaire assessing changes in closeness with their primary caregiver(s) over time. Questionnaires were also used to assess both individual and caregiver views on politics, religion, and homosexuality attitudes. Correlations indicated that both individual and parental views were significantly related to parent-child closeness in the Amazon sample, but generally not in the (smaller) Austin College sample. Multiple regressions were used for primary analyses; differences between individuals' and parents' views significantly predicted variance in closeness with the father in both samples and with the mother in the Amazon sample. As expected, differences between individuals and parents in political views, religious views, and sexual orientation views predicted changes in closeness with parents, although these predictions were only significant for the mother in one sample. Limitations of the study and implications of these findings will be discussed.

Mating Preference and Gender Presentation

Matilda Gajardo, Nevaeh Trevino, Carlos Estrada,
Amelia Schwarz & Matt Findley
Psychology, Austin College
Poster Presentation

Past research examining mating preferences has predominantly focused on heterosexual individuals or has applied heterosexual norms to homosexual individuals. The current research examined whether the key factor in mating preference, for individuals of any sexual orientation, is contingent on their gender presentation. Our hypothesis was that male individuals who identify with masculine traits will seek partners with effeminate traits. The same would hold true for the opposite identification. Our methodology utilized Bem's Sex Role Inventory, a 60-item questionnaire that identifies traits of masculinity, femininity, and androgyny. This inventory was filled out twice by each participant, once to select traits for themselves and once for an ideal partner. Additionally, photos from Hu et al. (2018) were altered to appear either feminine or masculine and used for participants to select which photo they found to be the most attractive. The results did not support the hypothesis, and even contradicted the researchers' assumptions in some cases.

The Relationship Between Perceived Parenting Styles and Young Adult's Sexual Self-concept

Eesha Hayee, Madison Gilmore & Matt Findley
Psychology Austin College
Poster Presentation

One concept that has been studied under the domain of sexual health is sexual self-concept (SSC). However, limited research has focused on the role of socialization particularly, parenting, in relation to SSC. Previous research has shown that parenting has a strong impact on adolescence self-concept. The current study aims to explore the impact of perceived parenting styles using Baumrind's model (1966) of parenting styles which consists of permissive, authoritarian, and authoritative, on two factors of SSC, sexual self-efficacy and sexual self-esteem. The sample consisted of 74 Austin college students ranging in ages 18-22, who completed an online survey that assessed perceived parenting styles, sexual self-esteem and sexual self-efficacy. Correlational analyses will be conducted using SPSS which will then be used to conclude the results. We are hoping that our findings will have implications on the promotion of adolescent sexual well-being.

Weight Stigma and Mental Health

Carrie McIntyre & Danielle Franks
Psychology Department
Oral Presentation

Weight stigma, the discrimination of people due to their weight and size, is regarded by many to be the last socially acceptable form of prejudice (Ashmore et al., 2008). This topic has received growing attention in recent years, due to increased awareness of weight stigma's deleterious mental and physical health effects (Puhl & Brownell, 2012). Previous research has established a connection between weight stigma and fatphobic beliefs and the development of eating disorders (Chen et al., 2020). What is less clear is if and how these beliefs differentially impact the mental health and eating behaviors of people with larger bodies versus those with average or smaller bodies and those of varying genders, races, and ages. The current study will elucidate these relationships by measuring anti-fat attitudes, internalized weight stigma, weight control beliefs, healthy lifestyle beliefs and how these attitudes relate to psychological distress, body image, eating behaviors, and disordered eating cognitions while examining the impact of the aforementioned demographic variables on these relationships. It is hypothesized that higher levels of weight stigma will lead to worse mental health outcomes and more disordered eating behaviors. In addition, the impact of race, gender, age, and BMI on this relationship will be examined exploratorily. The aim is to determine how factors related to weight stigma impact individuals of diverse identities so that targeted interventions can be developed.

