



AUSTIN COLLEGE  
STUDENT  
SCHOLARSHIP  
CONFERENCE

MARCH 20 & 21, 2020

# Welcome

Welcome to the eighth annual Austin College Student Scholarship Conference, a celebration of our students' intellectual curiosity and their participation in the pursuit of new knowledge and new achievement.

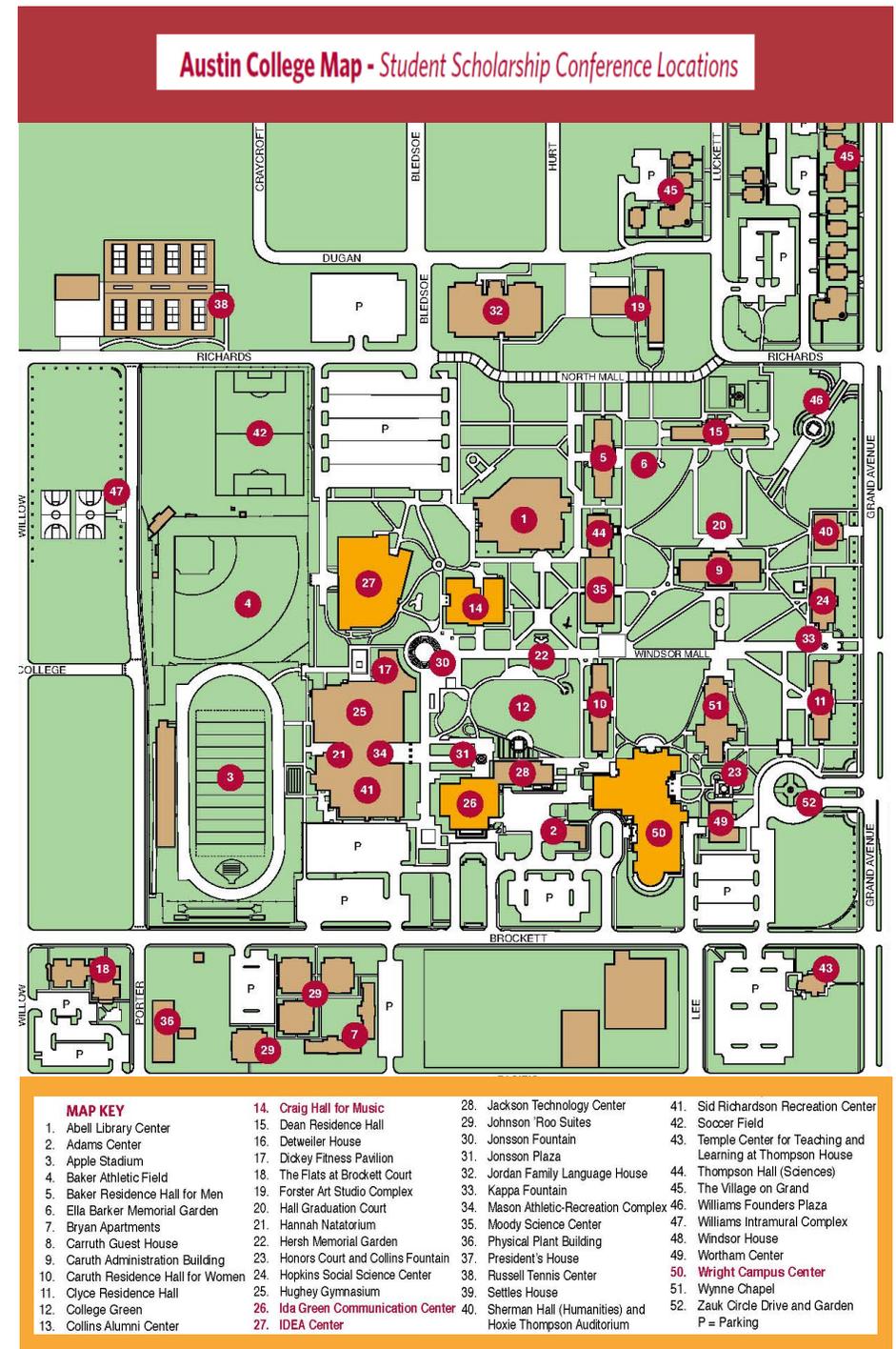
One of the hallmarks of an Austin College education is our belief that learning takes place everywhere. Our students go beyond the boundaries of the classroom and into the laboratory, the studio, the stage, and the community. The work presented here demonstrates how students have extended their learning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



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# Schedule of Events

## Thursday

7:00 - 7:45 p.m.	Elevator Speech Competition	Idea Center Atrium
8:00 - 9:00 p.m.	Improv	Idea Center
9:15 - 10:15 p.m.	Star Party	Idea Center Atrium & Adams Observatory

## Friday

1:00 - 3:00 p.m.	Poster Session I	Mabee Hall
3:00 - 4:20 p.m.	Oral Session I	Wright Campus Center Rooms
4:30 - 5:30 p.m.	Music Recital	Craig Hall Music Hall
5:30 - 7:30 p.m.	Art Reception	Craig Hall Art Gallery
7:30 p.m.	<i>An A Capella Midsummer Night's Dream</i> By Michael Ching and William Shakespeare	

# Schedule of Events

## Saturday

8:00 - 10:00 a.m.

Poster Session II

Mabee Hall

10:00 - 11:20 a.m.

Oral Session II

Wright Campus Center Rooms

11:30 - 12:30 p.m.

Honors Research Panel

Wynne Chapel

1:00 - 2:20 p.m.

Oral Session III

Wright Campus Center Rooms

2:30 - 3:50 p.m.

Oral Session IV

Wright Campus Center Rooms

4:00 - 5:00 p.m.

Oral Session V

Wright Campus Center Rooms

7:30 p.m.

*An A Capella Midsummer Night's Dream*

By Michael Ching and William Shakespeare

Wynne Chapel

# Student Contributors

Sawyer Ahmad	Haydee Fuentes
Esmeraldo Alejo	Andrew Fletcher
Emily Aller	Alex Garcia
Abigail Anderson	Grant Garrison
Austin Andrie	Zoe Garrett
Piriton Angaye	Ricardo Garza
Taqwa Armstrong	Christian Ghermay
Jasmine Babool	Caroline Glaister
Chloe Bachofen	Abigail Goodman
Shelby Bagby	Kaylan Guvernator
Jacob Baker	Morgan Hall
Nicole Baker	Nadia Hannon
Phung Banh	Sarah Harper
Hannah Barry	Saif Haque
Siran Berberian	John Haynes
Imran Blackall	D'Ara Henderson-Starkes
Erin Bobbitt	Andres Hernandez
Mackenzie Bolen	Jessica Hoffman
Madison Bolin	Seth Howard
Santos Botello	Hannah Hunt
Rachel Bowman	Allan Izaguirre
Kyle Breed	Anusha Jacob
Lois Bronaugh	Harper Jambor
Ashley Campos	Kailer Jones
Ashley Charales	Ethan Jordan
Nicholas Chaviers	Sarah Joseph
Kiera Chevalier	Prithvi Kalkunte
Chad Childress	Holly Kapp
Emily Collins	Kaitlin Kelley
Mason Corry	Yusuf Khan
Zoe Crews	Andrew Kim
Michaela Davis	Haeun Kim
Emily Davis	Varun Kotipalli
Andrew Dawson	Alvin LeBlanc
Vivianna Denittis	Chandler Lee
Hallie Dickerson	Matt Li
Maxwell Dodd	Todd Liang
Mandy Eckhardt	Brian Linares
Ashley Elliott	Kennedy Linder
Leslie Erwin	Elisha Lisson
Kiersten Esposito	Jack Lockhart
Bryan Fajardo	Matthew Lopez
Shannon Fagen	Brandon Mai
Kat Forbus	Pranavya Manickavelu
Abbey Franke	Allen Mankin
Nicholaus Frederick	Siddharth Marella
Lihlu Fuentes	Kianna Marrs

# Student Contributors

Adonis Martin  
Brycen Martz  
Paola Matus  
William McCarthy  
Charles McIntyre  
Malcolm McLeod  
Kristina McLeod van-Amstel  
Emily McMillan  
Brittany McMillen  
Michael Megenhardt  
Kevin Miranda  
Scout McComack-Morris  
Caelie Morris  
Oyindamola Olufosoye  
Melika Monfared  
Paul Mpunga  
Kirsten Munson  
Yamuna Nampoothiri  
Henry Neal  
Brian Nguyen  
Helen Nguyen  
Myhien Nguyen  
Caroline Ogden  
Madelyn Oliver  
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Manuella Owusu  
Elizabeth Pack  
Emma Page  
Tajal Patel  
Addie Pederson  
Valery Piachonkina  
Evan Powell  
Jordan Proctor  
Ariana Quirino  
Larry Quintana  
Anika Rajesh  
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Michelle Ramirez  
Natalie Randall  
Bennett Reagan  
Meghan Reeves  
Madeleine Reinhardt  
Abigail Reyes  
Callier Reynolds  
Toni Richards  
Zoe Rice  
Abby Ross

Austin Rue  
Janet Salazar  
Sarah Safarimaryaki  
Ruthann Schmiege  
Chloe Schnaible  
Andrea Selkow  
Priya Shah  
Tawfeeq Shaik  
Logan Shevalier  
Sylvia Sit  
Sarah Smith  
Allie Straeck  
Logan Taylor  
Stephen Tenney  
James Tessmer  
John Thompson  
Bridget Tolle  
Anh Tran  
Matthew Tran  
Kathy Tran  
Olivia Trusty  
Shreya Uppala  
Gwen Vandereveire  
Jillian Vandergrift  
Jimreeves Varghese  
Reshma Varughese  
Sydney Versen  
Kathryn Voelkel  
Zoya Waheed  
Elizabeth Waldie  
Micah Weber  
Claire Welton  
Alisa White  
Renee White  
Regan Wilkins  
Michael Winterrowd  
Cecilia Yip  
Rachel Young  
Richard Zhu  
Maggie Zumwalt

# Committee

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## **Coordinator**

Renee Countryman

## **Associate Coordinator**

David Whelan

## **Humanities Representatives**

Kirk Everist

Tom Blake

## **Fine Arts Representatives**

Ricky Duhaime

Mark Monroe

## **Sciences Representatives**

Andrea Overbay

David Aiello

## **Social Sciences Representative**

Ashley Tharayil

## **Student Support**

Aneurin Minson

## **Administrative Support**

Amy Parsons

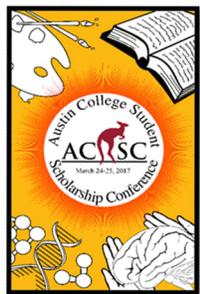
## “Art Contest Winner”

Congratulations to the Winner of the 2020  
Abstract Book Cover Artwork  
Design Contest

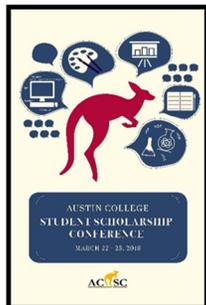
Nadia Hannon '21

Major: Computer Science & Physics  
Minor: Art & Mathematics

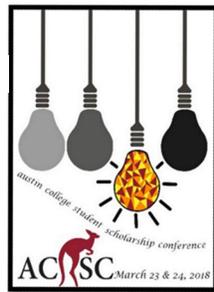
If you are interested in seeing your art work on our cover or on the posters we will use to advertise our 2021 Austin College Scholarship Conference, please keep in mind that next year's due date will be at the beginning of the Spring 2021 semester.



2017 Winner Kye Smith



2019 Winner Phung Banh



2018 Winner Rachel Thompson

## Elevator Speech Competition

Thursday, March 19 from 7:00 - 8:30 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.

### What is an elevator Speech?

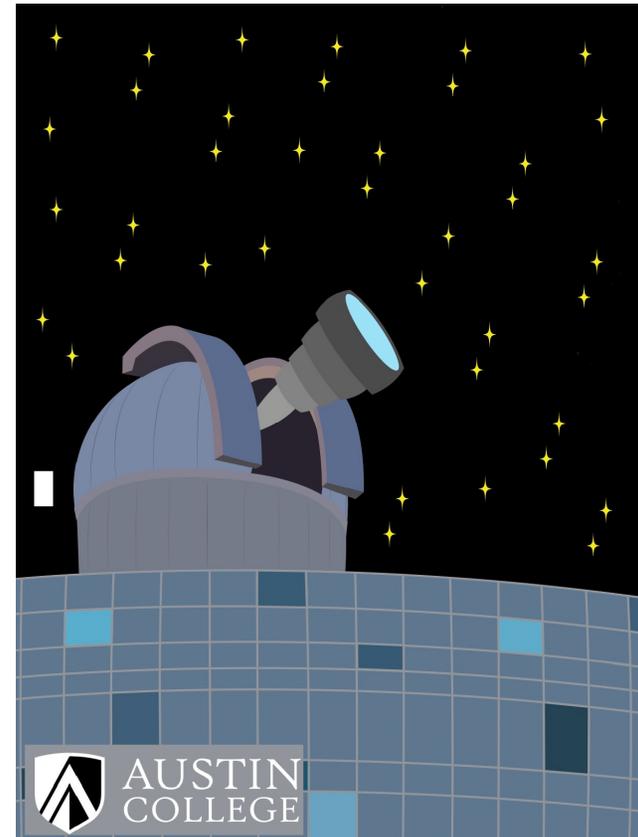
Imagine that you have just entered an elevator with Bill and Melinda Gates, who have enough money to fund any research project (and do in many different disciplines). They smile, say hello, and ask “why are you here this evening?” They are now your captive audience for this short elevator ride on your 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?

**Austin College Improv Troupe**  
**Thursday, March 19, 2020**  
**From 8:00 pm - 9:15 pm**

Abigail Goodman  
Callier Creedle Reynolds  
Chloe Bachofen  
D'ara Henderson-Starkes  
Grant Garrison  
Scout McComack-Morris  
Kyle Andrie  
Nick Chaviers  
Olivia Trusty  
Reid Zimmerman  
Shannon Fagen

**Star Party**

Join us on Thursday, March 19, 2020 from  
9:15p.m. - 10:15p.m. in the Idea Center Atrium/  
Adams Observatory.  
View the stars through the largest research  
telescope in North Texas!



# Poster Sessions

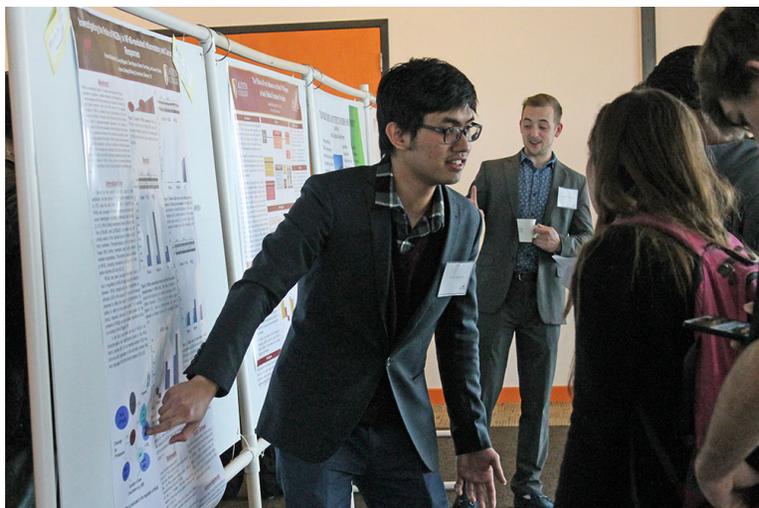
## Mabee Hall

### Session 1: Odd Numbers

Friday, March 20, 1:00 p.m. - 3:00 p.m.

### Session 2: Even Numbers

Saturday, March 21, 8:00 a.m. - 10:00 a.m.



## Investigating the Role of Transcriptional Activators on Altered Gene Expression in *S. cerevisiae* Mutants lacking *PGM2*

Madelyn Oliver<sup>1</sup>, Ruthann Schmiege<sup>1</sup>, Keara Malone<sup>1</sup>,  
Spencer Nystrom<sup>2</sup>, Rachel Jimenez<sup>1</sup>,  
Mandy Eckhardt<sup>1</sup>, Paul Mpunga<sup>1</sup>, Courtney  
Goldstein<sup>1</sup>, Ashley Charales<sup>1</sup> & David Aiello<sup>1</sup>  
Biology Department, Austin College<sup>1</sup>,  
Genetics & Molecular Biology, University of North  
Caroline at Chapel Hill<sup>2</sup>  
Abstract # 1

In *Saccharomyces cerevisiae*, the enzyme phosphoglucomutase (PGM) facilitates the interconversion of Glc-1-P and Glc-6-P. For cells grown on galactose-containing media, the loss of the major isoform of phosphoglucomutase, encoded for by *PGM2*, results in an imbalanced ratio of G1P and G6P relative to wt. In addition, *pgm2Δ* mutants have a slow growth phenotype on galactose and display defects in calcium homeostasis. The current working model of the lab hypothesizes that this altered G1P to G6P ratio results in abnormal uptake and compartmentalization of calcium within the cell, and, in turn, hyperactivates various stress signaling pathways that alter gene expression. Using RNA-Seq and DESEQ-2 analysis, a list of genes were compiled which showed altered gene expression between wt and *pgm2Δ* strains. These results were then analyzed using DREME analysis to determine transcription factors that might be coordinately regulating subsets of these genes. CRZ1 and RLMI were identified as potentially playing a role in the upregulation of a number of these genes. To experimentally confirm these results, this project is using chromatin immunoprecipitation (ChIP) to confirm the presence of these transcription factors at the promoters of genes of interest identified by the RNA Seq analysis.

## **Circular and Spherical Symmetry in Staircase Metric Tori**

Austin Andrie & Jack Mealy

Mathematics and Computer Science Department,

Austin College

Abstract #2

Staircase Metric Manifolds are boundaries between spaces of different densities. In this project, we analyze two specific types of constant-positive-curvature staircase metric manifold tori. A staircase metric torus is one in which the identified boundaries are of different sizes, creating a local angle change effect upon crossing the boundary, similar to a basic staircase metric manifold. Geodesics on the observed tori are found to exhibit pleasing symmetry. The math behind staircase metric manifolds and the creation of these tori are explained, as well as the calculation of geodesics on these tori.

## **Promoting Nutritional Wellness Through Community-based Collaboration**

Alisa White & Martinella Dryburgh

Leadership Studies, Austin College

Abstract #3

This project presents the interdisciplinary efforts of institutional and community entities united under the common goal of promoting community wellness in the Sherman area. I present my experiences as an intern for the Social Entrepreneurship for Poverty Alleviation (SEPA) program partnered with Masterkey Ministries to work in supporting Masterkey's food assistance program. Through development of an official case statement for the food services of Masterkey, this effort seeks to enhance community wellness by supporting the founding principles of culinary medicine and by decreasing food insecurity within the Texoma region. This project demonstrates the ability of community partnership to facilitate the development of community wellness along with the development of strong servant leaders, making an impact both within and beyond the individual and Austin College community.

## **Toward a Cyclic Supramolecular Square Using [Pt(mnt)(4,4'-bpy)<sub>2</sub>] Building Blocks**

Claire Welton & Brad Smucker  
Chemistry Department, Austin College  
Abstract #4

As a continuation of our goal of generating platinum-based supramolecular squares incorporating dithiolate ligands, [Pt(mnt)(4,4'bpy)<sub>2</sub>] (mnt = 1,2-dicyanoethene-1,2-dithiolate, 4,4'bpy = 4,4'-bipyridine), which contains two monotopic 4,4'bpy ligands, was reacted with platinum(II) complexes possessing exchangeable ligands. Various reaction conditions such as solvent polarity and reaction temperature were employed to favor cyclic products. Characterization of the soluble products with UV-vis and <sup>1</sup>HNMR spectroscopy yielded evidence for a bridging 4,4'bpy ligand, which supports the formation of a supramolecular square.

## **Characterizing Cell Proliferation and Migration Phenotypes of Mutagenized MEF Cells and Tumorigenic A9 Cells**

Emily Aller, Reshma Varughese, Kyle Breed,  
& Lance Barton  
Biology Department, Austin College  
Abstract #5

Cancer is a collection of diseases best defined by the deregulation of a cell's biology to promote uncontrolled proliferation. The progression of this tumorigenic behavior is primarily driven through the accumulation of mutations that promote the cell's ability to proliferate and ultimately allow the cell to colonize distant tissues in a process known as metastasis. In order to better understand the process of tumorigenesis, we have taken mutagenized MEF (mMEF) cells and investigated their genetic stability and capacity to proliferate, and then compared these data to those of tumorigenic A9 cells. In doing so, we hypothesized that mutagenizing the MEF cells would result in behaviors similar to the tumorigenic A9 cell line. Propidium iodide staining indicated that mMEF cells progressed faster through the cell cycle than A9 cells, and the mMEF cells were found to have an increased capacity to migrate via Transwell assay. However, scratch assays contradicted this data with the A9s moving farther into the scratch than mMEF cells. Thus while the data suggest that mMEF cells have gained mutations allowing for increased proliferation and migration, the resulting phenotypic changes appear to mimic those of A9 cells only some of the time. The mMEF cells were found to have mis-sense mutations to both the gene encoding p53 and the one encoding akt1, which have roles in regulation of the cell cycle. Overall, these data support the importance of deregulation of cell proliferation and promoting invasion in tumorigenesis; however, the observed difference between our mMEF cells and A9 cells indicate that the ways a cancer achieves this can vary significantly between cell lines.

## **The Relationship Between Social Media Use and FoMO in College Students**

Abigail Anderson, Elizabeth Waldie, Shannon Fagen,  
& Renee Countryman

Psychology Department, Austin College

Abstract #6

The relatively recent emergence of social media as a significant aspect of daily life has shifted the way human beings interact and understand one another. It is important to better understand the impacts of this shift due to the high prevalence of social media use, especially among young people. Data from Pew Research Center revealed that 88% of 18-29 year olds in the United States use at least one form of social media (Smith & Anderson, 2018). Fear of missing out (FoMO) is a new anxiety related to being left out or excluded from potentially rewarding experiences, connections, or opportunities (Przybylski, Murayama, Dehaan, & Gladwell, 2013). In our project, we measured the relationship between social media use and FoMO. In addition, we examined possible moderators that influence this relationship, including, academic self-concept, social media “influencers,” and friend groups. We used an online self-report survey to gather relevant data from psychology students at Austin College and we have so far had over 100 responses. In our data so far, we have found several general trends: students heavily use social media, with 56% of respondents reporting that they use social media to keep informed about what happens. In addition, 48% of respondents said they fear that others are having more rewarding experiences than them. We are also examining academic self-concept and collecting more data on both FoMO and social media use. If the data continues on its current trajectory, we expect to see a positive correlation between social media use and FoMO, and academic self-concept could possibly be a protector against FoMO. The development of FoMO is associated with many negative consequences, including decreased well-being, specifically in areas of mood and life satisfaction (Przybylski et al., 2013). The high prevalence and various negative consequences of FoMO as developed in association with social media use, a significant and mostly unavoidable aspect of modern human interaction, indicates a need for identified risk factors of this relationship. If risk factors that influence the relationship between social media use and FoMO can be established and eventually reduced, then well-being and mental health, among other variables, can be improved in our current society.

## **The Intrinsic Value of the Exchange Rate**

Oyindamola Olufosoye & Mikidadu Mohammed

Economics Department, Austin College

Abstract #7

The aim of this research is to examine the socio-cultural determinants of a country's exchange rate. The idea is that exchange rate is driven more by nonmarket valuation such as cultural preferences than market forces, and that, rather than actual market prices, consumer willingness to pay (WTP) for identical goods – one produced domestically and one imported – is a stronger predictor of exchange rate. Therefore, for any given two countries, the exchange rate is simply the ratio of the willingness to pay for a foreign good (WTPFG) to the willingness to pay for a locally produced identical good (WTPLIG). To test this hypothesis, I use a survey to gather data concerning consumer preferences in Singapore. The survey results show that there is a strong preference for American goods in Singapore and that Singaporeans were willing to pay more for American goods than locally produced identical substitutes. Furthermore, using the survey data, I calculated an exchange rate of S\$1.48 to \$1 compared to the actual exchange rate S\$1.36 to \$1 on 7/18/2019, implying that preference for foreign imported goods over domestic equivalents exerts a depreciation pressure on the local currency. This is also supported by the empirical estimates. Taken together, the findings suggest that cultural preferences, a non-market factor, is a good predictor of exchange rates. Thus, governments should also consider cultural intervention as part of its exchange rate stabilization policies.

## **Determining the Effects of Mutation on Alpha-crystallin B Chaperone Activity**

Alvin LeBlanc & James Hebda  
Chemistry Department, Austin College  
Abstract #8

In this project, I ran aggregation assays utilizing insulin and mutant ABX crystallin proteins in order to determine the effects of mutation on chaperone function and activity.

## **Exploring the Underlying Mechanisms of Tumorigenesis through Mutagenesis of Mouse Embryonic Fibroblasts**

Varun Kotipalli, Kristina McLeod-van Amstel,  
Jordan Proctor, Todd Liang, & Lance Barton  
Biology Department, Austin College  
Abstract #9

Cancer is the second leading cause of death in the United States, and is therefore the topic of much of today's research. Previous researchers have identified ten hallmarks that characterize cancer. The accumulation of these hallmarks is a trait of tumorigenesis. Understanding this progression from normal to cancerous phenotypes provides more insight on the underlying genetic and metabolic changes within cells. One gene that has been shown to be upregulated in various cancers such as Lewis Lung Carcinoma (LL/2) is PA28 $\gamma$ . To better understand its role in tumorigenesis, PA28 $\gamma$ -deficient mouse embryonic fibroblasts (MEF) cells were isolated and mutagenized with known carcinogens (EMS and MNNG). These "knockout" cancer clones (KOCC) were then characterized and compared to the cancer cell line, LL/2. Genes that are commonly mutated in cancer cells were sequenced. Unfortunately no coding missense mutations were identified, however LL/2 cells showed elevated aneuploid properties by flow cytometry. Scratch migration assays showed that the semi-adherent LL/2 cells exhibited more metastatic ability than the KOCC cells. However, transwell assays revealed that KOCC cells could travel through a synthetic membrane, that allowed for a mimic of two different microenvironments, more effectively than LL/2 cells. The effect of using chemotherapeutics against cell lines to compare resulting viability of cell lines was also investigated. Taxol reduced viability of the KOCC by about 45%, while it had no dramatic effect on LL/2 cells. Streptozocin had little to no effect on both cell lines. These data suggest that KOCC and LL/2 cells differ in the capacity to display key hallmarks of cancer.

## **Investigating the Metabolic Effects of Eip93f**

Cecilia Yip<sup>1</sup>, Steven Wyler<sup>2</sup>, Angie Bookout<sup>2</sup>, Joel Elmquist<sup>2</sup>, & Kelli Carroll<sup>1</sup>

Biology Department, Austin College<sup>1</sup> & Department of Pharmacology, UT Southwestern Medical Center<sup>2</sup>

Abstract #10

The increasing prevalence of obesity and adult-onset diabetes represents a major health crisis in the United States. These disorders result from a complex interaction of multiple genetic, environmental, and behavioral factors. The Elmquist lab is interested in identifying genes contributing to these diseases. Our lab performed a *Drosophila* screen to identify potential metabolic regulators in neurons (Figure 1). From this screen, we identified the gene ecdysone-induced protein 93f (or E93f) as a putative metabolic regulator. E93f is a transcription factor co-regulator known to play a vital role in programmed cell death during *Drosophila* growth and development. In mammals, the orthologs of this gene are Lcor and Lcorl which have been studied mainly in livestock and are associated with height and body size. Here, we sought to understand the causes of the phenotypes observed from E93f knock-down flies and eventually aim to identify which neurons are required for E93f to enact its metabolic function.

## **Small But Mighty: The Rehabilitation Center's Mission to Expand Speech Therapy Services to the Children of Grayson County**

Yamuna Nampoothiri & Nate Bigelow  
Public Health Department, Austin College

Abstract #11

This summer, I participated in the Social Entrepreneurship and Poverty Alleviation program. (SEPA) This internship pairs students with local nonprofit agencies to help them write grants. The Rehabilitation Center is a nonprofit organization located in Grayson County. They focus on providing rehabilitative services, such as physical, occupational, and speech therapy to the indigent population of Grayson County. A part of TRC's mission statement is that they service everyone, regardless of if they are insured or not. A major program that has surfaced in TRC is the Small But Mighty Program. This program provides speech therapy to indigent children ages 0-18. This paper explores the initiation of speech therapy in a public health context as well as the outcomes of the Small But Mighty program, including success stories and the implementation of speech programs into the public schools of Grayson County after the effectiveness of Small But Mighty. Overall, the importance of the Small But Mighty program in the context of language development for indigent children is highlighted.

## **A Surprise in the Synthesis of Dithioisonicotinate and Coordination with 2+ Metals**

Henry Neal & Brad Smucker  
Chemistry Department, Austin College  
Abstract #12

As part of our continued exploration in generating light-harvesting supramolecular complexes utilizing thiol-based ligands, we report an alternative synthesis of the dithioisonicotinate (dtina) ligand using Lawesson's reagent. Bis-dtina complexes with  $M^{2+}$  ( $M = Ni, Cu, \text{ or } Zn$ ) were also synthesized and characterized. These insoluble compounds were characterized by IR spectroscopy which confirmed the formation of the coordinated complexes. The UV-vis spectra of the soluble  $[Pt(bpy)(dtina)]PF_6$  complex, possessing only one dtina ligand, has absorptions in the UV and visible regions.

## **PA28 $\gamma$ Expression Does Not Determine ER $\alpha$ Expression in Mammary Cancer Cells**

Brittany McMillen, Jessica Hoffman, & Lance Barton  
Biology Department, Austin College  
Abstract #13

The proteasome activator PA28 $\gamma$  shows increased expression in cancer cells and is positively correlated with cancer severity. Through its role as a proteasome activator, PA28 $\gamma$  has been associated with protein stability and gene expression affecting cancer growth. One possible mechanism in which PA28 $\gamma$  has been connected to breast cancer growth is through regulating levels of the estrogen receptor, ER $\alpha$ . ER $\alpha$  expression can be correlated with the growth and severity of human breast cancers. Many human breast cancers are ER $\alpha$  positive and show estrogen dependent growth. The purpose of this research was to further evaluate whether PA28 $\gamma$  and ER $\alpha$  are correlated across multiple mammary cancer cell types. Furthermore, the gene activity of ER $\alpha$  can be measured by evaluating the transcription rates of ER $\alpha$  gene targets. Cathepsin D, the gene target being measured in these experiments, is a lysosomal protease whose transcription is promoted by ER $\alpha$ . Western blot data showed that cells with increased concentration of PA28 $\gamma$  protein were not significantly correlated to protein concentration of ER $\alpha$  as expected. RT-qPCR data showed that there was no universal correlation between PA28 $\gamma$  concentration and ER $\alpha$  gene expression, which was consistent with the western blot results. Additionally, RT-qPCR demonstrated that cathepsin D gene expression is not tightly correlated with ER $\alpha$  gene expression. Therefore, alterations in PA28 $\gamma$  expression do not affect ER $\alpha$  expression or activity in mammary cancer cell lines.

## **Are You Lonely? Factors that Predict Loneliness in Undergraduates**

Ashley Campos, Kevin Miranda, Regan Wilkins,  
& Renee Countryman  
Psychology Department, Austin College  
Abstract #14

Loneliness is defined as the feelings associated with the want and need to belong and because of this, loneliness can affect social, internet/media, and academic behaviors. Our study aimed to explore how college students perceive their loneliness and the effects of loneliness on their social behaviors. Undergraduate students (male = 41; female = 104), from the Austin College Psychology Participant Pool, were asked to complete a series of surveys on Survey Monkey. The students were then asked to rate the quality of their interpersonal relationships, quality of self-care, their average internet usage behaviors, and their perceptions of loneliness. Austin College students reported low levels of loneliness, strong interpersonal relationships, few internet addictive behaviors, and positive self-care. Several correlations were found: (a) students whom had higher levels of loneliness had higher levels of internet addiction, (b) students with higher levels of loneliness had low perceived interpersonal relationship quality, and (c) students whom had higher perceived loneliness had lower self-care scores. Levels of self-care, internet addiction, and quality of interpersonal relationships account for 36% of the variance found within loneliness. For future research, we would be interested in studying shyness in students and trying to understand the relationship between shyness and loneliness. We would also be interested in studying whether shyness can act as a moderator or mediator of feeling lonely.

## **Nanoparticle Drug Delivery of rHDL-DMXAA as a Vehicle for Anti-Cancer Drugs**

Melika Monfared<sup>1</sup> & Andras Lacko<sup>2</sup>  
Chemistry Department, Austin College<sup>1</sup>,  
Department of Physiology & Anatomy,  
University of North Texas Health Science Center<sup>2</sup>  
Abstract #15

In the United States alone, 1.8 million people were diagnosed with cancer in the past year (National Cancer Institute: SEER). Common treatments include surgery, stem cell transplant, immunotherapy, radiation therapy, and chemotherapy (National Cancer Institute). While these treatments may help, the side effects patients experience is largely negative. Side effects vary from hair loss, body soreness and fatigue, nausea, a compromised immune system, and damage to healthy cells. This lab attempts to create a new chemotherapy formulation that is highly specific for cancer cells only, can be administered through an IV or directly into a cancerous region, and significantly reduces the side effects of treatment. Just recently the lab has shifted into the pre-clinical phase with the hopes of becoming a new commercial drug in the upcoming decade. The drug formulation is made up of Vadimezan (DMXAA) and lipoproteins. We expect the rHDL-DMXAA to revert TAMs from M2 pro-tumoral phenotype back to M1 anti-tumoral phenotype so cancer regression may be observed. There were several techniques used to create the formulation such as conventional dialysis, filtering the components on a PD-10 column, conventional cholate dialysis with and without PEG, and the use of a nanoassembler with and without PEG. The desired end product must be approximately 50 nm, homogeneous, have a negative zeta potential, a high encapsulation efficiency, and an anisotropy ratio in favor of bound drug. As of now, only characteristics of different drug formulations have been collected as the techniques described above are being revised after each new formulation.

## **RR Lyrae Variable Stars in Globular Cluster Messier 15**

Bennett Reagan, Chloe Schnaible, Maxwell Dodd,  
Michael Winterrowd, & David Whelan  
Physics Department, Austin College  
Abstract #16

We present light curves of RR Lyrae variable stars observed in the globular cluster, Messier 15. We find the periods of oscillation for ten RR Lyrae variables, and use the Period-Luminosity relationship to determine their power output, and therefore their approximate distances from us. We then determine the distance to Messier 15 and compare it to values from the literature. We additionally comment on the methods used to compute the uncertainties in our data points, and make recommendations for best methods of pursuing aperture photometry with the Adams Observatory 24-inch telescope.

## **Construction of a Chirped-Pulse Fourier Transform Microwave Spectrometer**

Imran Blackall, Mason Corry, & Lindsay Zack  
Chemistry Department, Austin College  
Abstract #17

To acquire rotational spectra of gas phase samples, Chirped-Pulse Fourier-Transform Microwave (CP-FTMW) techniques have been greatly utilized due to their high sensitivity, quick data acquisition, and broad bandwidth. CP-FTMW spectrometers typically are built with expensive arbitrary waveform generators (AWGs), high-speed digitizers or oscilloscopes, vacuum systems, and other costly components. A cost-efficient alternative to previously reported CP-FTMW instruments operating in the 8-18 GHz range has been designed and constructed. In this spectrometer, several expensive components have been substituted with lower-cost components that perform similarly and will preserve high spectral resolution. The AWG, used to generate chirped pulses, has been substituted with an AD9914 evaluation board, which can produce chirped pulses via direct digital synthesis (DDS). The detector, which is usually a high-speed digitizer or high-bandwidth oscilloscope, has been replaced by a lower-bandwidth oscilloscope. Additionally, a waveguide coil will be used instead of a traditional vacuum chamber, with the vacuum system based on a refurbished 2" diffusion pump. Other cost-saving measures include the use of USB frequency synthesizers and lower power amplifiers. The design and construction of the spectrometer will be presented along with a discussion of our current progress.

## **Implication of Choice of Burrow Location in the Thirteen-Lined Ground Squirrel (*Ictidomys tridecemlineatus*)**

Taqwa Armstrong, Emily Davis,  
Hallie Dickerson, & Jessica Healy  
Biology Department, Austin College  
Abstract #18

Thirteen-lined ground squirrels (TLGS) range from Texas to Canada, but recently there are fewer colonies in the southern portion of their range, possibly due to food shortages, habitat fragmentation, or climate change, including flooding of burrows while animals are in torpor. Little is known about the potential effects of climatic differences on burrowing behavior or life history characteristics. To fill this gap we live-trapped and examined life history characteristics (reproduction, behavior, hibernation pattern, and choice of burrow location) of TLGS across a latitudinal range from TX to MN. By measuring the relative abundance of preferred food in areas with and without burrows, I hypothesized that areas with burrows would have a higher food density within a 2m radius than areas without burrows. Alternatively, I hypothesized that more burrows would be located close to headstones than in the open, as headstones could be protective against predation. Neither hypothesis was supported by our data and suggests that food and protection alone cannot predict burrow location. Therefore, some other characteristics such as soil texture could explain burrow choice. Soil analysis showed that (with the exception of TX) the organic matter decreased as we progressed North, however less organic matter suggests MN was mostly sandy, however this was not what was observed. Many southern populations were in areas with clay soil, which is susceptible to water retention and flash flooding events. This has implications for the survival of populations in other areas of the species range with similar soil types as the climate continues to change and these flooding events become more common.