College Distance from Home: Retrospective Study of First-Year Academic Performance

Natalie Semine, Marianna Bert, Logan Brummer,
Lael Weatherby & Matt Findley
Psychology, Austin College

The current research examined whether college distance from home was correlated with first-year academic performance. Additionally, separation anxiety, generalized anxiety, depression, and homesickness were examined as possible mediators. We hypothesized that greater distance would be correlated with lower GPA. 61 participants completed a self-report questionnaire consisting of measures for the four mediators as well as freshman year GPA and college distance from home (in miles). The results revealed a negative (though insignificant) correlation between distance and first-year GPA. Separation anxiety, generalized anxiety, depression, and homesickness did not serve as mediators but were correlated with one another.

Gender, Social Ostracism, Prosocial Behavior, and (Pretty Much) Everything in Between

Storm Simonin, Logan Herring,
Grace XiaoYao & Michele Helfrich
Psychology Department, Austin College
Poster Presentation

The experience of social rejection often evokes feelings of anger or depression. Consequently, ostracized individuals may display less prosocial behavior as these psychological responses manifest. The purpose of this study was to observe the impact of social ostracism on prosocial behavior in male and female individuals. We also sought to identify any factors possibly mediating this relationship, such as empathy, self-esteem, and self-efficacy. We hypothesized that (1) if empathy or self-efficacy is a mediator, then those that are socially ostracized will exhibit less prosocial behavior, (2) if self-esteem is a mediator, then those who are socially ostracized will show more prosocial behavior, and (3) females will be more willing than males to partake in the optional survey when they are ostracized. To invoke social exclusion or inclusion, participants played a program in which they threw a ball to "online" players, set to throw the ball frequently or infrequently back to the participant. Participants then answered questions designed to assess the potential mediators. After, subjects were asked to complete an optional survey without extra credit. The preliminary results indicated that females were more likely to complete the optional survey than males. Females perceived themselves as more empathetic, while males perceived themselves as having more self-efficacy. Our research showed that females were more likely to engage in prosocial behavior than males.

COVID-19 Masking Behaviors and the Perceived Empowerment and Confidence of Veiling Muslims

Sierra Thomas, Hanna Stocks, Rosemary Cortez
Carmen Guerrero-Castillo, & Michelle Helfrichr
Psychology Austin College
Poster Presentation

Hoover (2021) suggested that pandemic masking may alter perceptions of religious facial coverings. She noted that before COVID, individuals who wore religious coverings were ridiculed by many people in Western countries, yet as COVID progressed, acceptance of face veils likely increased. Our purpose was to investigate this possibility empirically. We hypothesized that (1) strictness of masking behavior would predict impressions of Muslim women, (2) level of facial covering on Muslim women would be negatively correlated with perceptions of their confidence and empowerment, and (3) adherence to veiling Muslim American stereotypes would negatively correlate with strictness of masking behaviors. Four surveys were created, each with a different picture of a Muslim woman with varying degrees of facial/head covering (e.g., no mask, face mask, hijab, and niqab) and emailed to 82 student participants. Participants reported their masking behaviors and level of agreement with Muslim stereotypes. They then rated the woman's confidence and level of empowerment on Likert-type scales. The preliminary results indicated that participants' masking behavior predicted an array of stereotypes about Muslim women. In addition, Muslim women were perceived differently based on their type of covering. Future research should explore the potential contribution of political ideology as well.

Public Health

Women's Health Education for Victims of Intimate Partner Violence (IPV) at the Grayson Crisis Center, Sherman, TX

Sarah Joseph, Kathy Tran,
Rebecca Osei & Saritha Bangara
Public Health Department, Austin College

Poster Presentation

Women with a history of intimate partner violence (IPV) are at an increased risk for cardiovascular disease, human papillomavirus, cervical cancer, and HIV, which we collectively termed as women's health issues (WHI). Despite its prevalence, the question remains as to why IPV has been overlooked as a significant risk factor for some of these chief chronic illnesses that afflict women. The objectives of this study were to determine baseline knowledge of WHI and to identify barriers to accessing healthcare services among victims of IPV at the Grayson Crisis Center, the only shelter for victims of family violence and/or sexual assault in Grayson County. Clients completed demographic surveys and subsequently participated in focus groups, which allowed us to assess their baseline knowledge regarding WHI and access to healthcare. A mixed-methods approach was used to analyze the data and identify themes from participants' responses. Through the data analysis of ten focus groups (n=38), the following themes emerged: perceptions of chronic conditions, inadequate services, and financial barriers to accessing healthcare. Our findings will be used to develop a trauma-informed, culturally sensitive WHI education program tailored to the specific needs and experiences of this population that can be integrated into other shelters that house similar populations.