## **Effects of Non-Lethal Predator Cues on *Aedes aegypti***

Matt Li, Sarah Joseph, Anusha Jacob,  
& Loriann Garcia  
Biology Department, Austin College  
Abstract #19

Predator exposure can alter mosquito morphology, behavior, and life history. The alteration of these characteristics during larval stages may impact the mosquito's ability to vector diseases as adults by affecting mosquito immune systems. To explore this phenomenon, we investigated the effects of non-lethal interactions with mosquito larval predators, dragonfly larvae (Odonata: Libellulidae), on *Aedes aegypti* (Diptera: Culicidae) mosquito larvae and adults. Mosquito larvae were raised in three different conditions of non-lethal predator cues in their water trays: control, chemical cues only, and chemical cues with physical cues. Control trays had DI water, while the experimental trays had kairomone water serving as chemical predator cues, or kairomone water with a caged dragonfly larva which served as the physical predator cue. Kairomones are chemical signals emitted by one organism that another species can detect. Kairomone water was prepped by maintaining several Libellulidae larvae in an aquarium. Water was removed from this aquarium as needed to use as chemical cue water. We recorded mosquito pupae size, pupation rates, and adult immune system strength for all three conditions. Our data revealed there was no difference in pupal size between all treatment groups, and mosquito larvae in the chemical cues with physical cues pupated faster than the control and chemical conditions. Additionally, mosquitoes reared in the presence of kairomones and physical cues had impaired immune system function, as evidenced by lower phenol oxidase activity. Further research will study the effects of the same non-lethal predator cues on mosquito longevity, adult size, and other immune response factors.

## **Temperature and Relative Humidity Changes over the Past 14 Years at the Austin College Weather Station**

Malcolm McLeod, Emma Page,  
& David Baker  
Physics Department, Austin College  
Abstract #20

In this modern era, even a small amount of change in the global climate can have drastic consequences on many aspects of everyday life. Here we examine changes in air temperature and humidity in Sherman from 2004 to 2018 using Austin College Weather Station data. We plot the average temperature, maximum temperature, minimum temperature, and dew point temperature for each season of every year: Winter (December, January, February), Spring (March, April, May), Summer (June, July, August), and Fall (September, October, November). Over the past 14 years, the overall trend shows that winters have become warmer and moister, while summers have become cooler and drier. Fall months have become moister over the past 14 years. Trends for the spring months are of the same magnitude as measurement uncertainty, so no definitive conclusions can be drawn.

## **Using a CURE to Design Rational Mutations to Disrupt Misfolding**

Jimreeves Varghese, Siddharth Marella,  
& John Richardson  
Chemistry Department, Austin College  
Abstract #21

Beta 2 microglobulin (B2M) is a 99 residue globular protein that is part of the Major Histocompatibility Complex Class I. B2M is a protein that has a tendency to misfold when misfolded B2M can form insoluble aggregates creating amyloid plaques which deposit in the cartilaginous joints of the body. The aggregation of B2M is seen most commonly with patients that are going through the hemodialysis, a procedure to treat renal failure. A year-long course-based undergraduate research experience (CURE) was developed to bridge the first and second semesters of biochemistry. The purpose of this project is to investigate the effect of disrupting the physiochemical composition of an amyloid nucleation site by monitoring the rates of aggregation and fibril formation in comparison to the wild type. Mutants were designed to alter the hexameric sequence (FYLLYY) of amino acids that makes up a putative amyloid nucleation site for the protein. In previous research, it was indicated that this particular hexameric region is a hot spot for nucleating the misfolding reaction. In phase one: mutations were selected, primers designed, PCR amplified, transformation into competent E. Coli cells, and sequenced. In phase two: Bacterial colonies were scaled up, protein expressed, purified, and characterized. Phase three: summer students investigate and troubleshoot the unsuccessful PCR products, certain mutants were able to take up the point mutation successfully while others did not. Furthermore, some of the primer designs created insertion sequences into the E. Coli due to self annealing ends that annealed to each other rather than the bacterial genome. The Camsol program was used to assess which mutant will have the largest difference in solubility from the wild type, and each mutation was ordered in priority from the largest change to the smallest change. The goal of the summer investigation of B2M was to change the procedures to correct for failed mutagenesis.

## Screening and Isolation of Cancer Cells containing CRISPR Deletion of PA28 $\gamma$

Priya Shah, Emily Aller, Varun Kotipalli, Michelle Ramirez, Jessica Hoffman, Brittany McMillen, & Lance Barton  
Biology Department, Austin College  
Abstract #22

One defining hallmark of cancer is characterized by uncontrolled cellular proliferation and by interruption of signaling growth pathways. One possible gene implicated in uncontrolled cellular proliferation may be PA28 $\gamma$ . This gene has shown high levels of expression in cancers, but studies have shown that knocking down PA28 $\gamma$  in cancers containing elevated expression may lead to a slower progression of cell growth. The CRISPR Cas9 genome editing tool was utilized to create a homozygous and partial heterozygous knockout of PA28 $\gamma$  in four murine cell lines that exist at varying stages of carcinogenesis. The goal of this project was to confirm the deletion of the PA28 $\gamma$  gene that was performed using the CRISPR Cas9 genome editing tool. A9, LL2, 4T1, and EPH4 cell lines were screened and isolated for the homozygous knockout of PA28 $\gamma$  gene. The screening was carried out using a combination of identification steps: PCR, T7EI digestion, and Western blotting. The cells that acquired a double edit of the gene and did not express PA28 $\gamma$  were collected and frozen down for future use.

## Fourier Transform Spectroscopy of MgCCH ( $X^2\Sigma^+$ ) and an Attempt to Confirm its Detection in IRC+10216

Sarah Safarimaryaki<sup>1</sup>, Jacob Bernal<sup>2</sup>, Jie Min<sup>2</sup>, Lucy Ziurys<sup>2</sup>, Ming Sun<sup>3</sup>, & Lindsay Zack<sup>1</sup>  
Chemistry Department, Austin College, Department of Chemistry & Biochemistry, University of Arizona<sup>2</sup>, Njing University of Science and Technology<sup>3</sup>  
Abstract #23

The MgCCH radical has been synthesized in the lab using discharge-assisted laser ablation techniques, and its microwave spectrum recorded using Fourier-transform microwave spectroscopy. Twenty-one rotational transitions were measured over a frequency range of 9-50 GHz, with spin-rotation and hydrogen hyperfine splitting observed. By doing a combined fit of the new data and previous millimeter-wave measurements, we have been able to determine the Fermi contact and dipolar coupling hyperfine constants and establish more accurate rest frequencies for an astronomical search. These rest frequencies have been compared to new low-noise spectral line survey data of the carbon-rich, asymptotic giant branch star IRC+10216, taken with the Arizona Radio Observatory (ARO) 12 meter telescope on Kitt Peak, AZ. Although a previous study has reported a tentative detection of MgCCH in IRC+10216, our data indicate that this molecule is not present. The laboratory and astronomical spectra of MgCCH are presented, as well as an analysis of the hyperfine structure of this radical.

## **Cyclin-dependent Kinase and mTOR Pathway shows Additivity in Anti-cancer Activity in Adult T-cell Lymphoma Cancer**

Richard Zhu<sup>1</sup>, Thomas Waldman<sup>2</sup>, Sarvesh Kumar<sup>3</sup>,  
& Masao Nakagawa<sup>4</sup>

Biology Department, Austin College<sup>1</sup>, National  
Cancer Institute<sup>2</sup>, National Institutes of  
Health Bethesda, MD<sup>3</sup> & Hokkaido University<sup>4</sup>

Abstract #24

This work was done under the mentorship of Dr. Sarvesh Kumar, a scientist at NCI/NIH, to perform full-time research on identifying the novel molecular targets/mechanisms of FDA approved therapeutic molecules.

According to literature, there are many signaling pathways involved in the regulation of the cell cycle such as the Cyclin dependent kinases (CDKs) and mTOR. While the CDKs 4 and 6 are responsible for regulating the G1-S checkpoint, the mTOR is responsible for regulating the cell's growth & metabolism. Inhibiting any of these pathways halts the cell from completing its G1 phase, thus terminating cell division. Research in the Kumar group is focused on identifying new therapy for adult T cell lymphoma (ATL) cancer by inhibiting the CDK-mTOR pathways, which play a major role in the cancer cells' proliferation.

This research investigates the anti-tumor activity of CDK and mTOR inhibitors in cellular and animal models; either individually or in combination of both the class of inhibitors. Two different ATL cell lines (ATL ST1 and ATL 43Tb-) were used to investigate the cell specific effects. The results of the experiments were that using both of the drugs together had a synergistic effect in inhibiting cell proliferation. Combining them achieved greater inhibition effect than using the drugs individually.

## **Predictors of Academic Performance and Stress at Austin College**

Kaitlin Kelley, Brycen Martz, Sylvia Sit,  
& Renee Countryman

Psychology Department, Austin College

Abstract #25

This study was conducted to investigate what approaches and habits correlate to optimal college performance. 101 students completed our survey that measured approaches to learning, perceived stress, academic performance, use of college resources, sleep, and eating habits. Individuals with high perceived stress were more likely to have poor academic performance. We found a strategic approach to learning to be optimal, correlating to higher GPA, lower stress and healthier habits. A surface approach showed correlations to high stress and low GPA. We found a surface approach to learning and sleep quality to be significant predictors of perceived stress. Our results suggest an optimal approach to college should focus on strategic qualities and maintaining good sleep quality to achieve high academic performance and low stress.

## Calibration of the Soil Moisture Sensor at the Austin College Weather Station

Allan Izaguirre, Gary Casey,  
& David Baker

Physics Department, Austin College  
Abstract #26

Agriculture in the area depends on soil moisture since it is necessary to know when to irrigate for the best plant growth and resulting crop yield. The Austin College Weather Station uses the Campbell Scientific CS 616 sensor to measure volumetric soil moisture content. The manufacturer recommended calibration equation is inaccurate for our type of soil. We collected soil samples from the Austin College Weather Station to compare the data collected by the sensor and the actual volumetric soil moisture. In order to calculate the volumetric water content of the soil sample, all samples were of the same volume and all were weighed before and after being dried out in an oven (the gravimetric method). The data from these samples were added to our gravimetric data from previous years. From the gravimetric data we ran a regression analysis to derive a more accurate calibration equation using the approach of Udawatta (2010).

## Examining the Requirement for High Affinity Calcium Influx (HACS) in *pgm2Δ* Mutant Strains of *Saccharomyces cerevisiae*

Pranavya Manickavelu, Paul Mpunga, Aarthi Kannan,  
& David Aiello

Biology Department, Austin College  
Abstract #27

Phosphoglucomutase (PGM) is an essential enzyme in yeast carbohydrate metabolism that allows for the interconversion of glucose-6-phosphate (G6P) and glucose-1-phosphate (G1P). The deletion of PGM, specifically the major isoform PGM2, results in several defects in calcium homeostasis and carbohydrate metabolism in *Saccharomyces cerevisiae* grown on galactose containing media. These defects include sensitivity to high extracellular calcium and cyclosporine A (CsA), increased unfolded protein response, and accumulation of G1P and calcium within the cell. The high affinity calcium influx system (HACS), composed of the protein subunits Mid1 and Cch1 and regulated by Ecm7, is localized to the plasma membrane and allows for calcium influx into the cell. HACS is critical in yeast cells when exposed to endoplasmic reticulum (ER) stressors and mating pheromones. We investigated whether or not HACS channel activity is required for the viability of the *pgm2Δ* mutant. We report here that loss of either MID1 or CCH1 severely impacts *pgm2Δ* mutant growth, and the *pgm2Δmid1Δcch1Δ* triple mutant is inviable on galactose, a phenotype partially rescued by the addition of low levels of extracellular calcium. KCH1 and KCH2 encode low-affinity potassium channels that also localize to the plasma membrane and are upregulated during the activation of HACS when cells are exposed to ER stress. The purpose of this study was to investigate a potential role for KCH1 and KCH2 in *pgm2Δ* viability and determine whether they contribute to calcium homeostasis defects observed in *pgm2Δ* yeast cells. Combinations of *kch1Δ* and *kch2Δ* mutations were combined with the *pgm2Δ* mutation and showed slower growth phenotypes on galactose containing media. Similar to rescue observed with the loss of the HACS channels, these slow-growth phenotypes were partially rescued with the addition of extracellular calcium reinforcing the importance of calcium influx and HACS activity in *pgm2Δ* mutant cell viability.

## **Evaluating Life Characteristics of *Ictidomys tridecemlineatus* Across a Latitudinal Range**

Emily Davis, Hallie Dickerson,  
Taqwa Armstrong, & Jessica Healy  
Biology Department, Austin College  
Abstract #28

Animals at different latitudes experience different environmental conditions, from hot dry summers in the south to long cold winters in the north. One species that exists over a wide latitudinal gradient is the 13-lined ground squirrel (TLGS). This species experiences very different climates across its species range, however it approaches survival with the same tactic: hibernation. This strategy is used to avoid seasons of low food availability by slowing metabolism to decrease body temperature, decreasing energy costs. In order to measure morphological & physiological characteristics across their species range we live-trapped adult TLGS, measured length, girth, mass, and sampled blood & white adipose tissue (WAT). Temperature data loggers were implanted (to be retrieved next summer) in order to record hibernation patterns. Blood was tested for the hunger hormone ghrelin and the sex hormone estradiol. WAT was tested for the energy balance regulatory enzyme pAMPK. KS squirrels had significantly more ghrelin. The KS squirrels were also the smallest squirrels with a more dense population. This may indicate that ghrelin is influenced by intraspecies resource competition in addition to the hibernation cycle. Estradiol was highest in OK squirrels. These individuals were captured first and during their reproductive season, unlike the rest of the states. There were also no significant differences in pAMPK by sex or state. There was no gradient change observed in any of the samples taken, indicating that these physiological and morphological aspects are not strictly tied to latitudinal range. However, when temperature data loggers are retrieved we expect to observe differences in the hibernation patterns because these are more likely to be tied to external temperatures.

## **The Impact of Gender Norm Conformity on Political Candidate Impressions**

Matthew Li, Kiera Chevalier, Evan Powell,  
Lihlu Fuentes, & Michele Helfrich  
Psychology Department, Austin College  
Abstract #29

Past research looked at the effects of candidate gender, messaging style, and attire on the perceptions of political candidates (Li et al, 2018). We found that females were judged as more attractive and likeable, when they presented a community-centric background statement rather than an expertise-based background statement (while males were not impacted). This led us to hypothesize that community-based populist messages support female gender norms and are potentially preferred to messages of expertise. The purpose of the present research was to further investigate the effects of gender on candidate impressions. 159 students from Austin College viewed pictures of a male or female candidate, a classroom (teacher) or fighter jet (air force pilot), and the candidates' children (family) were pictured or not pictured. Participants read identical candidate statements that detailed candidate stances on issues, except occupation and family details varied according to condition. The preliminary results indicated that family presence had a wide range of impacts. Candidates were perceived as more relatable, empathetic, and more representative of the community when presented with a family (compared to no family), and this was particularly beneficial for candidates with the military occupation. There was some evidence, however, that suggested that family presence was not as beneficial for the female candidate: Participants were less likely to agree with the female candidate statement if her family was present (compared to no family). Voting likelihood for the candidate was primarily impacted by degree of agreement with the candidate statement and was correlated with several other candidate characteristics. Future research should explore how gender norms operate in the political arena.

## Understanding the Rate of Oligomerization of Alpha Crystallin B via FRET

Yusuf Khan & James Hebda  
Chemistry Department, Austin College  
Abstract #30

Alpha crystallin is a small heat shock protein acting as a chaperone within many tissue types in the human body. Alpha crystallin B ( $\alpha$ XB) is found in abundance in the eye, where it is necessary for healthy function as people age. The protein's chaperone function works by binding partially misfolded proteins and preventing them from forming aggregates; without this function, aggregation of misfolded protein leads to the formation of cataracts. This research focuses on one experiment of many dedicated to understanding the chaperone activity of  $\alpha$ XB, via introducing specific mutations into the protein and comparing to wild type. The present study uses Forster resonance energy transfer (FRET) to visualize the rate of oligomerization in  $\alpha$ XB, which is thought to be a factor in its chaperone function. In order to prepare for FRET, fluorescent dyes were purchased and had their excitation and emission wavelengths measured. The method of labeling protein with these fluorescent dyes was also investigated. FRET was then measured in various pH and temperature conditions for the S85C, K92E, and double mutant S85C K92E proteins. The data from these preliminary experiments was somewhat inconsistent, but replications and improvement upon the data is intended to lay the groundwork for future experiments on the same and new mutants. This data, in conjunction with other experiments, will hopefully lead to a greater understanding of how the  $\alpha$ XB's rate of oligomerization affects its chaperone activity.

## Examining the Gene Expression of *RPH1* and *MOT3* in *Saccharomyces cerevisiae*

Sita Ramasamy & David Aiello  
Biology Department, Austin College  
Abstract #31

Transcriptional elongation factors play an important role in regulating gene expression. Spt4 is a transcriptional elongation factor that plays an important role in transcriptional pausing in mammalian cells, and in regulation of transcription through long trinucleotide repeats in *Saccharomyces cerevisiae*. Previous work in the lab identified the loss of SPT4 as a suppressor of *pgm2* $\Delta$  defects through an EMS mutagenesis screen. Yeast which lack PGM2, the major isoform of phosphoglucomutase, lose the ability to interconvert glucose-1-phosphate (G1P) and glucose-6-phosphate (G6P), and exhibit a variety of growth defects when grown in galactose-containing media. The most relevant of these include slow growth, imbalanced levels of G1P relative to G6P, high levels of intracellular Ca<sup>2+</sup>, and induction of the unfolded protein response (UPR), which is hypothesized to result from reduced ER calcium levels. Deletion of SPT4 was shown to rescue the Ca<sup>2+</sup>-related growth defects in the *pgm2* $\Delta$  background, but this rescue is indirect. Data collected by RNAseq have shown that Spt4 is important in regulating the expression of genes mediating stress responses such as those created by the imbalanced levels of G1P:G6P found in *pgm2* $\Delta$  mutants when grown in galactose. Using bioinformatics tools analyzing our RNASeq data, we have identified various target genes, and transcription factors predicted to coordinately regulate subsets of these genes, that are hypothesized to be essential for viability in *pgm2* $\Delta$  mutants. We show that many of these genes are increased in the *pgm2* $\Delta$  mutant compared to wild type and/or *pgm2* $\Delta$ *spt4* $\Delta$  strains. Collectively, the data provide a working model for how the loss of PGM2 hyperactivates stress-response genes in response to the observed calcium homeostasis defects. Current efforts in the lab seek to demonstrate *in vivo* that the identified transcription factors are involved in this altered gene expression.

## **Severity of Cold Fronts at the Austin College Weather Station**

Adonis Martin, Chad Childress, & David Baker  
Physics Department, Austin College  
Abstract #32

The Austin College Weather Station measures important weather and climate quantities, including wind speed and direction. We calibrated the R.M. Young Wind Sentry Set, and installed it at the Austin College Weather Station. The R.M. Young Wind Sentry Set consist of a wind vane and an anemometer. The wind vane measures the direction of the wind relative to true north and the anemometer measures the speed of the wind in m/s. Based on Austin College Weather Station wind data, we assessed the strength of cold front passages in North Texas during the spring seasons.

## **$\beta$ 2 Microglobulin Aggregation**

Elizabeth Pack & John Richardson  
Chemistry Department, Austin College  
Abstract #33

Beta-2-microglobulin (B2m) is a small single domain protein that is 99 amino acids long. When this protein misfolds it binds with other misfolded proteins to form aggregates. These aggregates form amyloid plaques that are seen in patients with kidney disease, type II diabetes, and Alzheimer's and Parkinson's disease. Previous research has hypothesized that when the residue region 62-70 becomes exposed, it initiates the aggregation process due to the high aromatic amino acid content. The aggregation of two mutants, Y66H and L65D, were compared to that of wild type B2m using Thioflavin T assays. The assays ran for 10 hours at 25°C at pH 2.5. From the assays wild type B2m aggregated much quicker than either Y66H or L65D. L65D showed no signs of aggregation after the 10-hour period.

**Development of *in vivo*  
CRISPR/Cas9-mediated Knock-in  
Strategies to Illuminate the Monarch  
Butterfly Brain Clockwork Circuitry**

Mandy Eckhardt<sup>1</sup>, Samantha Iiams<sup>2</sup>, & Christine Merlin<sup>2</sup>  
Biology Department, Austin College<sup>1</sup> & Texas A&M  
University, College Station<sup>2</sup>  
Abstract #34

Phosphoglucomutase (PGM) is an enzyme responsible for the interconversion of the metabolites glucose-1-phosphate (G1P) and glucose-6-phosphate (G6P) in *Saccharomyces cerevisiae*. A mutant yeast strain lacking PGM2, the major isoform of PGM, exhibits several defective phenotypes when the cells are grown on galactose media. These phenotypes include slow growth, high levels of G1P accumulation, increased Ca<sup>2+</sup> accumulation and uptake, and increased unfolded protein response. EMS mutagenesis was utilized to isolate mutant alleles that rescue *pgm2Δ* growth defects. We report here that SPT4, which encodes a transcription elongation factor, was identified through this screen. Many of the phenotypes observed in the *pgm2Δ* mutant are rescued in the *pgm2Δspt4Δ* double mutant. The only phenotype from the *pgm2Δ* strain that is not rescued by this double knockout is the high accumulation of G1P. We undertook an RNAseq analysis with the goal of identifying candidate genes that show differential expression between the wild-type and *pgm2Δspt4Δ* strains relative to the *pgm2Δ* strain that contribute to *pgm2Δ* mutant phenotypes, or mediate rescue in the *pgm2Δspt4Δ* strain. Analysis of this dataset suggests the *pgm2Δ* mutation causes cells to hyperactivate a variety of cellular stress response pathways. Further analysis using the DREME analysis tool has identified a number of transcription factors that show increased representation in the promoters of genes exhibiting differential expression between wild type, *pgm2Δ*, and *pgm2Δspt4Δ* strains. It is not known whether these groups of genes are contributing to the defective phenotypes observed in the *pgm2Δ* mutant, perhaps by inducing a hyperactive stress response, or if their increased expression is an adaptive survival mechanism. Current efforts are investigating what role individual genes showing differential expression are contributing to *pgm2Δ* mutant phenotypes and hyperactive stress responses, and if loss of individual transcription factors coordinately regulating groups of these genes can rescue *pgm2Δ* mutant phenotypes or if instead they are required for *pgm2Δ* survival.

**Expanding Mental Health Services in  
Texoma Through Non-profit and  
Community Engagement**

Helen Nguyen & Martinella Dryburgh  
Leadership Studies, Austin College  
Abstract #35

The Social Entrepreneurship Poverty Alleviation (SEPA) program at Austin College is designed to increase student engagement with local non-profit agencies and teach students about entrepreneurial endeavors. The Lighthouse Behavioral Wellness Centers is a non-profit organization located in Ardmore, Oklahoma, serving thousands of mental health patients throughout the Texoma community. The focus of this poster presentation is the development of community partnership, understanding of servant leadership, and reflection of the mental health services in the Texoma area. Special efforts include design of a case statement, expansion of an emergency crisis unit, and writing grants as part of the Austin College and the Lighthouse Behavioral Wellness Centers collaborative initiative.

## **Examining Global Changes in Gene Expression in *Saccharomyces cerevisiae* Mutants Lacking *PGM2* and *SPT4***

Mandy Eckhardt<sup>1</sup>, Keara Malone<sup>1</sup>, Rachel Jimenez<sup>1</sup>, Ashley Charales<sup>1</sup>, Courtney Goldstein<sup>1</sup>, Ruthann Schmiege<sup>1</sup>, Madelyn Oliver<sup>1</sup>, Spencer Nystrom<sup>2</sup>, & David Aiello

Biology Department, Austin College<sup>1</sup>,  
Genetics & Molecular Biology, University of North Carolina at Chapel Hill<sup>2</sup>  
Abstract #36

Transcriptional elongation factors play an important role in regulating gene expression. Spt4 is a transcriptional elongation factor that plays an important role in transcriptional pausing in mammalian cells, and in regulation of transcription through long trinucleotide repeats in *Saccharomyces cerevisiae*. Previous work in the lab identified the loss of SPT4 as a suppressor of *pgm2Δ* defects through an EMS mutagenesis screen. Yeast which lack PGM2, the major isoform of phosphoglucomutase, lose the ability to interconvert glucose-1-phosphate (G1P) and glucose-6-phosphate (G6P), and exhibit a variety of growth defects when grown in galactose-containing media. The most relevant of these include slow growth, imbalanced levels of G1P relative to G6P, high levels of intracellular Ca<sup>2+</sup>, and induction of the unfolded protein response (UPR), which is hypothesized to result from reduced ER calcium levels. Deletion of SPT4 was shown to rescue the Ca<sup>2+</sup>-related growth defects in the *pgm2Δ* background, but this rescue is indirect. Data collected by RNAseq have shown that Spt4 is important in regulating the expression of genes mediating stress responses such as those created by the imbalanced levels of G1P:G6P found in *pgm2Δ* mutants when grown in galactose. Using bioinformatics tools analyzing our RNASeq data, we have identified various target genes, and transcription factors predicted to coordinately regulate subsets of these genes, that are hypothesized to be essential for viability in *pgm2Δ* mutants. We show that many of these genes are increased in the *pgm2Δ* mutant compared to wild type and/or *pgm2Δspt4Δ* strains. Collectively, the data provide a working model for how the loss of PGM2 hyperactivates stress-response genes in response to the observed calcium homeostasis defects. Current efforts in the lab seek to demonstrate in vivo that the identified transcription factors are involved in this altered gene expression.

## **Attempting the Synthesis of the Coumarin Derivative in Anisucoumaramide**

Saif Haque & Ryan Felix  
Chemistry Department, Austin College  
Abstract #37

Anisucoumaramide, a compound harvested from *Clausena anisumolens*, is a coumarin with substitution on the 7th position and 8th position. It possesses potent MAO-B inhibitory properties, which can be used to combat neurodegenerative disorders such as Parkinson's and Alzheimer's. However, due to its extremely low yield from natural sources, using it as a medicine is improbable. Therefore, synthesizing it in a lab may increase the percent yield, making it able to be used in medicine. In the creation of the coumarin half of the compound, the cyclization of the ester into the lactone is attempting to be made more efficient with a photoisomerization in which riboflavin is used as a photocatalyst. Furthermore, methylation of the coumarin hydroxyls has shown uncertain results, therefore a selective methylation step in which both alcohols are acetylated and selectively de-acetylated is being tested. Further work is ongoing to improve yields and optimize reaction conditions.

## **Staircase Metric Tori**

Anh Tran & Jack Mealy

Mathematics and Computer Science Department,

Austin College

Abstract #38

In summer 2019, we studied the behavior of closed geodesics on new staircase metric (SCM) surfaces; specifically, on genus one tori in both the positive definite signature and space-time cases. After briefly going over the definition of compact manifolds, SCM geometry, the associated methodology, and its extension to the space-time category, we investigated the patterns of various geodesics on SCM and space-time SCM cylinders. Further, we sought to identify periodic geodesics on SCM and space-time SCM almost everywhere (a.e.) flat tori before deriving their parametric family since they have a more complicated boundary quotient scheme than other tori in previous work.

## **A9 Cells Display more Carcinogenic Characteristics than Mutated PA28 $\gamma$ Knockout Cells**

Addie Pederson, Brandon Mai, Khanh Nguyen,  
& Lance Barton

Biology Department, Austin College

Abstract #39

PA28 $\gamma$  is a proteasome activator that has been positively correlated with cancer, however the mechanisms behind the PA28 $\gamma$  link to carcinogenesis remains unclear. This study was a comparison of mouse A9 cells to mutated PA28 $\gamma$  knockout MEF cells (KOCC3) to determine their carcinogenic characteristics. Gene sequencing revealed that neither A9 nor KOCC3 cDNA had any missense mutations in *p53*, *h-ras*, *pten*, or *akt1*. Both the scratch and migration assays revealed that both cell types exhibited migration, but the A9 cells migrated more. In the viability test, it was observed that A9 cells showed resistance to Colchicine and Taxol while the KOCC3 cells did not. Taken as a whole, these results indicate that A9 cells behave more cancer-like than KOCC3, indicating perhaps a lack of PA28 $\gamma$  made it difficult for KOCC3 to obtain cancer hallmarks such as genomic instability and mutation, activating invasion and metastasis, and resisting cell death.

## **Upregulation of BER Increases Cancer's Radioresistance to Proton and Photon Irradiation**

Emily Aller<sup>1</sup>, Sharmistha Chakrabroty<sup>2</sup>,  
& Gabriel O. Sawakuchi<sup>3</sup>

Biology Department, Austin College<sup>1</sup>, Department of Experimental Radiation Oncology, MD Anderson<sup>2</sup>, of Radiation Physics, MD Anderson Department<sup>3</sup>

Abstract #40

In the US, radiation therapy is a common treatment for cancer, and there are currently two types of radiation therapy available: proton therapy and X-ray therapy. While both function by damaging the DNA of a cell, proton therapy is capable of forming a type of damage called clustered damage at a much higher rate. Clustered damage, which is characterized by multiple damage types in a short region of DNA, is much harder for the cell to repair than the damage a cell experiences as a result of X-ray beams. Additionally, the repair of minor lesions in the clustered damage sites by Base Excision Repair (BER), which is the primary responder to clustered damage sites, can result in the formation of potentially lethal double stranded breaks (DSBs). The purpose of this study was to investigate the biological significance of BER's conversion of clustered damage to DSBs, in order to determine whether BER would be a promising target for future chemotherapeutics that would be used in conjunction with radiation therapy. The ability of human pancreatic cancer cells to survive radiation at normal and elevated rates of BER was evaluated using clonogenic assays, and the amount of DSBs formed and resolved was visualized using immunofluorescent microscopy. The study found that human pancreatic cancer cells are more sensitive to proton radiation, and that elevating the rates of BER led to an increase in radioresistance to both proton and X-ray therapy.

## **Childhood Trauma and Neuroticism are not Predictors of Substance Use in College Students**

Maggie Zumwalt, Abigail Reyes,  
Matthew Lopez, & Renee Countryman  
Psychology Department, Austin College  
Abstract #41

The relationship between substance use, personality, and childhood traumatic experiences was examined using a survey that combined items from three different surveys based on each of the above variables. Experiencing childhood trauma and higher scores in Neuroticism were expected to predict substance use in college students. Extraverted individuals used alcohol and marijuana more frequently than the other personality types. Neurotic individuals used alcohol less than Extraverted individuals but more than the other personality types and experienced the most childhood trauma. Overall drug use and trauma score was not correlated with the Neurotic personality type. These findings show that while there is a relationship between substance use and personality type, there is no evidence of a relationship between substance use and trauma together and personality type.

## **Denaturation Analysis of Beta-2-Microglobulin Y66H Mutant**

Ricardo Garza & John Richardson  
Chemistry Department, Austin College  
Abstract #42

Denaturation Analysis of proteins and their mutants are performed in order to obtain valuable thermodynamic properties. Properties such as conformational stability and folding mechanism of the protein structure. The following study obtained the  $\Delta G$  native state and value of equilibrium of Y66H; a mutant for Beta-2-Microglobulin. This was done through setting up assays and running them through a Fluorometer. After thorough graphical analysis the  $\Delta G$  native state and value of equilibrium of Y66H were calculated. The findings show that Y66H is more stable than Wild Type B2M; thus it's propensity to unfold is more than B2M's.

## **Increased Trehalose Synthesis Rescues Calcium Homeostasis Defects Associated with the *pgm2* $\Delta$ Mutation in *Saccharomyces cerevisiae***

Shreya Uppala, Zoya Waheed, Sarah Smith, Akshaya Selvamani, Rebecca McDonald, Pranavya Manickavelu, Krishna Patel, Kristina Ngo, Ashley Charles, Vana Bahram, & David Aiello  
Biology Department, Austin College  
Abstract #43

Phosphoglucomutase (PGM) is an enzyme responsible for the inter-conversion of the metabolites glucose-1-phosphate (G1P) and glucose-6-phosphate (G6P) in *Saccharomyces cerevisiae*. A mutant yeast strain lacking PGM2, the major isoform of PGM, exhibits several defective phenotypes when grown on galactose media including: slow growth, high levels of Glc-1-P accumulation, increased  $Ca^{2+}$  accumulation and uptake, and increased unfolded protein response. We report here that SPT4, which encodes a transcription elongation factor, was identified through EMS mutagenesis, used to isolate mutant alleles that rescue *pgm2* $\Delta$  growth defects. Many of the phenotypes observed in the *pgm2* $\Delta$  mutant are rescued in the *pgm2* $\Delta$ *spt4* $\Delta$  double mutant. We undertook an RNAseq analysis with the goal of identifying candidate genes that show differential expression between the wild-type and *pgm2* $\Delta$ *spt4* $\Delta$  strains relative to the *pgm2* $\Delta$  strain. Analysis of this dataset suggests the *pgm2* $\Delta$  mutation causes cells to hyperactivate a variety of cellular stress response pathways. Further analysis using the DREME tool has identified a number of transcription factors that show increased representation in the promoters of genes exhibiting differential expression between wild type, *pgm2* $\Delta$ , and *pgm2* $\Delta$ *spt4* $\Delta$  strains. It is not known whether these groups of genes are contributing to the defective phenotypes observed in the *pgm2* $\Delta$  mutant or if their increased expression is an adaptive survival mechanism. Current efforts are investigating what role individual genes showing differential expression are contributing to *pgm2* $\Delta$  mutant phenotypes and hyperactive stress responses, and if loss of individual transcription factors coordinately regulating groups of these genes can rescue *pgm2* $\Delta$  mutant phenotypes or are required for *pgm2* $\Delta$  survival.

## **Menu Reading Automation For Meals on Wheels of Tarrant County**

Ariana Quirino, Jacob Baker, Nadia Hannon,  
James Tessmer, & Catie Patterson  
Mathematics and Computer Science Department,  
Austin College  
Abstract #44

At Meals on Wheels, Inc. of Tarrant County, menus are sent out every six months to allow clients to indicate which meals they would like to receive. Currently, these menu selections are processed by hand and entered in the database. In this project, we have used image processing to automate this process. Our objective with this project is to streamline and reduce the workload faced by the employees at Meals on Wheels of Tarrant County. Our project accomplishes this goal through the use of various image processing techniques, such as Canny Edge and Harris Corner Detection, and Optical Character Recognition.

## **Characterizing 4T1 Cell Line Through the Hallmarks of Cancer**

Brian Nguyen, Alisa White, Tajal Patel, & Lance Barton  
Biology Department, Austin College  
Abstract #45

Cancer is defined as a family of diseases that results from aberrations in normal cell function. For example, genetic and genomic instability are aberrations derived from mutagenesis or accumulation of mutations with implications on cell cycle progression, proliferation, and migration. The mutagenesis process was used to generate wild type cancer clone (WTCC) cells, which can be compared to the 4T1 cell line, an aggressive cell line derived from stage IV mammary tumors in mice. In this study, we compared the carcinogenic properties of WTCC cells in comparison to 4T1 cells to determine whether or not the mutagenesis process of the WTCC cell line was sufficient to generate an aggressive cancer cell line similar to the 4T1 cell line. Carcinogenic properties investigated included the following hallmarks of cancer: evading growth suppressors, sustained proliferative signaling, genetic and genomic instability, invasion and metastasis, and resisting cell death. Cell proliferation properties were studied through flow cytometry, indicating alterations in cell cycle progression and cell proliferation of the 4T1 cells. The scratch assay and transwell migration demonstrated increased invasive properties in the 4T1 cells compared to the WTCC. In addition, a mutation in the *src* gene of the 4T1 cells was identified, demonstrating genetic instability in the cancer cell line. Results supported that the 4T1 cells demonstrated 5 out of the 10 hallmarks of cancer as well as enhanced carcinogenic properties compared to the WTCC.

## Using and Developing CasRx Transcriptome Editing Tool

Varun Kotipalli<sup>1</sup>, Dr. Feng Xiong<sup>2</sup>,  
& Wenbo Li<sup>2</sup>

Biology Department, Austin College<sup>1</sup>  
Department of Biochemistry and Molecular Biology,  
U.T. H.S.C. at Houston<sup>2</sup>  
Abstract #46

In the past six years, the application of CRISPR/Cas9 system has grown exponentially, allowing the modification and editing of DNA elements in animal genome. Similarly, recent advances have developed new systems to manipulate RNAs, as exemplified by the CRISPR/Cas13. As compared to the commonly used RNA knock down tools, i.e. shRNA, CRISPR/Cas13 toolset has shown very superiorly high specificity and efficiency. We aim to utilize the Cas13 system to conduct knock down of endogenous RNA transcripts in human cells, for targeting both mRNAs and long noncoding RNAs. We choose to adopt a recent version that is referred to as Cas13d (CasRx), which has reportedly been shown to generate the highest knock down efficiency (97%) and specificity (<2% off target effects) in human HEK-293 cells. It utilizes a guide RNA (gRNA) that is comprised of a double stranded hairpin loop for the CasRx enzyme to bind the gRNA, together with a spacer region, which is complementary to the target RNA sequence to “guide” CasRx to cut the target RNAs. We hypothesize that this system can also be used to knock down nuclear-located noncoding RNAs, such as many long noncoding RNAs and enhancer RNAs, for which current RNA manipulating tools such as siRNAs or shRNAs cannot effectively knock down. To efficiently deliver gRNA into K562 cells, we engineered a viral vector plasmid with a zeocin resistant marker. Based on this system, we generated gRNAs targeting a non-coding RNA located in PSMA1 gene intron and also a gRNA targeting NFkB as a positive control. Briefly, these gRNA expressing plasmids were transfected into 293T cells via lipofectamine 2000. At 48 hours post transfection the virus containing medium was collected and was used to infect an engineered K652 cell line stably expressing the CasRx enzyme. After one week of zeocin selection, total RNAs from these cells were extracted. RT-qPCR was performed to quantify the RNA change between the control cells and the CasRx gRNA guided knock down cells. Although the preliminary results were currently inconclusive in producing significant knock down for NFkB, additional optimization is current ongoing. In future, we will optimize the CasRx system to conduct knockdown of endogenous mRNAs and other noncoding RNAs. We will also attempt to use the enzyme-dead mutant form of CasRx, dCasRx, to piggyback RNA editing enzymes to specifically manipulate RNAs, such as their splicing or chemical modifications.