Using Behavior Risk Factor Surveillance System 2018 Data to Assess the Association Between Insufficient Sleep and Cardiovascular Disease

Isbah Plumber & Saritha Bangara
Public Health Department, Austin College
Poster Presentation

Background: Sleep deprivation is defined as sleeping for less than 7 hours in a 24 hour time period and is extremely prevalent in the US, as 35% of adults regularly experience sleep deprivation (CDC, 2016). Sleep deprivation has been seen in the past to be correlated with chronic and infectious diseases. For example, in 2014, the CDC found that 4.7% of people sleeping <7 hours suffered from coronary heart disease as opposed to 3.4% of people who received ≥7 hours of sleep, and 4.8% of sleep deprived people suffer from heart attack as opposed to 3.4% of those who are not sleep deprived. Aims (s)/Objective(s): Data from the 2018 Behavior Risk Factor Surveillance system (BRFSS), a public dataset collected by the CDC, will be used to determine the sociodemographic characteristics and health risk behaviors associated with sleep deprivation among 18-65 year old adult participants in the United States. Methods: Statistical analyses will be performed using SPSS (Statistical Package for the Social Science) to explore variables including age, sex, marital status, education level, employment, weight, income level, alcohol consumption, and physical consumption. Practical Implications: The results of this study may be used to inform the development of programs that focus on ensuring Americans get adequate and quality sleep. Disparities can be reduced within various demographics with information on the causes of sleep deprivation and an emphasis on the importance of sleep.

Correlation between the Perpetual Health Disparity in African American Communities and the Standard of Living of Past Generations

Sara Schuster, Isbah Plumber
Public Health Department, Austin College
Oral Presentation

Improvements in socio-economic status (SES) have improved health and health outcomes among people of all racial/ethnic backgrounds. Unfortunately, African Americans have not seen major improvements in health and health outcomes, when compared to other races/ethnicities. Studies have attributed the cause of these to neighborhood characteristics such as stress, nutrition, environmental chemical exposures, and more importantly, chemical exposures in food products and packaging. These chemical exposures have been found to induce oxidative stress or irregular methylation that have been found to affect health and health outcomes. Evidence suggests that oxidative stress or irregular methylation and its associated damages to health and health outcomes can be passed on genetically from one generation to the other, even when people move up in the SES ladder. Could this be the reason behind the continuity of the disproportionately poorer heath and health outcomes in African American communities, compared to other race/ethnicities? The purpose of this study is to ascertain the potential correlation between generational health outcomes and oxidative stress due to lower SES, environmental chemical exposures, and chemical exposure in food products and packaging among African Americans communities.

Theatre

Why do People Enjoy being Afraid? A Guide to Constructing a Safe and Effective Haunted House

William Bridgewater & Kirk Everist
Art Department

Oral Presentation

What is fear? Why do people willingly put themselves in situations that could make them afraid? In order to answer these questions, I will be doing a deep analysis and breaking down the effects of fear on the human mind and why we find that fear enjoyable. In order to do so, I will be looking at the Alpha Psi Omegas haunted house where I have both participated and helped coordinate. I will also be looking into a documentary covering what is known as "The Blackout Experiments" in order to figure out the line between fear and trauma. This paper will be included a manual on how to piece together a safe and effective haunted house.