## Sex Education and its Relation to Sexual Behaviors and Attitudes

Vivianna DeNittis, Madeleine Reinhardt, Kathryn  
Voelkel, Kirsten Munson, & Matthew Findley  
Psychology Department, Austin College  
Abstract #47

Previous research has predominantly focused on the difference in sexual behavior depending on the presence or absence of sex education. The aim of current study was to expand on previous research by observing the possible relationship between type and extent of sex education, risky sexual behaviors, and attitudes towards sex. We collected demographic and sex education data through a survey from students enrolled in psychology courses at Austin College. Variables in the study included socioeconomic status, sexual permissiveness, sexual behaviors, frequency of sex education, and duration of sex education. The results found a marginally significant difference in sexual behaviors between respondents that received formal education and those who did not received formal education. There was not a significant correlation found between the comprehensiveness of sex education and sexual attitudes or behaviors. The frequency of sex education implementation was also not significantly correlated with sexual attitudes or behaviors. While there was a significant negative correlation between the duration of sex education and sexual behaviors, there was not a significant correlation between duration and reported sexual attitudes. The current study has potential implications for sex education and its impact on sexual attitudes and behaviors.

## **Exploring the Synthesis of the Furanone Side-Chain in Anisucoumaramide**

Andrea Selkow & Ryan Felix  
Chemistry Department, Austin College  
Abstract #48

Coumarins are used widely in medicine because of their pharmaceutical versatility, such as the ability to act as an anticancer, antibacterial or immune system activating drug. Anisucoumaramide is a recently discovered coumarin derivative found in *Clausena anisumolens* with monoamine oxidase-B (MAO-B) inhibitor potential. Artificially synthesizing this compound in lab would enable the further investigation of anisucoumaramide's biological properties, as harvesting the molecule from *C. anisumolens* gives very low yields. The work reported here is specifically aimed at trying to develop a way to synthesize the furanone half of the molecule by starting with the methylation, allylation and eventual decarboxylation of a keto-ester. A ring expansion reaction that would transform an epoxide into a five membered furanone ring was also explored. While the synthesis is currently incomplete, these steps provide insight on how anisucoumaramide might be synthesized and provide a foundation for future research, which aims to complete the synthesis and improve yields.

## **Investigating the Effects of p53 Mutations on WTCC and LL/2 Cell Lines**

Michelle Ramirez, Shreya Uppala, Myhien Nguyen,  
Bryan Fajarado, & Lance Barton  
Biology Department, Austin College  
Abstract #49

Cancer is described as the uncontrolled growth of abnormal cells, which arises from an accumulation of mutations in various oncogenes and tumor suppressors. Typically, cancers exhibit specific phenotypes known as the ten hallmarks of cancer. These hallmarks may contribute to potential tumor growth, proliferation, and tissue invasion. The transcriptional regulator and tumor suppressor p53 has important functions in many metabolic pathways that may contribute to the development of these hallmarks and is often found to be mutated in many types of cancers. In this study, wild type cancer clones (WTCC) and Lewis lung carcinoma (LL/2) cells were found to exhibit many of the cancer hallmarks. DNA sequencing confirmed that both cell types had a mutated version of the p53 gene. LL/2 cells were found to be more metastatic and invasive as compared to WTCC cells. Streptozocin and SCH 529074 (p38i) were studied as chemotherapeutics and it was found that Streptozotocin was more toxic to the WTCC cell line compared to SCH 529074 (p38i). Although previous research has demonstrated that mutant p53 is a contributor to the ten hallmarks and carcinogenesis, the following study offers insight on possible therapeutic solutions while observing and further understanding its effects.

## **An Irony of the Protestant Work Ethic**

Alex Garcia, Abigail Goodman,  
Katelyn Kuehnhold, & Lisa Brown  
Psychology Department, Austin College  
Abstract #50

This study examined people's appraisals of effort. Specifically, we examined whether those high in Protestant Ethic (PE) and low in Humanitarian-Egalitarian values (HE) versus people high in PE/low in HE differentially perceive a service for a client because of differences in the perception of the client's deservingness. Previous research suggests that strong endorsement of PE may promote judgmental views of people with different values for hard work (Mudrack, 1997). We hypothesized this would be true particularly for those high in PE and low in HE when the client is lazy.

## **Examining the Effects of Deleting Genes that Encode HACS and LACS in *Saccharomyces cerevisiae* mutants Lacking PGM2**

Paul Mpunga,<sup>1</sup> Harsha Tamtam<sup>1</sup>, Aarthi Kannan<sup>1</sup>,  
Sona Selvamani<sup>2</sup> & David Aiello<sup>1</sup>  
Biology Department, Austin College<sup>1</sup>  
& Coppell High School<sup>2</sup>  
Abstract #51

*Saccharomyces cerevisiae* is utilized to study Ca<sup>2+</sup> homeostasis to better understand human disease. The major isoform of phosphoglucomutase, PGM2, interconverts glucose-1-phosphate (G1P) and glucose-6-phosphate (G6P) in carbohydrate metabolism. Mutants lacking PGM2 exhibit an increase in the G1P:G6P ratio, due to the inability to interconvert between the two metabolites. Additionally, the *pgm2Δ* mutant displays slow growth on galactose-containing media, sensitivity to cyclosporin A, increased induction of the unfolded protein response, and higher levels of intracellular Ca<sup>2+</sup>. Calcium influx across the plasma membrane is mediated by two uptake systems: LACS (Low-Affinity Ca<sup>2+</sup> Influx System) is comprised of only one known protein encoded by FIG1, and HACS (High-Affinity Ca<sup>2+</sup> Uptake System) consists of a complex of integral membrane proteins encoded by MID1, CCH1, and ECM7. The phenotypic effects resulting from the loss of HACS encoding genes in the *pgm2Δ* mutant, individually and in combination, were observed in galactose-containing media. Loss of HACS genes exacerbated the slow growth phenotype of *pgm2Δ* on galactose with combinations of HACS gene deletions being near lethal with the *pgm2Δ* mutation. Additionally, Ca<sup>2+</sup> assays were conducted to compare the effects of the loss of HACS genes on Ca<sup>2+</sup> sequestration. Paradoxically, we observed an increase in total cell Ca<sup>2+</sup> in *mid1Δ* and *cch1Δ* mutants, and this increase was further amplified in strains with the *pgm2Δ* mutation. However, the *mid1Δcch1Δ* double mutants do not exhibit an increase in total cell Ca<sup>2+</sup> relative to wildtype, while the *pgm2Δmid1Δcch1Δ* triple mutant still maintains high levels of total cell Ca<sup>2+</sup>. Collectively, the data suggest there are additional, as yet unidentified, Ca<sup>2+</sup> influx mechanisms for yeast cells.

## **Addressing Breast Cancer within Women in North Texas as a Public Health Issue through Civic Engagement**

Caroline Glaister & Martinella Dryburgh  
Leadership Studies, Austin College  
Abstract #52

In this poster, I will address how grant writing through the Social Entrepreneurial-ship for Poverty Alleviation (SEPA) program addresses Public Health issues within the local Sherman community specifically through service and civic engagement. I will do this by analyzing breast cancer, an issue specific to Women Rock, the non-profit agency I worked with directly during the summer of 2019. Through determining the success of the different programs and initiatives this organization used, we can determine how to efficiently utilize engaging community foundations, volunteers, and servant leadership. Through academic connections within a Public Health context, I will determine how the efficient use of civic engagement is relevant to Public Health issues.

## **Detection of Partisan Gerrymandering Using Geometry**

Hannah Hunt, Elisha Lisson, & Andrea Overbay  
Mathematics and Computer Science Department,  
Austin College  
Abstract #53

Every ten years, in the United States the seats in Congress are redistributed according to the population of the states, and to accommodate for this change the congressional districts are often redrawn. However, the new map is selected by that state's government so these new districting maps are very susceptible to partisan gerrymandering from the state's majority party. Partisan gerrymandering is the act of selectively drawing the borders of an election district in order to manipulate the results of the election to disproportionately favor one party over the other. We frequently look at a district's strange shape when it is suspected of being gerrymandered, so we looked at methods of looking at the shapes of districts and using the convexity coefficient which quantifies the 'niceness' of each district. In this poster, we will expand on the mathematical complexities of geometrically analyzing congressional districts.

## **Purification and Characterization of the WT and Disease Associated Variants of DNMT3A PWWP Domain**

Michelle Ramirez<sup>1</sup>, Alison Norvil<sup>2</sup>,  
Humaira Gowher<sup>2</sup>

Chemistry Department, Austin College<sup>1</sup>  
Department of Biochemistry, Purdue University<sup>2</sup>  
Abstract #54

DNA methyltransferases (DNMTs) are enzymes that catalyze the transfer of methyl groups from S-Adenosylmethionine to DNA. DNA methylation in mammals is involved in regulation of gene expression. DNA methylation is catalyzed during early development by enzymes Dnmt3a and Dnmt3b. DNMT3a has a C-terminus that catalyzes methylation and an N-terminus that regulates methylation by binding to DNA and histones. Located in the N-terminus is a region composed of proline, tryptophan, tryptophan and proline (PWWP domain) which binds with the di- or tri-methylated lysine 36 on histone 3 (H3K36me<sub>2/3</sub>) and DNA. These interactions have been associated with the regulation of gene expression by DNA methylation. Mutations in this region are associated with genetic diseases such as Tatton-Brown-Rahman syndrome (TBRS), Microcephalic dwarfism (MD), and heritable cancers such as Pheochromocytoma/paraganglioma (PCC/PGL). The effect of two mutations on the PWWP domain and activity of DNMT3A has been characterized in MD. However, the effect of other mutations on PWWP domain activity has not been characterized. In this study we investigated and characterized the effect of the TBRS and PCC/PGL associated mutations on DNA binding and histone binding activity of PWWP domain. Site directed mutagenesis was performed using rolling circle PCR, followed by bacterial expression and purification of the recombinant wild type and variant proteins. DNA and histone binding was tested by using Dot-Blot method. The wild type PWWP domain and variant proteins were expressed and purified. A dot blot analysis showed that R301W mutation had no effect on DNA binding to the PWWP domain.

## **Undergraduates Gratitude Toward Cafeteria Food Based on SES and Ethnicity**

Kianna Marrs, Renee White, Ashley Elliot,  
Emily Collins, & Renee Countryman  
Psychology Department, Austin College  
Abstract #55

This study examines how SES, race/ethnicity, and eating patterns interact to affect gratitude towards cafeteria food within the Austin College student population. We employ a 3x3 within subjects, quasi-experimental design using a factorial ANOVA. To collect data, we used an online survey.

# Determining the Optimal Oligomeric Size for Chaperone Activity of Alpha-B Crystallin

Matthew Tran & James Hebda  
Chemistry, Austin College  
Abstract #56

From birth, the lens of the eye contains all of the proteins needed for sight already intact, preventing the need for additional proteins which may cloud the lens of the eye. Cataract formation occurs when protein misfolding happens, leading to an aggregation in the lens of the eye blocking light from passing through the lens. To prevent this, chaperone proteins exist which hinder the ability for proteins to misfold and aggregate, limiting the rate of cataract formation. Alpha-B Crystallin, a small heat shock protein, works by binding to misfolded proteins and preventing them from misfolding and aggregating in the lens of the eye. It can be found as both a monomer as well as an oligomer, both of which are thought to be involved in the regulation of lens proteins. Though it is known that AXB prevents cataract formation, the mechanism by which the chaperone protein works remains unknown. A series of tests were performed on AXB and a 3E variant shown to act as a super chaperone at different temperatures designed to determine the optimal oligomeric size in order to aid in chaperone activity. Initial results suggest that in order to operate as an efficient chaperone, AXB must dissociate into smaller oligomers.

## Student Oral Presentations Block I

Friday, March 20, 2020  
3:00 p.m. - 4:20 p.m.



**Scarborough Panel**  
Moderator: Stacey Battis  
Humanities Division

This fellowship program, created in honor of former Austin College professors Paul Beardsley and Clyde Hall, fosters faculty-sponsored student research in the Humanities and Social Sciences. Student fellows immerse themselves in a research project of interest and devote 10 weeks of undivided time in the summer to the academic venture, with extensive faculty guidance in the developmental phase. The Scarborough research program offers Austin College undergraduates substantive and potentially formative experiences that increase their understanding of the opportunities and commitments of academic research in a discipline of interest.

**An Evolution of Cults, Communes,  
and Compounds in Texas**

John Thompson  
History Department  
Faculty Sponsor: Felix Harcourt

This project will attempt to discover the connection between Texas's deeply rooted religious origins and the development of its cults and cult leaders, delineate key factors among cults in Texas, and analyze the societal impact of these cults. The religious background of Texas will be scrutinized as well as the general conditional, psychological, and sociological traits behind the genesis of cults. Cults of various sizes will be examined, but particular attention will be paid to those that made the most significant impact. The question why many prominent cults in the US originated in Texas will also hopefully be answered. However, not only the development of these organizations will be studied. The reaction by the general population as well as the reaction by governments, both on a local and federal, will be monitored to isolate any trends that have become apparent over time. This study will provide analysis based on the cults contemporary religious/societal counterparts as well analysis from today's worldview.

## **I was Murdered because I was born a Woman: Feminism Today in South Korea and Japan**

Haeun Kim

Classical & Modern Languages Department

Faculty Sponsor: Scott Langton

Despite its rapid modernization and development, South Korea has taken the 118th place out of 144 in gender equality ranking, according to the Global Gender Gap Report 2017. This dismal ranking reflects the fact that violence against women in South Korea is perpetrated by the country's social structure and social institutions. Such gender disparity has directed South Korean citizens, especially women, to expand their knowledge in feminism. A growing number of South Korean feminists revoked nationwide MeToo, Off-corset movement and protests in 2017-19, raising the awareness of gender inequality in South Korea and other East Asian countries, under the influence of Confucianism. Similarly, Japan has taken the 110th place among 144 nations according to the Global Gap Report 2018. As one of the global hegemonies, Japan's technological, economic, and cultural growth have been influencing Western and Eastern nations as well. Yet, the problem of objectification and excessive sexualization of women in media were continuously raised as problems. The prominent violation of women's rights has also challenged women in Japan to stand against the institutional sexism that has been poisoning the nation. As a result, women in Japan also participated in a movement that resembles South Korea's Off-corset movement. A famous feminist novel Kim Ji-young, Born 1982, written by a South Korean author, Cho Nam-ju, was also published in Japan with huge popularity among women of different backgrounds and ages. Sharing indistinguishable societal values, ethics, and culture, growing feminism and feminist movements in South Korea and Japan should be examined and compared together. The recent societal reformation and progressive changes in South Korea and Japan deserve more attention, and this paper will examine the impacts of feminism on gender equality in South Korea and Japan, which would also highlight feminist movements in other parts of East Asia.

## **Laying the Law: Mary as Legislatrix in "The Miracle of Theophilus"**

Holly Kapp

English Department

Faculty Sponsor: Tom Blake

This talk, a product of Scabrough summer research developed into an honors thesis in English, will explore the Virgin Mary's relationship to and reign over law and text within the context of the once immensely popular medieval miracle legend, "The Miracle of Theophilus" (late 13th century). I will discuss how in many medieval miracle legends, Mary acts as mediatrix between her Son and humankind. However, in the striking Middle English "The Miracle of Theophilus," the Virgin acts not as mediatrix but as an empowered legislatrix, outwitting Satan in a prolonged legal battle culminating in Mary's tearing away the contract binding Theophilus' soul. This thesis examines Mary's influence over law and text within the legend and explores her reinvigorated agency in late medieval England. Evaluated through New-Historicist and Psychoanalytical Feminist Theoretical lenses, this miracle legend is analyzed alongside contemporaneous illuminations of the Virgin fighting Satan in Middle English manuscripts and contrasts this agency with her removal from the legend in the early modern period.

## **Métissage-marronnage: Demarginalizing the French Caribbean Literary Canon**

Manuella Owusu

Classical & Modern Languages Department

Faculty Sponsor: Stacey Battis

This project posits an alternative approach to French Caribbean literature, one that centers its marginalised voices in an effort to re-configure the present discourses that privilege canonical texts. The purpose of my research therefore is to study and analyse the ways that women in Antillean literature are changing the way that their literature presents and discusses their subjectivities and that of the Antilles. Suzanne Dracius, who presents an alternative discourse on Antillean literature that is important to the understanding and re-framing of our intellectual approaches to Francophone literature in general, serves as a major point of focus in this work. My research thus focuses on her identity theory of métissage-marronnage, in a comparison against the major theories associated with Antillean literature (Négritude, Antillanité and Créolité) to provide insights that create new understandings and new ways of reading narratives presented by women within Antillean literature and Francophone literature as whole.

## **A Comparative Analysis of the Utilization of Complementary and Alternative Medicine Practices Among Women with Postpartum Depression in the United States and Thailand**

Jasmine Babool

Economics & Business Administration Department

Faculty Sponsor: Mathias Akuoko

Postpartum depression is a major issue among women throughout the world. In the United States, awareness is increasing that curative medicine alone may not be the best solution to address rising rates of postpartum depression among mothers. More than two-thirds of women experience some form of postpartum depression in the United States compared to less than ten percent in countries such as Thailand. A substantial amount of knowledge exists detailing that utilization of complementary and alternative medicine practices would not only reduce the burden of postpartum depression, but would also minimize the healthcare cost and other co-morbid conditions associated with postpartum depression. We examined the utilization and effectiveness of complementary and alternative medicine practices in the treatment of postpartum depression within both the United States and Thailand. Data was extrapolated from peer reviewed studies that focused on the treatment of postpartum depression to draw a cross-cultural comparison between the two health frameworks. Additionally, we reviewed current topics such as general depression, pain, and the cost of services in this study. Preliminary findings show that among women 19-49 years of age in the United States, only 28 percent of postpartum women reported utilizing complementary and alternative medicine, compared to about 62 percent of women experiencing postpartum depression in Thailand. Among the reasons for this low utilization of complementary and alternative medicine practices, among women with postpartum depression in the United States is attributed to the lack of knowledge and understanding of these practices coupled with inadequate providers of these services. Comparatively, women in Thailand make use of complementary and alternative medicine due to it being integrated within the country's health promotion activities as well as the services are abundantly available to women. We recommend further evaluation of postpartum depression among women in the United States and the use of complementary and alternative practices to improve health outcomes and reduce healthcare costs associated with postpartum depression.

## **New Client to Route Assignment For Meals on Wheels of Tarrant County**

Ariana Quirino

Mathematics and Computer Science Department

Faculty Sponsor: Catie Patterson

Meals on Wheels, Inc. of Tarrant County adds new clients for meal delivery routes daily. This is a time-consuming process that incorporates a multitude of factors. These factors include the distance between the new client and neighboring routes, the number of deliveries already on the route, and the total travel time for the route. In this poster, we will describe a decision-assist algorithm to suggest a route for each new client. This algorithm's objective is to streamline and reduce the workload faced by the employees at Meals on Wheels of Tarrant County.

## **Is "Bowling Alone" Related to Prejudice? Examining Ways Trust Relates to Prejudice**

Katelyn Kuehnhold

Psychology Department

Faculty Sponsor: Lisa Brown

Trust is a key element in any relationship and a factor in building community (Balliet & Lange, 2012). Over the course of nearly 50 years, there has been a decline in the generalized trust within the American populace (Mewes & Giordano, 2017). This reduction of trust has been related to a decline in civic engagement, such as involvement in religious activities, membership in labor unions and parent-teacher associations, as well as volunteering involvement (Putnam, 1995, 2000). Research has focused on trust in relation to a sense of connection within a group, rather than attitudes and impressions towards an outside group. To my knowledge, no studies have examined the relationship between trust, prejudice, and other social indicators over time within the General Social Survey (GSS). The goal of this research is to gain insight into the relationship between generalized trust and prejudicial attitudes and actions, and ways in which this relationship may shift over time.

## **Optimizing Client-Meal to Funding Source Assignments for Meals on Wheels, Inc. of Tarrant County**

Natalie Randall  
Mathematics Department  
Faculty Sponsor: Catie Patterson

Meals on Wheels Inc, of Tarrant County (MoWTC) is a non-profit organization whose primary function is to prepare and deliver free meals daily to its clients. These clients are unable to provide meals for themselves due to age, health complications, or financial circumstances. MoWTC delivers more than one million meals a year to their expanding client network in Tarrant County, Texas. The cost of preparing and delivering these meals is covered by two kinds of donations: restricted funds and community funds. Restricted funds come from outside agencies and each restricted funding source comes with its own set of client requirements based on characteristics like age or health status. In this poster we will describe the creation and implementation of an algorithm that determines the optimal client meal to funding source assignments that maximizes restricted funding source usage.

## **Syncretic Resistance: Galilean Jewish Responses to a Roman World**

John T. Haynes  
Anthropology Department  
Faculty Sponsor: Brian Watkins

This paper is a new evaluation of evidence recently found in Jewish-Galilean sites of the Late Roman period, particularly the excavation being carried out by a multi institutional team led by Jodie Magness of the University of North Carolina at the ancient village of Huqoq. This evidence- primarily drawn from new interpretations of Galilean synagogue art and ancient accounts of Galilean-Jewish daily life-points towards a distinctive form of cultural syncretism between Jewish and Greco-Roman cultures. While syncretism in a conquered region between the local culture and the culture of the conqueror is usually seen as an abandonment of local identity, to be replaced by identities influenced by foreign political and cultural domination, the Jews of the Galilee instead used Greco-Roman culture and symbolism to strengthen their local culture, to emphasize its Jewishness in opposition to the “pagan” religious identity of the Romans, and even to signal their resistance to Roman rule. These seemingly Roman customs and symbols were in fact tools used by the local community to strengthen and adapt their Jewish identity, rather than evidence of some abandonment of Jewish identity in the face of Roman domination. Viewing the Late Roman Galilee as essentially a colonial situation, with many of the hallmarks of later European colonialisms, the paper has the ultimate aim of using post-colonial theory to re-evaluate what was previously considered to be a sign of cultural defeat and domination, as what were in truth symbols of determined anti-colonial resistance and an ability to adapt to a changing world.

## **Iraqi Science Fiction's Response to the Iraq War**

Andrew Futcher  
English Department  
Faculty Sponsor: Alex Garganigo

With the use of Iraq + 100 story collection of ten short stories set 100 years after the American invasion of Iraq in 2003 we hope to discuss the themes that Iraq writers would like to discuss using the medium of science fiction. These themes ranging from colonialism, imperialism and recovery of the past.

## **A Photometric Method for Identifying Binaries**

Emma Page  
Physics Department  
Faculty Sponsor: David Whelan

Our goal is to create a data-driven photometric method for discovering binary companions for O-, B-, and A-type stars. Using all-sky surveys Tycho-2, 2MASS, and WISE, we compare the photometry for a sample of 972 stars of known spectral type to model spectral energy distributions based on Kurucz model atmospheres, identifying those which closely match the models and show no signs of binarity or contamination by dust emission. This sample allows us to compute intrinsic photometric colors as a function of spectral type and luminosity class which are then used as the benchmark for other stars. Unique color excesses for dust emission and binarity are independently identified, and the method is tested by removing the sample color excesses to recover the primary spectral type colors. By combining survey photometry with spectral types, we have a straightforward method for identifying approximate spectral types of binary companion stars.

## **Hattie Caraway: Forgotten Senator of the Great Depression**

Nicholaus Frederick  
History Department  
Faculty Sponsor: Victoria Cummins

Hattie Caraway was the second woman to be nominated into the Senate. Caraway would later win a primary against prominent male politicians in 1932, defying Arkansas party bosses and a powerful governor that appointed her to the seat, and then go on to easily win her first election. Becoming the first woman to serve as an elected senator, Hattie Caraway's legacy has been historically defined through the powerful men present in her life. From her husband, Senator Thaddeus Caraway, to her fellow senator from Arkansas Majority Leader Joseph Robinson, to Huey Long of Louisiana, who historians have long attributed Caraway's "surprising" victory too. Contemporary and historical analysis of Caraway showed her as a senator who rarely spoke to help her constituents. Gender normative voices have long bombarded historical interpretations of Caraway but have failed to examine the role she had to assume, a role of a woman paving the way in a completely male-dominated Senate. Throughout my research, I have examined different qualitative and quantitative sources in order to discover why Hattie Caraway is not as prominent in academic history as other figures.

## **Elizabeth Stuart Phelps, Feminism, and the Social Gospel**

Jillian Vandergrift  
English Department  
Faculty Sponsor: Randi Tanglen

My research focuses on novels by Elizabeth Stuart Phelps (1844-1911), a nineteenth-century spiritualist and reformist author. Though she was widely read in her time, Phelps has been largely forgotten and can now be categorized as a recovered writer. In my close readings of Phelps' work, I emphasize the intersection of her major themes of feminism and social gospel while exploring ideas that emerge from those themes, like questions of audience and white savior characters. The social gospel movement grew out of the late nineteenth-century era of reform. Social gospel practitioners used their Christian values as justification for social reform and attempted to enact that reform through Christian practices. My research is centered around three of Phelps' novels: *The Gates Ajar* (1868), *The Silent Partner* (1871), and *A Singular Life* (1895). In this presentation, I will be discussing one of the novels in question. *The Gates Ajar* and *The Silent Partner* feature female protagonists who have the intelligence and the agency to accomplish their goals in bettering their communities. The publication of *A Singular Life*, however, revealed how Phelps' strong sense of individuality and embrace of feminist ideals had all but vanished, replaced by a more magnified version of the Christianity that guided her since childhood. By tracking the trajectory and exchange of Phelps' feminism and faith, I will draw connections between her historical and personal contexts and the characters in her works.

## **A Proposal for the Student Loan Crisis**

Phoebe Angaye

Economics & Business Administration Department

Faculty Sponsor: Daniel Nuckols

The student loan debt in the US has reached nearly \$1.6 trillion dollars. This debt has negatively impacted students, lenders, and the US economy. By analyzing proposed plans and current federal policies that currently deal with the crisis, my research question asks which existing policies or new policy proposals would be beneficial in helping solve the student loan crisis. It is argued that any student loan program that does not factor-in the true cost of finance, e.g., the loan charges a zero real rate of interest, has the burden of the loan repayment insurance plan falling upon the taxpayer and hence, presents the political challenge of convincing taxpayers to continue to support the subsidization of higher education. The goal of this research is to propose a policy that helps alleviate the student loan crisis by sharing the effective cost between the student and taxpayer in a politically expedient manner.

## **Education of Slavery in Texas High Schools**

Santos Botello

History Department

Faculty Sponsor: Felix Harcourt

The focus of this project is how slavery has been taught in relation to the Civil War in Texas public schools. In particular, the emphasis of this project is the 1960s and examining how slavery was presented in classrooms during this decade. The goal of this research is to evaluate why slavery was taught the way it was and how the different people that had strong influences affected this topic in the state curriculum.

## **Transgenerational Effects of Predatory Stress in Pea Aphids**

Nicole Baker  
Biology Department  
Faculty Sponsor: Loriann Garcia

Predation stress affects the behaviors and distributions of many organisms, as well as their interactions with one another. Non-lethal predator stress can be particularly influential on an organism's behavior across time, as the predator encounter does not result in death. Pea aphids (*Acyrtosiphon pisum*) are known to increase wing morph formation in generations following lethal predator stress to their colony, but behavioral responses to non-lethal stress, such as reduced reproduction and dropping off the plant, have received less attention. Here we seek to better understand pea aphid behaviors following non-lethal predator stress within and across generations. We exposed adult pea aphids to 2 hours of non-lethal predatory stress, induced by a lady beetle (*Hippodamia convergens*) with immobilized mouthparts. After exposure, *A. pisum* reproductive behavior was observed every 12 hours for 48 hours, and the number of offspring produced by stressed and control aphids were tracked. We found that within the first 24 hours, the amount of offspring produced by stressed *A. pisum* was significantly lower than the amount produced by control *A. pisum*. The amount of offspring produced over the second 24 hour period, however, was similar between both groups. The reproductive output between both groups over the total 48 hour time window showed no significant differences. These results indicate that stressed *A. pisum* avoid reproducing in an unsafe environment immediately after predation stress, but this stress response only lasts up to 24 hours. In additional ongoing experiments, we will use parasitoid wasps to induce similar non-lethal stress in *A. pisum* adults, and then investigate behavioral responses to non-lethal stress across subsequent generations. We expect that the offspring of *A. pisum* exposed to non-lethal stressors will exhibit more predator avoidance behaviors to non-lethal stress than control *A. pisum*. These experiments will contribute to our understanding of how reproductive and antipredator behaviors can be modified across generations of genetically identical organisms.

## **New Ways of Seeing**

Anna Forbus  
Anthropology Department  
Faculty Sponsor: Terry Hoops

One of the first senses that humans rely on, even as an infant, is vision and therefore the impact that the medium of visual art has on a person is profound, even if not always imminently perceived. Yet, the art made available to the public in the past has been controlled and dictated by the wealthy and, more specifically, the male gaze. English art critic John Peter Berger's documentary and essay *Ways of Seeing* explores the impact that this monopoly over public art has towards the general population and discusses the internalized perceptions of gender and sex that men and women develop about themselves and others. However, in the almost 50 years since Berger began exploring these ideas, the control over the art community has shifted and society's notions of sex and gender have changed, as well as the publicness of these emerging experiences, making his analysis take on a more heteronormative lens that is not reflective of the changing times. This thesis expands off of Berger's ideas by examining the relationship between the recent emergence of new expressions of gender and sexuality and the shift of representation across varying forms of art, specifically coming from the LGBTQ+ community, and how they build off one another.

## **Forever the Thinker: The International Context of Marx(ism) in the 1840s**

Lois Bronaugh  
History Department  
Faculty Sponsor: Hunt Tooley

Famous for his radical notions of total revolution by workers, Karl Marx contributed heavily to communist theory in the 19th century amidst the rapid industrialization of Central Europe. Yet despite the many years and publications which he dedicated to this subject, the foundation of Marx's ideology was formed in a single transformative decade that encouraged him to think more internationally about the nature and implication of his theory. Specifically, Marx's experiences in and comparisons of each of the four countries where he lived during these years broadened and challenged his initially passive, if still bold, ideas. Perhaps the most notable of these is Marx's introduction to and partnership with Friedrich Engels, with whom he would author the revolutionary Communist Manifesto in 1848. Engel's background, a German economist involved in the textile industry in England, provided the particular context necessary for Marx to apply his dialectic prediction of imminent social and political change on a global scale, thereby setting the stage for the internationalism evoked in his call for revolution in the Manifesto. Although this total turnover never occurred in the 1840s, Marx stuck to the principles which he formed in this time for the rest of his life.

## **Characterization of the 3E mutant of Alpha B Crystalline**

Khanh Nguyen  
Chemistry Department  
Faculty Sponsor: James Hebda

Protein homeostasis is crucial for the proper working of the cell. Misfolded proteins are non-functional and can become toxic, leading to many diseases such as Alzheimer's and cystic fibrosis. Alpha Crystallin is a protein found in the eye lens that acts as a chaperone to prevent misfolding of other proteins. In this way, alpha crystallin helps maintain the proper refractive index and clarity of the eye lens.  $\alpha$ B-crystallin is an isoform of alpha crystallin and is found in many different types of tissue. The mechanism by which  $\alpha$ B-crystallin prevents aggregation is not yet fully understood. In normal conditions,  $\alpha$ B-crystallin is known to form large heterooligomers and exchange subunits extensively. This study investigated the correlation between subunit exchange and chaperone function of a mutant of  $\alpha$ B-crystallin (3E) utilizing fluorescently labeled proteins. The 3E mutant is a model for phosphorylated  $\alpha$ B-crystallin and has shown to have exceptional chaperone efficiency. By using Forster Resonance Energy Transfer (FRET), subunit exchange could be observed between donor and acceptor labeled proteins as a function of time. Previous experiments with wild type  $\alpha$ B-crystallin show a correlation between higher chaperone function and higher oligomer exchange. As such, we hypothesize this mutant will show heightened subunit exchange compared to wild type in all temperatures to be tested (25°C, 37°C, and 45°C) and at different pH conditions (6 and 7).

# Firm Behavior in the Face of Severe Weather: Studying the Effects of Deterministic and Probabilistic Warning Systems

Seth Howard

Economics & Business Administration Department  
Faculty Sponsor: Kevin Simmons

In the face of increasing severe weather, particularly tornadoes, it is necessary to understand how firms process and react to information related to storms. More specifically, research is needed to predict and understand firms' behavior in response to varied storm warning systems. This project responds to the Weather Research and Forecasting Innovation Act of 2017, H.R. 353, which calls for the use of social and behavioral science to study and improve storm warning systems. This study distributed a digital survey experiment to Dallas-metropolitan firms, resulting in a sample of over 170 observations representing a variety of industries. The goal of this project is two-fold: To offer both descriptive and explanatory results concerning firm behavior in the face of severe weather. The former analyzes how severe weather is approached generally by firms, such as how often emergency preparation is talked about, and how much the firm trusts the information they receive about storms. The latter explores how firms react and behave in response to deterministic and probabilistic warning systems. For instance, this study finds that when the probability of a storm affecting a firm reaches around 90%, their behavior reflects that of a deterministic warning. These results are valuable because they can inform more effective storm warning systems, potentially reduce productivity loss, and increase trust in storm-related information.

# Conference Music Recital

Friday, March 20, 4:30 PM  
Craig Recital Hall

**“Un moto di giota” from *Le Nozze di Figaro*, K. 492** W.A. Mozart  
Meghan Reeves, soprano

**“Total Eclipse!” from *Samson*, HWV 57** G.F. Händel  
Austin Rue, tenor

**Du bist die Ruh, D. 776** F. Schubert  
Morgan Hall, soprano

**“Si, tra i ceppi” from *Bernice*, HWV 38** G.F. Händel  
Brian Linares, bass-baritone

## II

**Dusk to Dawn (2019) – Trio for Clarinet, Violin, Cello** P. Matus  
Paola Matus, clarinet      Andrew Kim, violin  
Andrew Dawson, cello

## III

**String Quartet in E-flat Major, K. 160** W.A. Mozart

Allegro  
Un poco adagio  
Presto

### AC Student String Quartet

Andrés Hernández, violin      Andrew Kim, violin  
Zoe Rice, viola      Andrew Dawson, cello

## **Student Art Exhibit**

**Symbioscapes**  
William McCarthy  
Art Department  
Faculty Sponsors: Mark Monroe

We are changed by the natural world we live in, and the natural world is changed by us. There are places in nature -- canyons, forests, mountains, rivers -- that make us who we are, and shape our experiences in ways which are unique and significant to each individual. Some of these places might be a part of a National Park or a National Monument. Others are less protected. All of these places, however, are subject to change. We have the ability to respect or to exploit the natural world. I make the case for respect. Only through establishing a mutualistic and cooperative set of approaches to our environment can we preserve the places we love. In this photo project, "Symbioscapes," (Symbio from the Greek verb συμβιόω "to live together") I combine portraiture, landscape painting and journalism to give a voice and a face to places of significance in the natural world. I will interview individuals who have a special connection to places in nature after painting the place they love onto their face. I will be writing their story down and capturing digital and film photographs of the participants within their chosen places. The resulting photographs of these individuals will show a visual connection of person and place as the painting and landscape align within the composition. The stories that participants share will become a way for these natural sites to merge with the human world. I hope to open doors of introspection in viewers by sharing these stories and displaying the intimate connection between humans and the natural world.

## **A Vibrant Black Family**

Kianna Marrs  
Art Department  
Faculty Sponsors: Mark Monroe

Before diving into the project I was certain how many subjects I wanted, what I wanted the subjects to wear, and the unique look that they needed to possess. Also, I was certain that I wanted Blackness and its essence to be showcased throughout my series with expressive faces and colorful face paint mimicking the varieties of African masks. However, I was unsure what I wanted my theme to be until I was in the middle of photographing. During the photographing process, I ensured that each shot was mildly warm and very dark, but not too dark that the studio lights did not capture the highlight points on their deep skin complexions.

Mid shoot, as I was directing the models' positioning, I noticed that they were emulating a family, a Black family. After having this realization, I ensured that each hand and head tilt was placed strategically in order to relay a message of genuine, yet orderly love. Originally, the photograph that depicts the two women straining each others eyes was just a photograph of me asking them to interact in a strange manner. However, I realized that the interaction between the two women portrayed a mother and daughter relationship. The mother is slightly tilting her head to express concern as the daughter is tilting her head up as the mother speculates her.

My series is an example of a loving Black family, a phenomenon that people still find uncommon or have unfortunately never experienced having themselves. I wish for my audience after viewing this collection to recognize that beauty is also encapsulated through the deepest of skin tones which is difficult to accept and see from most. Most importantly, I want my audience to comprehend that the colorful face paint symbolizes the vibrancy and love that lives within the Black community.