Interdisciplinary Interactions Between Science and Theatre

Olivia Trusty & Kirk Everist
Theatre Department, Austin College
Oral Presentation

At the surface, theatre and science appear to have very little in common, as theatre moves the audience through passion an emotion, while science is grounded in reason and evidence. This study reflects on the connections between science and theatre by analyzing theatre through the objective scientific lens and analyzing science through the introspective and subjective theatrical lens. First, I examined director, Zoe Crews' production process of Circle Mirror Transformation by Annie Baker at Austin College in 2021 through the scientific method which created benefits and limitations to the creative and reflective process. I also examine the use of rehearsal reports as lab notebooks, as the stage manager for this production. Lastly, I examine how improv works as a method of experimentation Plays about science have historically focused on scientific ideas or the male figures behind them. In the last 10 years, more plays about female scientists, their work, and their lives have emerged. These plays illuminate untold stories that provide recognition for the overlooked and forgotten. However, these stories come with a price. Authenticity and truth are sometimes sacrificed for dramatic effect and plot. While the connections between science and theatre are more than what meets the eye, they require careful balance so that one discipline does not overwhelm the other.

Panel Sessions

Craft Talks: Tips for Creative Writers

Isabel Garrison
Zuni-Ire Rubio
Larry Ramirez Quintana
Shannon Fagen

When writers of fiction, poetry, and creative nonfiction speak about what they do, they speak of craft: there are patterns, structures, and tried-and-true methods that can be studied, examined, and emulated in order to construct great writing. Students in the Spring 2021 Form and Theory of Writing course explored various writing techniques and problems, drawing on the works and writing wisdom of writers such as J. R. R. Tolkien, Leigh Bardugo, Suzanne Collins, George Saunders, Gloria Steinem, Ocean Vuong, Jericho Brown, and Yoko Tawada. Craft essays can be both heavily-researched and deeply personal, and these student writers' engaging essays touch on a variety of topics: effective world-building for fantasy writers, writing in a language other than your "mother tongue," the utility of love triangles in shaping plot and building characters, and discovering what it means (and how) to write with purpose.

Expository Writing: Perspectives on Loneliness

English Department

Dajia Campbell
Isbah Plumber
Michelle Zhu

Students from English 114 researched and wrote on various aspects on the condition of loneliness in American society. Through their research they discovered how different writers and thinkers engage with communicating on the "epidemic of loneliness." Students defined, qualified, and put forth various calls to action on how to address this issue and translated their written research papers into different mediums to share their findings to increase awareness and offer further possibilities on how to address this issue. From infographics, podcasts, brochures, videos, and even graphic memoir, students share insights on why and how the epidemic of loneliness effects people from marginalized groups, single parents, students, and other populations.

Theatre Performance

These Shining Lives

by Melanie Marnich

directed by Olivia Trusty '22

Thursday, Friday, and Saturday, March 24 - 26

7:30 pm in the Beardsley Arena Theatre (Ida Green)

Cast and Crew

Catherine Donohue…….…….Chloë Bachofen*

Tom Donohue……..Rhys McComack-Morris*

Charlotte Purcell……..Theresa Pohl

Frances O'Connoll……Allie Straeck*

Pearl Payne……..…….Kennedy Shumate

Rufus Reed…….….……William Bridgwater*

Director……..…….……...Olivia Trusty*

Stage Manager…….……...Sydney Versen*

Assistant Stage Manager(s)……. Deedee Jansen & Elizabeth Funderburk

Lighting……...……...……. Liz Banks

Board Op……...…….…… Aguiele Ndoungla

Sound Design and Board Op……..…….……. Chase Chavez

Scenic Design…….……Dan Pucul*

Costumes…….……..……Brooke Lee

Props Master…….……...……. Sawyer Ahmad*

Crew……..…….…...Megan Kiel

Projection Design and Op……..……Mia Rios

Stage Makeup Artists…….……. Mia Rios & Bailey Payne

House Manager……..……..Bailey Payne

*Denotes membership in Alpha Psi Omega

Austin College Improv Troupe
Performances follow
These Shining Lives at the
Beardsley Arena Theatre

Thursday, March 24, 2022 -
Saturday, March 26

Olivia Trusty
Chloë Bachofen
Shannon Fagen
Katelyn McComack-Morris
Grant Garrison
Lindy Luker
Roshni Khosla
Percy Stout
Deedee Jansen