# Theatre

Wynne Chapel

Friday, March 20 at 7:30 pm

Saturday, March 21 at 7:30 pm

Sunday, March 22 at 2:00 pm

## *An A Capella Midsummer Night's Dream*

By Michael Ching and William Shakespeare

### Actors:

Helena: Hannah Barry  
Hermia: Toni Richards  
Lysander: Gwen Vandereveire  
Demetrius: Alex Garcia  
Quince: Abbey Goodman  
Bottom: Erin Bobbitt  
Flute: Chloe Bachofen  
Starveling: Christian Ghermay  
Snout: Kailer Jones  
Snug: Shannon Fagen  
Oberon/ Theseus: Michael Megenhardt  
Titania: Siran Berberian  
Hippolyta: Elizabeth Brentzel  
Egeus: Allie Straeck  
Puck: Zoe Crews

### Chorus:

Bridget Tolle  
Chandler Lee  
Emily McMillan  
Grant Garrison  
Kennedy Lindner  
Logan Shevalier

### Technicians:

Design Coordinator: Kat Forbus  
Stage Manager: Olivia Trusty  
Assistant Stage Managers: Sydney Versen and  
Larry Ramirez Quintana  
House Manager: Scout McComack-Morris

### Tech Crew:

Anika Rajesh Scout McComack-Morris  
Caelie Morris Larry Ramirez Quintana  
D'ara Starks Kiersten Esposito  
Harper Jambor Sydney Versen  
Janet Salazar Sawyer Ahmad  
Logan Taylor Micah Weber

Director: Dr. Kirk Everist  
Vocal Director: Dr. Wayne Crannell  
Voice Synthesizer: Dr. John "13 Fingers" McGinn



## Student Oral Presentations Block II

Saturday, March 21, 2020  
10:00 a.m. - 11:20 a.m.

## **Steal Like a Writer, Speak Like Yourself: Leveraging Artistry and Originality to Support Student Writers**

Moderator: Lisha Storey  
Scarborough writing center

Jillian Vandergrift  
Holly Kapp  
Caroline Ogden  
Leslie Erwin

Four peer writing assistants from the Scarborough Center for Writing will examine writing center pedagogy and scholarship in an effort to better understand Austin College writers and our tutoring practice. Presenters explore the relationship between originality and bricolage in tutor development for a new writing center, investigate the role of voice in students' writing, consider the student perceptions of the writing center and how we can interpret them, and discuss the value of authorship in increasing writers' confidence. Jillian, Holly, Caroline, and Leslie have recently presented their scholarship at the joint conference of the International Writing Centers Association and the National Conference on Peer Tutoring in Writing in Columbus, Ohio. They will share their projects in order to facilitate discussion about the role of the writing center in nurturing the culture of writing at Austin College.

## **Opera A Cappella: An Exploration of the Potential of an Underutilized Theatrical Form**

Hannah Barry  
Theatre Department  
Faculty Sponsor: Kirk Everist

In this paper I investigate the rare occurrence of operas in an a cappella style with specific emphasis on *A Midsummer Night's Dream*, *Opera A Cappella* by Michael Ching. While uncommon in contemporary practice, a cappella opera has a strong basis in the historic tradition of Madrigal comedy. Further experimentation in the art form should be performed due to the strong historical precedence, the potential benefits involved in the actual practice of a cappella opera, and the art form's potential for commercial success.

## **The Search for Exoplanets at the Adams Observatory**

Nadia Hannon, Adonis Martin, Michael Winterrowd  
Physics Department  
Faculty Sponsor: David Baker

Using the Adams Observatory at Austin College, we are attempting to discover exoplanets on behalf of KELT and TESS. We have observed 2 target stars from the Kilodegree Extremely Little Telescope (KELT) database and 3 target stars from the Transiting Exoplanet Survey Satellite (TESS) database. By using the transit method, a dip in intensity from the light emitted by a star indicates that an object passed in front of the star. It can then be determined from the curve whether or not an exoplanet is orbiting the target star. False positives can occur, and we discovered 2 nearby eclipsing binaries. While no new exoplanets have yet been confirmed as a result of this research, one TESS target has been upgraded to a verified planetary candidate."

## **Securing the 19th Amendment Through Paul's Party: The Power Behind the Tactics of The National Woman's Party**

Valery Piachonkina  
History Department  
Faculty Sponsor: Victoria Cummins

For seventy-two years, American women had been gathering, advocating, and protesting in order to earn their right to vote. By the turn of the 20th century, a great number of suffragists started to grow impatient and frustrated with the lack of progress on their right to vote; then along came Alice Paul. Dedicating her determination, intelligence, and resilience for women's suffrage, Paul changed the scene in the early 1900's by founding the National Woman's Party; however, her journey towards achieving women's right to vote was not easy, as activists were often ostracized, beaten, and arrested for demanding any kind of reform. Alice Paul's creation of the National Woman's Party helped secure the nineteenth amendment because of the party's vast political influence on the American public, President Woodrow Wilson, and Congress. The persistent and unconventional campaign strategies of the National Women's Party, heavily involving the use of fervent rhetoric, helped sway public opinion which ultimately catalyzed government action to ratify the nineteenth amendment.

## **The Crux of Concussion Reporting: Sub-Concussive Blows and Player/Coach Relationships**

Mackenzie Bolen

Psychology Department

Faculty Sponsor: Renee Countryman

This study began as a platform for promoting concussion education to athletes. However, there is already rich research supporting that the frequency at which athletes sustain concussions is not due to a lack of concussion awareness. Furthermore, the danger of athletes sustaining repeated head trauma seems to be a lack of knowledge on repeated sub-concussive blows and the athlete's relationship with the athletic staff. The lack of external injury when one sustains a concussion adds an extra layer of difficulty to diagnosing an already elusive injury; which leads to these injuries often going undiagnosed. Athletes who have never been diagnosed with concussions are being diagnosed with CTE postmortem, paralleling the theme of athletes frequently going undiagnosed (Concussion Legacy Foundation, 2019). This lack of diagnosis is most likely due to the 1000s of sub-concussive blows an athlete can sustain in a season, and never know they've sustained an injury (Slobounov, et al., 2017). The purpose of this research is multifaceted; firstly, the study identified the danger of compounded sub-concussive blows and the lack of athlete knowledge on these supposedly minor injuries. Secondly, the athlete-coach relationship plays a crucial role in injury reporting. There is an absolute necessity to change the cultural stigma of not reporting concussions in order to decrease repeated head trauma in athletes, to hopefully prevent the manifestation of lethal neuropathology's.

## **Wright Campus Center 254B**

### **Cyber-security and Deep Learning: Securing Microbiome Classification via Obfuscation**

James Tessmer<sup>1</sup> & Sergio Salinas Monroy<sup>2</sup>

Mathematics and Computer Science Department,  
Austin College<sup>1</sup> & Electrical Engineering and Comput-  
er Science Department, Wichita State University<sup>2</sup>

Faculty Sponsor: Michael Higgs

Deep learning is a powerful tool available for data classification; however, its high computational cost requires many users to offload their classification to the cloud. This method is not without risk as uploading data opens it to attack from a malicious third party or use by a dishonest cloud host. This can be particularly impactful for data used in research as it frequently contains personally identifying or otherwise sensitive information. One solution is to apply differential privacy to uploaded data by obfuscating it. In this project we implement this method by attempting to apply an obfuscation model that has been previously evaluated to a novel shotgun metagenomic classification network named GeNet. A successful implementation would yield a minimal loss of accuracy in classifying DNA sequences while substantially increasing the security of training and classification data. The resulting model is incomplete as the obfuscation network was not successfully applied to GeNet; however, a model of GeNet trained on limited data was created along with a custom PyTorch data-loader to facilitate the application of the obfuscation network.

## **Gender Identity, Drag Culture, and Theatre**

Chloe Schnaible

Theatre Department

Faculty Sponsor: Kirk Everist

In this paper I study some of theatre's most famous characters and their relationship to modern day gender identity and drag culture. At the time of writing many of these characters, our understanding of gender identity, gender expression, and drag culture were not as advanced or popular as they are today. Today's theatre is considered a space to break rules but also a very progressive and welcoming space, so how does this relate to our understanding of gender roles and queer expression? If some of these playwrights were still around today, how would they define the identity of the characters they created? Are drag characters in theatre celebrating or hurting the culture associated with them? I tackle these questions and more as I look common drag and transgender characters such as Peter Pan from Peter Pan, Angel from Rent, Hedwig from Hedwig and The Angry Inch, and more. I aim to analyze these characters and plays from a modern perspective as a professional thespian and queer person. From Shakespeare, to Vaudeville, to modern day theatre, I want to tackle the role gender has always had when it came to theatre and performance art, and give my audience the tools they need to understand, enjoy, and celebrate these characters.

## **Examination of Novel Platinum Compounds as Possible Anti-cancer Therapeutics**

Brian Nguyen

Biology Department

Faculty Sponsor: Lance Barton

Cancer is the second leading cause of death worldwide. Typical treatments have revolved around radiation therapy or chemotherapy. Regarding the latter, several platinum-based compounds have been developed as chemotherapeutic agents, the most well-known being cisplatin, which was originally used to reduce proliferation in bacteria before being used as a chemotherapeutic in the 1980s (Rosenberg 1984). Cisplatin is one of the most widely used anti-cancer therapeutics to date due to its efficacy. While effective, cisplatin also has severe cytotoxicity to patients and when used cancer cells can show resistance to cisplatin (Basu and Krishnamurthy 2010). Alternatives to cisplatin, such as oxaloplatin, carboplatin, and tetraplatin, have been created, there is still severe cytotoxic effects to patients (Rixe et al. 1996). The Austin College Chemistry department has synthesized new cisplatin related compounds, BIM, RUM, and RUB. This project examines their efficacy in mammary cancer. Preliminary results indicate that the 4TI cells appear to have lower viability when treated with RUM and RUB.

## A Basic Solution

Oliwier Owczarek  
Economics Department  
Faculty Sponsor: Mikidadu Mohammed

The purpose of this research is to analyze the effects of a Universal Basic Income (or UBI) on willingness to work and macroeconomic performance in the United States. To analyze the effects a UBI will have on individuals' willingness to work, a survey was conducted to examine the important determinants of reservation wages. For the impact of UBI on U.S. macroeconomy, a structural vector autoregression model was utilized. At the micro level, the study finds that following a \$12,000 UBI-related increase in annual income, reservation wages of workers rise, resulting in a statistically significant decrease in willingness to work. At the macro level, an increase in overall government welfare (UBI) spending causes a statistically significant increase in unemployment and inflation, and a statistically insignificant decrease in real GDP. Altogether, the results suggest that UBI may not have any expansionary or recessionary effects, and while changes in unemployment and inflation are significant, they do not reach the destructive levels many critics claim.

## A Newly Discovered Genetic Disorder Associated with Life-Threatening Aortic Disease in a 6-Year-Old Boy

Madison Bolin  
Chemistry Department  
Faculty Sponsor: Ryan Felix

**Background:** A young patient presented to our center with several aortic pathologies that required serial surgical interventions. He was ultimately found to have a genetic variant that may explain his recurrent disease. **Methods:** We performed a retrospective review of this patient's medical records at our institution. Genetic testing was performed at another center. **Results:** A 6-year-old male was referred for evaluation of an incidentally discovered ascending aortic aneurysm in 2005. The patient did not manifest signs or symptoms of connective tissue disorder, autoimmune disease, or constitutional illness on examination, and the patient had no family history of aortic disease. Computed tomography angiography confirmed a 4.7 cm aneurysm, for which the cardiothoracic team successfully performed aortic root and ascending aortic replacement with a mechanical valve conduit (Bentall procedure). Six years later, in 2011, the patient returned with atypical chest pain and was found to have an acute type B dissection that required an emergent open replacement of his descending thoracic aorta. He subsequently required an open thoracoabdominal aortic repair with Dacron graft in 2013 for continued dilatation and increasing low back pain. The patient was closely followed postoperatively, and in 2014 an aortic arch aneurysm with right brachiocephalic artery involvement was revealed. He then underwent total arch replacement with debranching. Genetic testing for COL3A1 (Ehlers-Danlos), TGFBR1, TGFBR2 (Loeys-Dietz), ACTA2 (Familial Thoracic Aortic Aneurysm and Dissection) and SMAD3 (Loeys-Dietz and Familial Thoracic Aortic Aneurysm and Dissection) was negative. The patient was referred for further investigation with whole exome sequencing and gene matching at a specialized institute. The patient was found to have a rare variant of ARIHI gene similar to a known genetic variant in fruit flies that leads to abnormal clustering of their skeletal muscle nuclei. Loss of ARIHI in aortic smooth muscle cells affects mechanosensing, weakening the aortic wall muscles to induce aneurysms (1). The patient's aortic tissue samples underwent pathological analysis which confirmed abnormally shaped nuclei in the aortic smooth muscle. Figure 1 shows the serial follow-up computed tomography angiography and magnetic resonance angiography. **Conclusion:** This patient's mutation in his ARIHI gene may be the cause of his life-threatening aortic disease that has been successfully managed at our institution. The patient is currently alive and attending college, with minimal limitations related only to his need for oral anticoagulation. Since the long-term prognosis of his remaining arterial

## **From Norway to Moldova: the Inner Workings of Happiness**

Prithvi Kalkunte

Economics and Business Administration Department

Faculty Sponsor: Kevin Simmons

This project stems from a single question: what makes people happy? Utilizing data from the World Bank and the World Happiness Index, this project explores the indicators that contribute to a country's self-reported subjective well-being, or happiness. Specifically, this seeks to go past commonly used indicators (GDP and Life Expectancy) to find significant, alternative indicators. Based on prior literature, this project considers air pollution, population density, and percentage of urban population. We test our hypothesis with a multivariate linear regression model, the dependent variable being happiness ranking. Ultimately, our research shows that our air pollution, population density, and urban population are significant in predicting happiness ranking, and our results suggest we may be able to affirm and extend our prior literature to this larger scale of 139 countries.

## **Theatrical Makeup for African American Actors**

Rachel Bowman

Theatre Department

Faculty Sponsor: Kirk Everist

For my abstract, I would like to speak out for the African American actors, whether they are in high school or starting college, who are having a hard time finding the appropriate theatrical makeup based on their skin tones, ranging from light-brown to tan, to dark. I had the experience where the makeup crew of my old high school's drama department was unable to find the right shade of foundation that would blend in well with my yellowish-brown complexion. I believe that our school's drama department should include theatrical makeup for the African American students who are participating in numerous theatre productions.

## **The Literary Works of Santiago Ramon y Cajal Under a Microscope**

Shelby Bagby

Classical and Modern Languages Department,  
Spanish Studies

Faculty Sponsor: Patrick Duffey

Santiago Ramón y Cajal, a Nobel Prize winning neuroscientist from Spain in the 1800s contributed a vast majority of neuroscience knowledge, still valid to scientists today. In addition to his scientific contributions, Cajal wrote many short stories, many of which reveal his wishes for a regeneration of Spain, one that would share the political spotlight with science, instead of exclusively focusing on religion. This work responds to the critical analyses of the short story, “Casa Maldita,” published in Cuentos de Vacaciones, or Vacation Stories, a set of short stories that represent some of the most popular literary work written by Cajal. “Casa Maldita” shows us that Cajal, as a member of la generación del 98, is saddened by Spain’s loss of territories but remains optimistic as Spain makes the transition to become a developed country. Through symbolism and religious undertones, Cajal shares his goals for Spain through the protagonist’s viewpoint. I will also provide a response to the arguments put forth by literary experts of Cajal’s work, including Laura Otis and Ryan Davis, among others.

## **Honors Student Panel**

**Wynne Chapel**

**Saturday, March 21, 2020**

**11:30 a.m. - 12:30 p.m.**

Lois Bronaugh (History)

Seth Howard (Economics)

Naeun Kim (East Asian Studies)

Natalie Randall (Mathematics)

Moderator: President Steven O’Day

## Student Oral Presentations Block III

**Saturday, March 21, 2020**  
**1:00 p.m. - 2:20 p.m.**



## Literary Decadence in Modern East Asia

Moderator: Scott Langton  
East Asian Studies

This panel examines themes explored in specific cultural products from East Asia's modern era (late 19th to late 20th centuries), including the tension between modernization and traditional values, imperialism, total war, and socialist revolution. The panelists' presentations are informed by their research for the Spring 2019 iteration "East Asia in the Modern Era" (EAS130). Presenters are: Allen Mankin (The Human Impact of Modernization on China through Contemporary Fiction); Caroline Ogden (To Move Forward: Modernization in Lu Xun's "Diary of a Madman" and "Medicine"); Kathy Tran (Meiji Era Transition Represented in KOKORO & "The Dancing Girl"); Ethan Jordan (Depictions of War & Violence in Classic Animated Japanese Films)

## **Gender and Class in Decadent East Asian Literature**

Phung Banh

This paper examines themes of gender and class relations as explored in specific short stories by two of East Asia's most decadent 20th century writers, Zhang Ailing and Tanizaki Jun'ichiro. Specifically, it analyzes Zhang's portrayal of the relative agency of upper-class women in 1940s Shanghai in "Red Rose, White Rose" (1944), and Tanizaki's portrayal of classism and corruption in an elite university prep school in Tokyo in "The Thief" (1921). Zhang's story portrays two very different women and how they impact the male protagonist's life. One is his "red rose," who is unconventional, passionate, and high-spirited; the other is his "white rose," who is pure, unsophisticated, and compliant. Tanizaki's story portrays the anxiety of a lower-class student who is suspected by his wealthy roommates of the multiple incidents of theft that have happened in the dormitory. Despite the decadent techniques employed unreliable narrators, sensual imagery, psychological torment these stories rise above mere "art for art's sake" to offer sharp social commentary.

## **Decadence in East Asia: Doubt in Human Goodness, Misanthropy**

Haeun Kim

Akutagawa, one of the very prominent figures of the era of decadence in East Asian literature, is well-known for his misanthropic attitude in his stories. He often uses characters that are driven by their very basic desires, such as hunger, thirst, and libido, criticizing how human beings can be repulsive and ugly. Yet, his attitude towards humanity and doubt in human goodness are unveiled in a unique way in "The Martyr." Through introducing an innocent young boy named Lorenzo, he introduces a pure symbol of piety that accentuates the wickedness of humankind. He contrasts Lorenzo with everyone else around him, emphasizing his misanthropia and challenging the audience's trust in people. The paper will compare Lorenzo to the most significant religious and historical figure, Jesus Christ, tightly examining the symbolism and characteristics of decadent writing.

## **Akutagawa Ryunosuke: Exploring His Works Through the Lens of His Spirituality**

Bridget Tolle

I will analyze the ways Japanese decadent writer Akutagawa Ryūnosuke wrote about Christianity and explore his personal beliefs and understanding, focusing on his stories of “The Martyr” and “The Christ of Nanking.” Akutagawa wrote many stories involving different spiritual beliefs, and these are two of his stories on Christianity. Although he read about different beliefs voraciously, it is likely that he did not believe any of them despite his desperate need and desire because of his life-long mental instability. I will approach the close-readings of these short stories with a greater knowledge of Akutagawa’s spiritual life and his relations with Christianity. Understanding who Akutagawa was and the struggles he faced give greater insight into his psychological writing.