Coached by Dr. Kirk Everist

Art & Poetry Readings

Raise Your Voice

Suspension Literary Magazine
Saturday, March 26 5:00
Forster Art Complex

Sonia Charales
Larry Ramírez Quintana
Sawyer Ahmad
Amulya Balusu
Sydrah Maher
Apoorva Sakthivel
Délice Dembe
Aguiele Ndoungla
Roshni Khosla
Mya Thomas
Laila Al-Rifai
Leo Dickinson
Timarea Kimbrough
Minaal Syed
Becca Tobias
Alyssa Vyrva
Breana Wooten
Chloë Bachofen

Music

Conference Music Recital

Saturday, March 26 4:00 pm - 4:50 pm
Craig Recital Hall

L'Estro Armonico: Vivaldi's Harmonic Whim

A Lecture Recital by

Andrew Kim, '22, *violin*
Andres Hernandez, '22, *violin*

Assisted by

Timothy Jenkins, *piano*

Are you Creative?
Are you Artistic?
Are you Imaginative?

SUBMIT YOUR WORK TO
SUSPENSION
LITERARY MAGAZINE

POETRY
FICTION
DRAMA
PHOTOGRAPHY
ESSAY
ART
ORIGINAL WORK

Send inquiries and submissions to:
suspension@austincollege.edu

ACUMEN
Call for Papers

ACUMEN is *Austin College's student-run journal of research. Are you involved in a research project on campus? Have you written a paper for class you are particularly proud of?*
Submit your paper for publication!
All subjects welcome.

How to Submit
Send your research paper (with bibliography) as .doc or .rtf to
acumen@austincollege.edu

Submission Guidelines

- Submissions should be approximately 7-20 pages in length.
- Submissions may be the products of individual or class research, directed or independent studies. Please do not submit work that is up for publication elsewhere, such as honors theses or research done in collaboration with AC faculty.
- Students should consider their audience to be generally educated and well read. However, the emphasis on interdisciplinary exchange of ideas requires that technical terminology from any field be generally explained for this audience.
- Submissions may be selected for publication on a conditional basis, provided the student makes the necessary revisions.
- All papers must follow college guidelines for academic integrity.

For more information, or if you are interested in participating in Acumen as a member of the review board, please email the editor at **acumen@austincollege.edu**

Sponsors

CREATE@AC

Austin College
is an enhanced institutional member of the
Council on Undergraduate Research
Learning Through Research

Sigma Xi
The Scientific Research Honor Society

Acumen *(Student Research Journal)*

Suspension Literary Journal

WHAT DID YOU LEARN TODAY?

We are interested in hearing about your presentation experience at the 2022 ACSC.

Participate in a Research survey for a chance to WIN a prize!!!

You have two options:

1. use the QR code provided below, then email your confirmation page to CREATE@austincollege.edu

or

2. Sign-in and complete the survey at the registration table or with one of our volunteers

Index

Index

Index

Index

What will you CREATE@AC?

Center for Research, Experiential, Artistic & Transformative Education

CREATE is the home for student research at Austin College. Located in the Wright Campus Center, Room 204, CREATE helps administer opportunities for Undergraduate Research for the students of Austin College. There are several different ways for you to get involved with research: via the classroom or independently, with group or individual research projects. Each project will have a mentoring faculty member to guide you through the process. CREATE will have opportunities throughout the year for you to show your work and share your knowledge.

Director of CREATE
Renee Countryman

ACSC Coordinator
Renee Countryman

Scarbrough Coordinator
Mindy Landeck

Sciences Summer Research Coordinator
David Aiello

Departmental Honors Program Director
Scott Langton

ENSURE Coordinator
Lance Barton

Members at Large
Mikidadu Mohammed
Loriann Garcia
David Whelan

Congratulations to the 2nd Place Winner of the
2022 Schedule Poster Artwork
Joseph Cernero '25
Intended Majors: Public Health & Business