## **Aestheticism through Characterization in Twentieth Century East Asian Literature**

Caroline Ogden

This presentation examines aestheticism in short stories from East Asian authors Junichiro Tanizaki (“The Tattooer”), Ryunosuke Akutagawa (“The Nose”), and Eileen Chang (“Red Rose, White Rose”). Particularly focusing on the use of characterization and imagery, I examine how each author’s text feeds into the greater category of East Asian literary decadence, tracing shared themes of the role of the New Woman, modernization, and the pursuit of the beautiful. I further extend the literary analysis by contextualizing the social movements pertinent in Japan and China during the early twentieth century setting all of the texts were written in.

## **“Monsters, Marvels, the New World: 16th -Century French Encounters with Extraordinary”**

Classical and Modern Languages Department,  
French Studies

Moderator: Stacey Battis

This is a panel showcasing the research projects developed by French 353 students in Fall 2019. Each student discusses a different aspect of how 16th-century French writers engaged with French Others - the Ottoman Empire, the Jewish population, and New World cannibals. The European imaginary in the medieval and early modern periods engages with a discourse of the monstrous and the marvelous in its descriptions of unicorns, two-headed beasts, and werewolves; they are signs, miracles, and portents. How is this imaginary applied to human Others? How does the European perspective negotiate with alterity? To what extent is the Other used as merely a mirror for Europe to confront itself?

## **Narrative Style in Early-Modern Travel Writings: Evliya Çelebi and André Thevet**

Tawfeeq Shaik

In the early modern period, there were almost always clear motives for travel writing, with such accounts often being carefully engineered to support the beliefs and goals of the royal courts hiring the explorers, turned travel writers. In the case of André Thevet, a French explorer, the motive was clear: describe the Brazilian natives as barbaric animals who needed to be saved by the “civilizing light” of France so as to justify French colonization of the area. Given the ubiquity of this narrative engineering in European travel writing during the Renaissance, I expected to find a similar pattern in Ottoman travel writing as the Empire was a colonizing force, much like Europe, at the time. This was not at all the case. The travel writings of Evliya Çelebi, a prominent Ottoman explorer, are arranged as haphazard, personal accounts in his *Seyahatnameh* that inconsistently judged foreign places and people. There wasn't a clear “point” that Çelebi was trying to argue about the Other like Thevet was. Rather, there was a deep emphasis on the emotional experience of encountering the Other, whether it be an experience of fascination or horror. It is this freely emotional narrative style in Evliya Çelebi's *Seyahatnameh* that I've analyzed in this project in comparison with André Thevet's pointed narrative style in *Les Singularitez de Brésil* in order to form a firmer understanding of travel writing across the East-West divide.

## **The Meat of the Issue: Cannibalism in 16th Century France**

Abbey Frank

In this paper I examine the role of cannibalism as a discursive tool in 16th-century French writing. Did the French parallel the Spanish, who used cannibalism to excuse the colonization of indigenous people? I argue that, no, the French had a unique use of cannibalism as a mirror to their society because their discourse of cannibalism was informed by the events of the religious wars. This is done using the texts of Jean de Léry and Michel de Montaigne, two authors divided by religion, politics, and experience, in order to deliver a more comprehensive look at French thought. Looking at these texts provides evidence that the French were different than their Spanish contemporaries in that the French found the cannibals of Brazil to be similar, or even better than, their own society and used that similarity to direct horror at the events of the religious wars.

## **Unexplainable Otherness: Jews in the 16th century**

Michaela Davis

In this paper, I investigate French Renaissance literature of two types: one that creates empathy for the monstrous Other and one that flatly refuses to extend that empathy to a particular Other. While Michel de Montaigne and Ambrose Paré, in discourses about monsters that were typical about monsters of the time, exhibit an almost incredible amount of compassion for monsters, I argue that none of that empathy extends to the Jewish population of Europe. I first demonstrate the lengths to which Montaigne and Paré go to humanize monsters before turning to discourses about European Jews. I take Pierre Boaistuau as a representative example of the European against Jews. I introduce a legend, created by Christians, called “The Wandering Jew”; this legend illustrates the dehumanization that was given of the Jews. My investigation of these French Renaissance discourses of the Other- the humanization of the monster and the dehumanization of the Jew-reveals the inherent limitations of Christian charity. This investigation of the French Renaissance for the Other refuses to add any remorse for the Jews, there is little to no evidence on the Jews classification other than the idea of the Other. Such an analysis affects the Jews during the Renaissance and the writers who wrote about the characters. The relationship between monsters and Jews are completely developed through the writers which created the idea of the Other.

## **Montaigne and New World Cannibalism**

Zoe Garrett

Montaigne has two essays where he discusses cannibalism practices in the New World, which he views through his experiences of civil war in France. In these two essays, Montaigne shows the native peoples of the Americas through the lens of the noble savage, glorifying their blissful ignorance of their own monstrosity. He also critiques the savage brutality of the Europeans as they go in and colonize the native populations. I found that these two essays demonstrate how his opinions on the natives developed and changed, as well as how he viewed war within his own country through his critiques of the militaristic nature of French dealings with the natives. I argue that Montaigne's views on cannibals are inextricably intertwined with his views on war, therefore an assessment of Montaigne's writings on Brazilian cannibalism would be incomplete without his experiences of war.

## **Flash Fiction**

**Taqwa Armstrong, Nicholas Chaviers,  
Siran Berberian, and Stephen Tenney**

Faculty Sponsor: Meg Brandl  
English Department

Flash fiction, a hybrid genre of creative writing, takes cues from both fiction and poetry, inviting writers to be deliberate and playful with their words and spanning subject matter from the realistic to the speculative and absurd. But how does flash work? What challenges and features are unique to flash? How can flash be used to build longer stories? And is there something about the genre's brevity that makes it better-suited to our current on-the-go culture and attention spans? This panel of students from the Fall 2019 Fiction Writing course will give original readings of their own works of flash fiction and reflect on their understanding of and strategies for writing flash.

## **Student Oral Presentations Block IV**

**Saturday, March 21, 2020**

**2:30 p.m. - 3:50 p.m.**



## **Coffee and Café Culture in Vienna and Paris - An Ethnographic Project Analyzing the Socio-Cultural Significance of Coffee**

Moderators: Wolfgang Lueckel & Colin Foss  
Classical and Modern Languages Department

Esmeralda Alejo  
Hallie Dickerson  
Kaylan Guvernator  
Charales McIntyre  
Sarah Haper

This presentation will be based on a personal ethnographic project in Vienna and Paris done during a 2020 January Term. Students do field research on how the production, distribution and consumption of the beverage manifest themselves in Austrian and French culture, both from a historical as well as a contemporary perspective. Students will draw and present meaningful conclusions based on their research on site, including interviews, investigation of archives and museums as well as photographic material they collect or produce themselves.

## Making the Middle Ages Matter

Moderator: Tom Blake  
English Department

This presentation will be based on a personal ethnographic project in Vienna and Paris done during a 2020 January Term. Students do field research on how the production, distribution and consumption of the beverage manifest themselves in Austrian and French culture, both from a historical as well as a contemporary perspective. Students will draw and present meaningful conclusions based on their research on site, including interviews, investigation of archives and museums as well as photographic material they collect or produce themselves.

## Picturing the Middle Ages

Rachel Young

Responding to the widespread dissemination of misinformation concerning the Middle Ages, my experimental paper devises a media strategy to combat certain modern conceptions about the period and their replication in our contemporary discourses. Meant to be circulated on college campuses the three fliers designed and contextualized within this paper, each contain images juxtaposed with quotes from various travel narratives and present-day speakers, alike which together destabilize these misconceptions. The first entitled, "This Isn't a New Tactic," tackles the romanization of Christian crusaders and knights by highlighting the similarities between the animalizing rhetoric they employed to describe their enemies to that implemented by Nazi Propagandists, and presently Trump. This is visualized through a tripartite flyer depicting a knight, Hitler, and Trump mirroring one another in their aggressive pointing poses, beside their respective quotes. The second, "Modist Fashion A Continuum," utilizes a photoshoot from the Nigerian based fashion house *Modist* overlaid with a quote from Ibn Jubayr to undermine the ahistorical notion that Islamic women are the only women to project their religious doctrine through the medium of clothing and thus, disrupt the implementation of this fallacy to rationalize Islamophobia. Finally, the third, "Distracted Ibn Jubayr," playfully employs the distracted boyfriend meme to subvert the conversion through seduction trope that's become near synonymous with Orientalism and the exoticized east. Together, these three flyers begin to chip away at but a fraction of the misconceptions the public holds, but it's a start. As scholars of the Middle Ages, it's our great duty to hold the line. And so, as I conclude my paper, I urge each of you to similarly begin chipping away.

## **Medieval Travel Narratives and Modern White Supremacy**

Abby Ross

In modern society, we find issues like destruction of religious structures, racism, and forced labor unfortunately common due to prominent hatred within the media and with political figures not disenfranchising such hatred or discrimination. This paper proposes a series of posters to combat these attitudes with modern images and medieval quotes from sources like the travel narratives of Ibn Jubayr and Sir John Mandeville which disrupt a white version of the Middle Ages and disrupt appropriation of the medieval for white supremacist and Islamophobic purposes.

## **Medieval History in an Age of White Supremacy**

Jack Lockhart

In an era in which medieval iconography and phraseology are commonly appropriated as cryptographic weapons by the far-right, medieval scholars are tasked with combating harmful public perceptions of medieval history and culture. More specifically, this means dismantling the attitudes of Eurocentrism and exclusionary time. This paper looks at the travels of John Mandeville as a Eurocentric and racist source that could be used to embolden white supremacists but then refutes this cherry-picking of sources by providing a counterpoint in the travels of Abbasid Muslim emissary Ibn Jubayr, who encountered and wrote about the Vikings during his trip up the Volga river.

## **Using Medieval Travel Narratives to Combat White Supremacist Narratives**

Caroline Ogden

This paper proposes a series of posters to combat the appropriation of the Middle Ages for white supremacist purposes. Focusing on the white supremacist championed statue of Viking Thorfinn Karlsefni, Victorian portrayals of medieval women as helpless white damsels in distress, and the framing of the East as backwards and dangerous, I incorporate quotes from medieval travel narratives which show instead a world populated by Vikings who traded and interacted with Muslims of the Abbasid caliphate, strong women of color like the Mongolian warrior princess Ayaruk, and ornate medieval Islamic maps that charted global trade routes.

## **Modernization and Upheaval in East Asia**

Moderator: Scott Langton

East Asian Studies

This panel examines themes explored in specific cultural products from East Asia's modern era (late 19th to late 20th centuries), including the tension between modernization and traditional values, imperialism, total war, and socialist revolution. The panelists' presentations are informed by their research for the Spring 2019 iteration "East Asia in the Modern Era" (EASI30). Presenters are: Allen Mankin (The Human Impact of Modernization on China through Contemporary Fiction); Caroline Ogden (To Move Forward: Modernization in Lu Xun's "Diary of a Madman" and "Medicine"); Kathy Tran (Meiji Era Transition Represented in KOKORO & "The Dancing Girl"); Ethan Jordan (Depictions of War & Violence in Classic Animated Japanese Films)

## **To Move Forward: Modernization in Lu Xun's "Diary of a Madman" and "Medicine"**

Caroline Ogden

In this paper, I examine how Chinese author Lu Xun uses metaphor in his literature, particularly the short stories "Diary of a Madman" and "Medicine," to spur his twentieth century compatriots to modernize in an increasingly global age. Particularly focusing on the use of cannibalistic fable in each story, I explore how Lu Xun views traditional Chinese social and medicinal practices as detrimental to the nation's security and instead places his hopes for the nation in Western and Communist methodologies, turning to literature to vocalize his concerns. Utilizing close-reading and historical context, I use the texts to illustrate the early-twentieth century conflict between westernization and traditionalism present in the major East Asian countries, particularly China, and the particular nuances that complicate the issue.

## **The Human Impact of Modernization in China through Contemporary Fiction**

Allen Mankin

In "Ah-Q: the Real Story" by Lu Xun, the titular character serves as a metaphor for the helplessness of the Chinese nation and its citizenry in the face of modern issues such as imperialist aggression and internal discord. Likewise, the movie "To Live" by Zhang Yimou deals with the helplessness of individuals caught in the wake the Communist revolution and its aftermath: the Great Leap Forward. These stories examine the suffering of ordinary people faced with rapid societal changes they cannot even comprehend, must less steer. Though Lu Xun and Zhang Yimou come from different periods in time, the pain of the nation is their shared subject.

In this paper, I discuss how these two works converge in their depiction of helplessness and how they portray and contextualize suffering, while acknowledging how they differ. Lu Xun's time period influences his work, as it is a temporal reflection upon a China that seems powerless against external and internal pressures while assuring itself of its continued prominence. Zhang Yimou has the benefit of hindsight but nevertheless offers a somewhat pessimistic retrospective, exploring how efforts to alleviate the problems that plagued Lu Xun's time created misery of their own—from the killing fields of the Communist revolution to the strain caused by the Great Leap Forward.

## **The Meiji Era Transition Represented in Kokoro and “The Dancing Girl”**

Kathy Tran

During the period of the Meiji Restoration, Japan was led on a path of modernization. As the people of Japan find themselves in the midst of these changing times, two prominent authors, Mori Ogai and Natsume Soseki, emerge with the popular works “The Dancing Girl” and Kokoro, which both express the turmoil between the traditional oriental culture of Japan and the permeating influence of western cultures. Similarly, both authors exemplify the elements of western conventions, such as realism and romanticism, in Meiji literature. This paper examines how the dichotomy between the city and country settings in Kokoro and the symbolism of the characters in “The Dancing Girl” illuminates the conflict between modern individualistic and traditional collectivist cultural values. In Kokoro, Natsume Soseki presents the contrasting urban and rural settings to underscore the effect of higher education and industrialization on Japanese society. On the other hand, in “The Dancing Girl”, Mori Ogai utilizes the role the characters play in the society to represent the duty to one’s nation versus individualistic freedom.

## **Depictions of War and Violence in Classic Japanese Animated Films**

Ethan Jordan

In this paper, I compare the narratives, characters, themes, and depictions of war and violence in the films, "Momotaro's Divine Sea Warriors," and "Grave of the Fireflies" to better understand the impact of World War 2 on the nation of Japan, and the perspectives surrounding the events of that war.

## **The Craft of Creativity Panel - Suspension**

Moderator: Meg Brandl  
English Department

Suspension Literary Magazine Creative writing invites an individual's expression of one's identity, beliefs, and perspective of the world. A college literary magazine allows young writers to express their voices. This expression can go on to build resumes and reputations. Suspension Literary Magazine publishes the creative works of the students of Austin College such as poetry, short stories, and artwork. The campus literary magazine presents a panel called: The Craft of Creative Writing. This panel will address the creative process when writing an original piece of work. The editors and staff of Suspension will walk through their own original pieces of creative literature, both poetry and prose. The presentation of each piece will open the discussion of how writers combine creative ingenuity with the craft of writing to create their work. The audience will be invited into the creative process by starting their own piece of writing based on the strategies presented by the panel. This provides an opportunity for writers to get an inside view into what goes on in the process of creative literature, starting with their campus literary magazine.

## ***Finding Words: Malayalam - A Cultural Expression Through Poetic Elements***

Sonia Charales

My poem, *Finding Words: Malayalam*, explores the struggles of being bilingual and searching for an identity in the midst of two cultures. As the title implies, finding words that truly express oneself can be rather difficult, especially when those words may have no meaning to others. A page of words can make a reader feel lost when the words are in a different language. Readers may find it difficult to grasp onto the Malayalam words, just as people struggle to grasp onto English. The poem is written in two languages, which are English and Malayalam. The piece takes inspiration from layers of moments from my linguistic development, which goes as far back as elementary school and continues through my college days. These moments go on to explain decisions made for the poem and the story behind its creation. An exploration of translation and cultural significance will be embarked on through poetic elements and personal experiences.

## The Pale Protector

Caelie Morris

One of the essential parts of the craft of literature is drawing upon emotion. William Faulkner described himself as a failed poet, doomed to write prose. As a prose artist myself, I strive to work against that genre expectation of poetry as the only form of pure emotion in writing artistry. In my piece “The Pale Protector”, I drew upon my personal experiences with religion and revolution in order to spark the same desire for change in my audience. By referring to the Western canon and working with Biblical allusions, I used the emotions associated with those archetypes to strengthen the characters rapidly in a short piece of prose. Many of the pieces we choose as members of Suspension rely on this deeply entrenched sense of emotion. However, the struggle we have when confronted with art is to find out why it evokes those emotions. A good editor will seek the craft behind the creativity, delving into the heart of a piece’s structure, literary elements, and much more in order to find out what makes it so powerful.

## In Between the Sheets

Haydee Fuentes

I created in *In Between the Sheets* back in high school, the origin of all teenage angst. Being considered a gifted student, I was under a lot of pressure to finish off high school still following the protocols of the high school education system, I rarely had something stable in my life. Financial woes, choosing a college, paying for it, making sure my friends were fine, passing the final exams that could grant me college credit. Personally, the last thing I needed was frivolous—to me anyway—worries like whether I’d go to prom (and buy the dress, and find company), or a graduation party that would just add to the *really* life-altering ones. Besides, during one of those busy nights where I juggled homework, scholarships and my newly-introduced-to-the-Teletubbies brother, I took some time to sink into my music. As my brother added chaos to my nightstand by rearranging my trinkets and lotions with his imagination, I decided to go into one of my hobbies and do some self-reflection. My life was fixing to change in a matter of months, and aside from my family, did I actually have something else more solid than the Titanic iceberg afloat in my life? It was one of those moments where you went “Uh, sure.” It’d been a year since I began questioning my sexuality and finally had an answer as to how much it affected my life. With my music having a heavily emotional ambiance, well, if you knew the brain of a writer, you know it only took a handful of seconds for chaotic creativity to ensue. I worked on the poem a couple of words a day, burying myself into it when school was more overbearing than a waiter’s checkups while my mouth was full. And as I also had private conversations with myself regarding whether Emily Blunt or John Krasinski was the better-looking person (there is no one right answer here), the more comfortable I became with myself as a person, but also with my writing. I published it online with a small synopsis and had some understanding comments. Even though it is private and I haven’t officially stated anything to many people, I always look over the poem and the comments just as a sense of hope for myself and as a reminder that despite the craziness of college and the journey of self-discovery I’m going to undergo, at least I have a slice of my identity pretty figured out.

## A Secret You Take to the Grave

Jillian Vandergrift

As part of our panel, I will be presenting my short story “A Secret You Take to the Grave,” which was published in the 2018-2019 edition of *Suspension*. The story centers around teenager Sam, whose grandmother recently passed away. Sam wasn’t very close to her grandmother, but she’s feeling a lack of closure about her death because of her mysterious final words alluding to some unknown secret. With her best friend, Avery, Sam hunts through her grandmother’s old diaries and they try to discover what it is that was so special to her Gram. I will share passages from the draft I brought to my creative writing workshop course and then identify how those passages changed during my revision process. Using feedback from my classmates, I can offer a window into how workshops function. In comparing the original draft and final, published copy of my story, I will track what kinds of changes were made and explore how I came to those decisions. I will also discuss how this story led me to recognize nostalgia and grief as major themes in my writing, and thus evaluate what my motivations are in my writing.

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- 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.
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